

This Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. The final funding available to support the plan outlined here is pending final FY 2017 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



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U.S. PRESIDENT'S MALARIA INITIATIVE



PRESIDENT'S MALARIA INITIATIVE

SIERRA LEONE

Malaria Operational Plan FY 2017

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ABBREVIATIONS and ACRONYMS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
CDC	U.S. Centers for Disease Control and Prevention
CHW	Community health worker
CRS	Catholic Relief Service
DDMS	Directorate of Drugs and Medical Supplies
DFID	U.K. Department for International Development
DHAPQ	Dihydroartemisinin-piperaquine
DHIS2	District health information system-2
DHMT	District health management team
DHS	Demographic and Health Survey
DMO	District medical officer
DPPI	Department of Policy, Planning, and Information
EPI	Expanded program on immunization
EVD	Ebola virus disease
FANC	Focused antenatal care
FELTP	Field Epidemiology and Laboratory Training Program
FY	Fiscal year
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GoSL	Government of Sierra Leone
HFS	Health Facility Survey
HMIS	Health management information system
HSS	Health systems strengthening
iCCM	Integrated community case management
IPTi	Intermittent preventive treatment for infants
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LMIS	Logistics management information system
MCH	Maternal and child health
MDA	Mass drug administration
MICS	Multiple Indicator Cluster Survey
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MoHS	Ministry of Health and Sanitation
MOP	Malaria Operational Plan
NHSRP	National Health Sector Recovery Plan
NMCP	National Malaria Control Program
NMSP	National Malaria Strategic Plan
NPPU	National Pharmaceutical Procurement Unit
PBSL	Pharmacy Board of Sierra Leone

PHU	Peripheral health unit
PMI	President's Malaria Initiative
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SBCC	Social and behavior change communication
SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine-pyrimethamine
TBA	Traditional birth attendant
TES	Therapeutic efficacy study
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

I. EXECUTIVE SUMMARY

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

Sierra Leone was selected as a PMI focus country in FY 2017.

This first FY 2017 Malaria Operational Plan (MOP) presents a detailed implementation plan for Sierra Leone, 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 align with the National Malaria Control strategy and plan and build on prior investments by 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 Sierra Leone, describes progress to date, identifies challenges and unmet needs to achieving the targets of the NMCP and PMI, and provides a description of activities that are planned with FY 2017 funding.

The proposed FY 2017 PMI budget for Sierra Leone is \$15 million. PMI will support the following intervention areas with these funds:

Entomologic monitoring and insecticide resistance management: Key pillars within NMCP's vector control strategy are to strengthen capacity in entomology surveillance, to conduct insecticide resistance monitoring, and to evaluate vector behavior. In order to achieve maximum impact, PMI will help to

equip the NMCP, partners, and districts with the knowledge and skills to implement an informed and evidence-led vector control program. With FY 2017 funding, PMI will assist the NMCP in building entomological capacity by establishing sentinel entomologic and insecticide resistance monitoring sites and establishing an insectary. In addition, PMI will support two technical assistance visits from the U.S. Centers for Disease Control and Prevention staff to assist with training and monitor planning and implementation of vector control activities.

Insecticide-treated nets (ITNs): The NMCP supports universal access to free long-lasting ITNs for all households primarily through mass campaigns conducted every three years and reinforced through routine distribution channels (i.e. at the first antenatal care (ANC) visit to pregnant women and to fully immunized children). The NMCP has conducted three rounds of mass ITN distribution campaigns (2006, 2010, and 2014) and plans to conduct a fourth campaign in June 2017. The Global Fund and DFID will provide over 4 million ITNs needed for the 2017 universal mass campaign. Preliminary results from the 2016 Malaria Indicator Survey (MIS) show that overall ITN-access appears to be low but ITN-use appears to be high in households with at least one ITN. With FY 2017 funding, PMI will procure approximately 675,000 ITNs to contribute to the annual net need in 2018 for the routine distribution channels (ANC and expanded program on immunization, or EPI). Based on findings from a Global Fund-supported social and behavioral change communication (SBCC) assessment and barrier analysis in 2017, PMI will also support strengthening of SBCC for ITNs.

Indoor residual spraying (IRS): The NMCP's IRS strategy is evidence-based and is a part of their integrated vector management strategy. The NMCP has carried out a pilot IRS study in 2010-12 in four districts. The goal of the pilot was to assess the feasibility and community acceptability and to generate the evidence required for the scale up of IRS. However, due to lack of resources, no additional IRS activity has taken place. With FY 2017 funding, PMI will build NMCP's IRS capacity and support entomological surveillance to gather evidence for future spray operations in two high burden districts in 2019. PMI will also advocate for Sierra Leone to be included in the UNITAID NgenIRS Project which will reduce the cost of insecticides and allow the expansion of the number of districts covered from two to four. PMI will prepare for one spray cycle in 2019 by procuring insecticides and supplies for two districts (protecting approximately 1.2 million people) with FY 2017 funds. Contingent upon the availability of funding, training, and other implementation expenses would be budgeted for with FY 2018 MOP funds.

Malaria in pregnancy (MIP): The NMCP supports the WHO multi-pronged approach toward MIP with the provision and use of an ITN during pregnancy, intermittent preventive treatment during pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP), and prompt and effective case management of malaria and anemia. The NMCP adopted the 2012 WHO policy recommendations which ensure pregnant women receive IPTp-SP doses starting early in the second trimester of pregnancy (13 weeks) and continue to receive IPTp-SP until delivery with a minimum interval of one month between doses. ITNs and IPTp are provided to pregnant women as part of the focused antenatal care (FANC) package of services at health facilities aimed at making pregnancy safer. With FY 2017 funding, PMI will support the NMCP with updating the national policy and guidelines in line with the WHO IPTp policy recommendations and assist the NMCP and Division of Reproductive and Child Health (DRCH) in establishing a national MIP working group for addressing technical issues and challenges. To ensure health providers are familiar with the new guidelines, PMI will support the NMCP's plan to train peripheral health providers including health facility staff, community health workers, midwives, and public and private sector hospital staff on the updated MIP policy and guidelines.

Case management: The NMCP aims for all suspected malaria cases to receive confirmatory diagnosis and all malaria cases to receive effective treatment. Since annual ACT and rapid diagnostic test (RDT) needs are currently covered by the Global Fund, PMI will contribute to procuring severe malaria drugs. Currently antimalarial commodities are distributed through a separate distribution system. However, the NMCP, PMI and other donors share the goal of an integrated pharmaceutical management system. With FY 2017 funding, PMI will focus on building in-country capacity for drug testing and quality assurance, including support for the accreditation process of the national drug quality laboratory. To help reduce malaria burden, PMI will focus on training and supervision, as well as improving the quality of malaria diagnosis and case management practices in public health facilities and at the community level with a particular emphasis on severe malaria management. Additionally, PMI will support the NMCP in establishing stronger linkages with the private sector to improve the quality and capacity of case management practices and reporting.

Health systems strengthening and capacity building: The NMCP is focused on strengthening procurement and supply chain management of malaria commodities, improving malaria data collection and reporting through the health management information system (HMIS) and improving coordination and partnerships with all malaria stakeholders. With FY 2017 funds, PMI plans to continue supporting an embedded long-term technical advisor to assist with coordination with Global Fund grant processes and help build overall leadership and capacity at the national level. In addition, PMI will support the Ministry of Health and Sanitation (MoHS) staff participation in trainings focused on malaria related activities including disease surveillance and malaria program monitoring and evaluation at the chiefdom level. Finally, PMI will support Peace Corps' education and health volunteers to work in malaria prevention and control and to assist the NMCP to identify and address programmatic gaps in community malaria interventions.

Social and behavior change communication (SBCC): The NMCP's goal is for at least 80% of the population to practice correct malaria prevention and treatment measures by 2018. The NMCP and PMI are aligned in their goals to provide quality messaging around consistent and correct use of ITNs, ANC attendance and IPTp delivery, prompt care-seeking for fever and for more severe disease symptoms, adherence to prescribed treatment, and overall knowledge about the cause of malaria. With FY 2017 funds, PMI plans to support the NMCP in updating the national SBCC strategy, with a focus on supporting the development of a cohesive and standardized SBCC package. Building on a 2016 partner mapping exercise, PMI will assist the NMCP to coordinate SBCC efforts, standardize messages, and improve the quality of the communication and delivery of malaria-focused SBCC. PMI will also help fill the gaps in the roll-out of the updated national strategy.

Surveillance, monitoring and evaluation (SM&E): The NMCP's SM&E strategic objective is to strengthen surveillance, monitoring, evaluation, and operational research for effective program management. Data reporting and use are key priorities, and the NMCP aims for at least 95% of health facilities reporting to be routinely on malaria program performance by 2020, while further decentralizing data management down to the chiefdom level. With FY 2017 funding, PMI will focus on improving malaria data quality and timeliness by strengthening the capacity and infrastructure at the district and chiefdom levels, including appropriate use of data for decision making, and supportive supervisions from districts to health facilities. At the national level, PMI will support the NMCP SM&E team and Department of Policy, Planning, and Information in conducting supportive supervision to the peripheral level. PMI will also support two technical assistance visits from PMI HQ. PMI will contribute to the 2018 Demographic Health Survey (DHS) in order to better understand the malaria profile and intervention coverage in the country. Additionally, PMI will support a health facility survey in 2018 to

assess improvements in health facility malaria indicators including quality of case management practices.

Operational research (OR): The NMCP aims to establish strong collaborative research initiatives with national and international research and academic institutions. The NMCP, in collaboration with these institutions and other partners, plans to define a malaria operational research agenda and provide a forum for dissemination of research results in 2017. Although PMI will not fund any OR activities with FY 2017 funds, PMI will support the NMCP and its partners to develop an operations research agenda and to convene a meeting/workshop to develop an OR strategic plan.

II. STRATEGY & BACKGROUND

1. Introduction

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

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2. General description of public health system and malaria control efforts

Sierra Leone is located on the west coast of Africa, bordered on the north and east by Guinea, on the south by Liberia, and on the west by the Atlantic Ocean. The country has a tropical climate with temperatures ranging from 21°C to 32°C and a mean daily temperature of 25°C. It has two major seasons: wet season (May to October) and dry season (November to April) with heavy rains in July/August. It has an average annual rainfall of approximately 320cm. Relative humidity is high ranging from 60-90%.

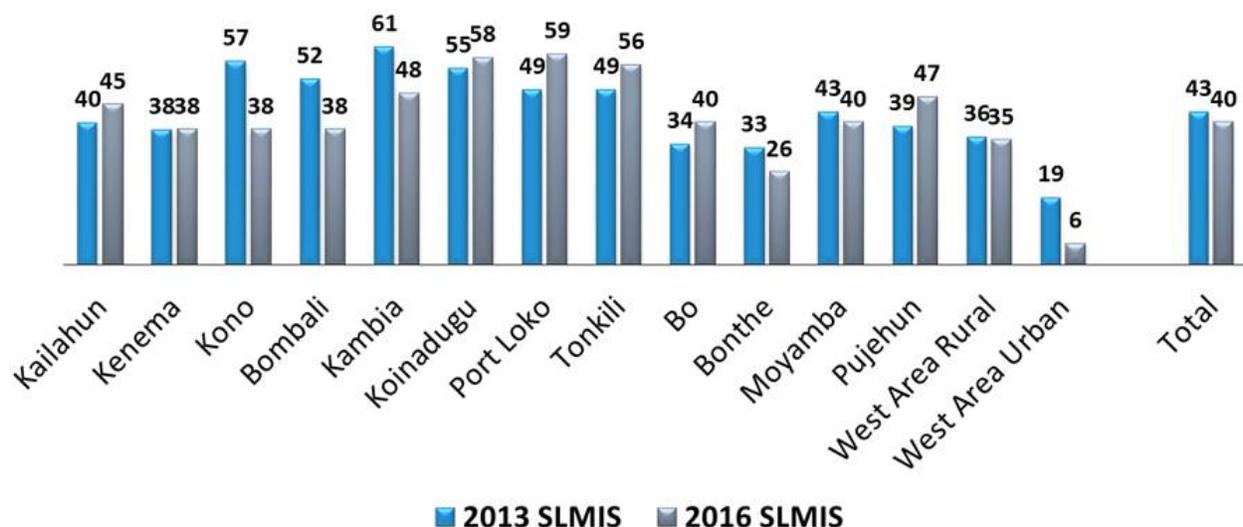
The country has a varied terrain, ranging from coastline swamps, inland swamps, and rainforests to one of the highest mountains in West Africa, Bintumani, at 2,200 meters. The vegetation is mainly secondary palmbush interspersed with numerous swamps, which are mostly cultivated for rice. These swamps provide ideal breeding places for the Anopheline vectors of malaria. All geographic areas of Sierra Leone are favorable to malaria transmission, which is stable and perennial. The major vectors for malaria are *Anopheles gambiae* s.s., *An. funestus*, and *An. melas*. The peak biting period is between 10 p.m. – 2 a.m. Malaria transmission has two peaks, one that begins during the rainy season in May and the second towards the end of the season in October/November. The major parasite species are *Plasmodium falciparum* (>90%), *P. ovale*, and *P. malariae*. An estimated 2,240,000 outpatient visits are due to malaria every year, of which about 1,000,000 patients are children under five years of age. Pregnant women and children under five constitute 4.4% and 17.7% of the total population, respectively, and are the most vulnerable groups¹. Malaria is also considered a major impediment to socio-economic development, leading to poverty.

The most recent entomological studies were carried out prior to and during the civil war (1990-1994), which reported annual Entomological Inoculation Rates (EIR) ranging from 6 to 884. National prevalence data does not capture the true malaria burden as it is limited to routine data collected at public health facilities. Multiple national household surveys have been conducted in the past several years, including the Multiple Indicator Cluster Survey (MICS), Demographic and Health Survey (DHS), and Malaria Indicator Survey (MIS). Figure 1 below shows parasitemia from the MIS 2013 and MIS 2016. According to the MIS 2016, parasitemia ranges from 6% in Western Urban to 58% in the northeastern district, Koinadugu, among children 6-59 months of age. Table 1 summarizes malaria parasitemia and severe anemia by district based on the MIS 2016 data.

¹ National Malaria Strategic Plan 2016-2020, National Malaria Control Program. Ministry of Health & Sanitation. 2015

Figure 1: Prevalence of Malaria Parasitemia in Children under 6-59 Months by Region, Sierra Leone 2016 MIS

Percent of children 6-59 months with a positive malaria microscopy test



The malaria parasitemia prevalence estimates in children under five years of age were 46% and 53% according to 2013 and 2016 MIS using RDT and 43% and 40% using microscopy. MIS 2016 showed that one in ten children under the age of five had severe anemia (<8g/dL) (Figure 2). Prevalence of severe anemia was highest in Koinadugu (20%) and lowest in Kono (3%) and Western Area Urban (2%).

Figure 2: Severe Anemia in Children 6-59 months based on 2016 MIS

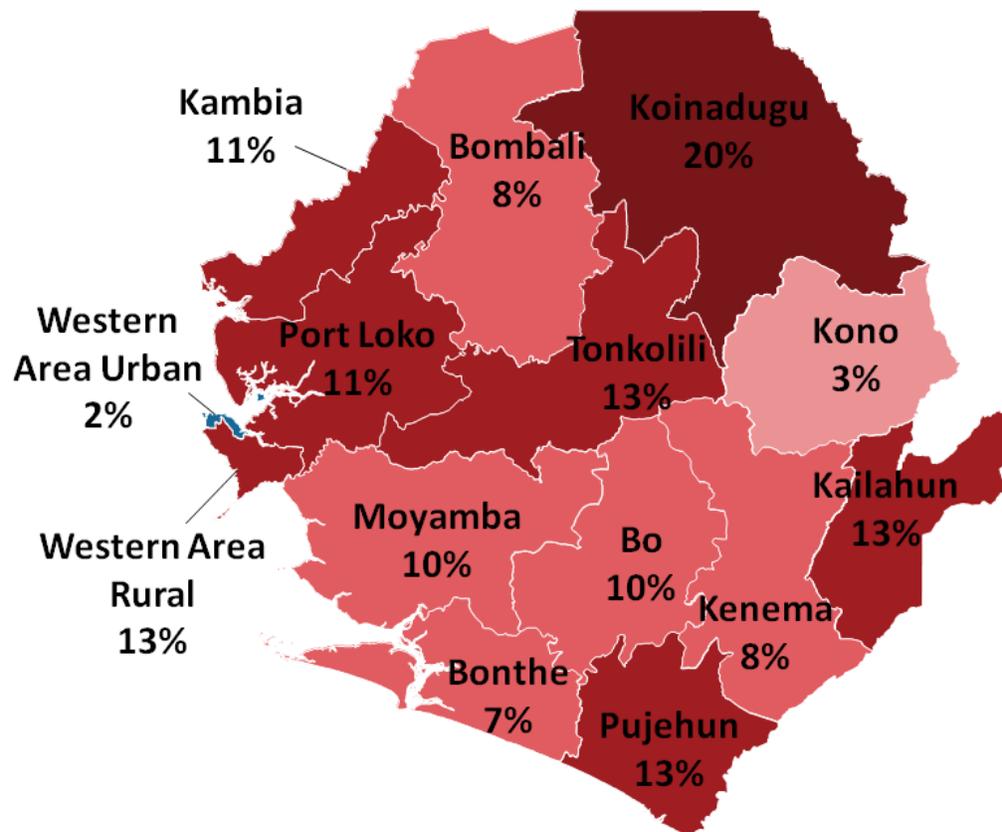


Table 1: Sierra Leone by Districts and Key Malaria and Anemia Indicators based on 2016 Malaria Indicator Survey

Region	District	2015 Census	Children Under Five Parasitemia* MIS 2016	Children Under Five Severe Anemia ** MIS 2016	U5 ITN Use^ MIS 2016	ITN-1 Ownership^^ MIS 2016
Eastern	Kailahun	525,372	45%	13%	58%	76%
	Kenema	609,837	38%	8%	66%	76%
	Kono	505,767	38%	3%	46%	58%
Northern	Bombali	606,183	38%	8%	43%	54%
	Kambia	343,686	48%	11%	49%	68%
	Koinadugu	408,097	58%	20%	40%	62%
	Port Loko	614,063	59%	11%	34%	51%
	Tonkolili	530,776	56%	13%	34%	60%
Southern	Bo	574,201	40%	10%	65%	76%
	Bonthe	200,730	26%	7%	54%	73%
	Moyamba	318,064	40%	10%	50%	61%
	Pujehun	345,577	47%	13%	48%	67%
Western Area	Rural	442,951	35%	13%	26%	42%
	Urban	1,050,301	6%	2%	26%	40%
National Total / Average		7,075,641	40%	10%	44%	60%

*Percent of children 6-59 months tested positive for malaria via microscopy testing

**Percent of children 6-59 months old with severe anemia (hemoglobin < 8.0 g/dl)

^Percentage of children under five years of age who slept under an ITN the night before the survey among all households

^^Percent of households with at least one long lasting insecticide treated mosquito net

3. Country health system delivery structure and Ministry of Health and Sanitation (MoHS) organization

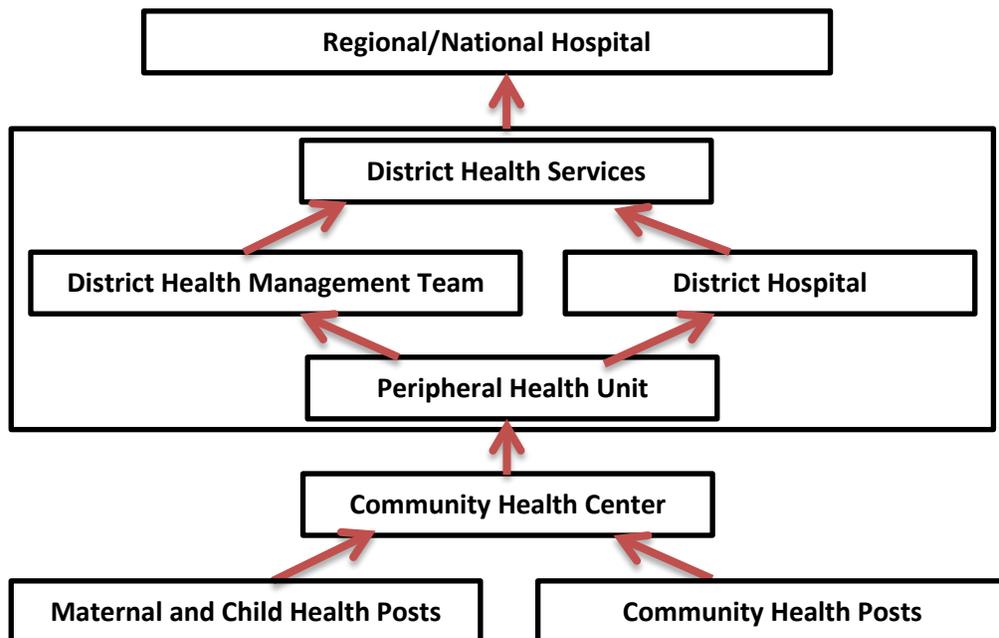
As part of the public sector reforms, which started in 2003, the Ministry of Health and Sanitation (MoHS) is organized into two main divisions at the central level: medical services and management services. The core functions of the MoHS remain as “policy formulation; standards setting and quality assurance; resource mobilization; capacity development and technical support; provision of nationally coordinated services, e.g. epidemic control; co-ordination of health services; monitoring and evaluation of the overall sector performance and training.”² The districts’ responsibilities include implementation of national health policies; planning and management of district health services; provision of disease prevention, health promotion, curative and rehabilitative services; health education; ensuring provision of safe water and environmental sanitation; health data collection, management, interpretation, dissemination and utilization.

² Government of Sierra Leone, Basic Package of Essential Health Services 2015-2020

Sierra Leone’s health service delivery system is pluralistic with the Government, faith-based missions, non-governmental organizations, and the private sector all providing services. There are public, private for profit, private non-profit and traditional medicine practices. The private sector is underdeveloped compared to other countries in the sub-region and involves mainly curative care for inpatients and outpatients on a fee-for-service basis. Private health facilities operate under the authority of individual owners and/or boards of directors and are mainly found in urban areas. Traditional healers and Traditional Birth Attendants (TBAs) are reported to provide a significant amount of health care, with TBAs attending almost 90% of deliveries at the community level (BPEHS 2015-2020).

Sierra Leone’s public health delivery system comprises three levels (see Figure 3). District health services form the core component of primary health care. They are composed of a network of peripheral health units (PHUs), the district hospital (DH), and the District Health Management Team (DHMT). The DHMT is responsible for the overall planning, implementation, coordination, monitoring and evaluation of the district health services under the leadership of the District Medical Officer (DMO).³

Figure 3: Health Facility Structure



The PHUs are the first line of health services, and are further sub-classified into three levels. The maternal and child health posts (MCHPs) are situated at village level and cater for populations of up to 5,000. They are staffed by maternal and child health (MCH) aides who are trained to provide a range of services: antenatal care, supervised deliveries, postnatal care, family planning, growth monitoring and promotion for under-five children, immunization, health education, management of minor ailments, and referral of cases to the next level. The MCH aides are supported by community health workers (CHWs) who are community-based and play a complementary role in health promotion and counselling of caregivers to improve health status and access to care. The CHW is an essential part of the continuum of

³ Government of Sierra Leone, Ministry of Health and Sanitation. National Health Sector Strategic Plan 2010 - 2015. 2009

care from the community to health facility and referral level, and for counter referrals.⁴ Community health posts (CHPs) are at ‘small town’ level with populations between 5,000 and 10,000 and are staffed by state-enrolled community health nurses and MCH aides. In addition to the services provided at the MCHPs, CHPs include services relating to prevention and control of communicable diseases, such as vaccination programs, and rehabilitation. They refer more complicated cases to the next level.

Community health centers (CHCs) located at Chiefdom level typically have a catchment population of between 10,000 and 20,000 people. They are staffed with a community health officer (CHO), state-enrolled community health nurses, MCH aides, an endemic disease control unit assistant and an environmental health assistant. CHCs provide all the services provided at the CHP level in addition to environmental sanitation and supervise the CHPs and MCHPs within the Chiefdom.

The district hospital is a secondary level referral facility for the PHUs. It provides the following services: outpatient services for referred cases from PHUs and the population living within its immediate environs, inpatient and diagnostic services, accidents and emergencies, and technical support to PHUs. While there are public and private hospitals in each district, only the capital, Freetown, has hospitals that are considered to be true tertiary level facilities – Connaught Hospital, Ola Daring Children’s Hospital, Princess Christian Maternity Hospital, Lakka, Kissy Mental Hospital, and Jui. Some of these facilities do provide a limited range of primary care services. For example, Princess Christian Maternity Hospital runs a routine antenatal care (ANC) clinic for women who live in close proximity to the hospital and for whom the hospital is the nearest healthcare facility. The revised 2015-2020 Basic Package of Essential Health Services and National Health Sector Strategic Plan will upgrade the skill level, supply chain, and services available throughout the health system, including building a true tertiary level of care through the University Teaching Hospital Complex. The distribution of health facilities per each district is shown in Table 2.

⁴ Government of Sierra Leone, Ministry of Health and Sanitation. Policy for Community Health workers in Sierra Leone. June 2012

Table 2: Number of Health Facilities by District as of July 2015

Organization unit	MCHP	CHP	CHC	Government Hospital	Private Clinic ⁵	Private Hospital	Total
Bo	69	24	28	1	2	3	127
Bombali	55	32	15	1	5	3	111
Bonthe	15	26	14	1	4	2	62
Kailahun	18	42	14	1	1	1	77
Kambia	40	15	13	1	2	1	72
Kenema	60	33	26	1	2	2	124
Koinadugu	43	18	10	1	2	0	74
Kono	44	25	16	1	1	0	87
Moyamba	55	26	18	1	2	1	103
Port Loko	70	21	15	2	1	2	111
Pujehun	49	14	13	1	0	0	77
Tonkolili	75	15	12	1	1	2	106
Western Area	39	28	39	11	22	10	149
Total	632	319	233	24	45	27	1280

Source: Government of Sierra Leone, Basic Package of Essential Health Services 2015-2020

Impact of the Ebola Virus Disease Epidemic on the Health System in Sierra Leone

The epidemic of Ebola Virus Disease (EVD) which peaked in Sierra Leone from June 2014 to November 2015 impacted negatively on all aspects of the nation and its people. The health system was ill-equipped to cope with the massive increase in need for effective health promotion, preventive, diagnostic, and therapeutic services for EVD and other endemic diseases like malaria. The effect of the EVD epidemic on malaria was significant, largely because the two diseases have similar symptoms and signs, and posed great demand on the weak health system. Prior to the EVD outbreak, access, and utilization of malaria treatment services at facility and community levels averaged 85% and 50%, respectively (HMIS, 2013). The findings of a health facility survey conducted by UNICEF in October 2014 to assess the impact of EVD outbreak on health system in Sierra Leone showed that routine services provided through health facilities were affected across all districts. However, the extent of the impact was not even across all districts.

The observed drop in facility utilization has been attributed to several factors including the widespread avoidance of formal testing and treatment by patients due to Ebola-phobia as well as precautionary measures taken by health care workers in the face of inadequate infection prevention and control measures. Based on WHO guidance, MoHS temporarily suspended malaria testing to minimize exposure to blood, blood products and other body fluids and recommended presumptive treatment during this period. In the post-Ebola period, efforts are underway to re-establish “test-treat-and-track” as the standard best practice. The long-term impact of the EVD crisis on health services and malaria control efforts in Sierra Leone is largely unknown at this time.

⁵ “Private” includes all non-governmental entities, including not-for-profit (NGO), for-profit, and faith-based institutions.

To reduce malaria transmission and reduce the number of febrile cases which otherwise would have been suspected as EVD, the MoHS in collaboration with its partners (WHO, UNICEF, MSF-Spain, the Global Fund, RBM partners, and other stakeholders) carried out a mass drug administration (MDA) campaign using first-line antimalarial medicine (three-day course of artesunate-amodiaquine [ASAQ]). Two rounds of MDA were carried out in December 2014 and January 2015, in EVD hotspots areas as recommended by the WHO.

Government of Sierra Leone Health Sector Plans

Sierra Leone has the National Malaria Strategic Plan (NMSP) 2016-2020 and the National Health Sector Recovery Plan (NHSRP) 2015-2020 to address critical challenges in the health system and disease control programs. The NMSP 2016-2020 outlines priority interventions, strategic direction, and investments required to achieve and sustain universal coverage with high impact control measures to achieve the 2020 national goals. The 2016-2020 strategic plan has similar goals and objectives as the previous plan but with the addition of consideration for malaria elimination as a long term goal and coordination with the NHSRP. A notable area of alignment between the current NMSP and the NHSRP is the inclusion of epidemic and emergency preparedness as a key intervention for the NMCP. In addition, malaria control and mass distribution of insecticide-treated nets (ITNs) are priorities for the NHSRP, as well as community-based health service delivery with a commitment to support CHWs to be a more effective link between health facilities and households. CHWs will play an important role in health promotion and community surveillance in addition to their existing roles in direct basic service delivery. Successful implementation of the community system strengthening strategy should improve community case management of malaria, and boost efforts by government to integrate health service delivery at community level and to scale-up integrated community case management (iCCM). The NHSRP will leverage the support of several development partners, but specific commitments are still being expected from the partners.

4. National malaria control strategy

The NMSP 2016-2020 supports improvement of the health status of the population and the fight against poverty by reducing the burden due to malaria. The NMCP's overall vision is "access to malaria control interventions for all" with the mission to "direct and coordinate efforts towards a malaria-free Sierra Leone through effective partnerships."

Goal: By 2020, reduce malaria morbidity and mortality by at least 40% compared with 2015.

Objectives:

Objective 1a: All suspected malaria cases should have access to confirmatory diagnosis

Objective 1b: All malaria cases to receive effective treatment

The MoHS endorses parasitological confirmation of malaria as part of good clinical practice to improve the quality of care of patients. Before treatment is instituted, confirmation should be done using microscopy or rapid diagnostic tests (RDTs) and prompt and effective treatment with ACTs. NMCP seeks to strengthen the capacity of health workers both in the public and private health sectors to implement the new test-treat-and-track (T3) strategy by strengthening capabilities in prompt and targeted malaria case management; integration of quality assurance and quality control systems; incorporating malaria in pregnancy into the maternal and child health strategy; improving the procurement and supply chain for the commodities for malaria prevention and treatment; proactive

engagement of the private sector in malaria control, as well as community participation in diagnosing, treating and reporting malaria cases.

Objective 2a: Provide access to 100% of the population at risk with preventive measures by 2017

Objective 2b: To protect at least 80 % of pregnant women and children under one year with IPTp3 by 2020

The strategic plan proposes to use three vector control strategies: ITNs, indoor residual spraying, and larval source management. Mass distribution campaigns will be repeated every three years and continuous ITN distribution through ANC and expanded program on immunization (EPI) outlets will be done nationwide to maintain high levels of coverage during the entire period of the strategic plan. A long-lasting ITN mass distribution campaign for universal coverage is planned for June 2017. Strengthened public-private partnerships will serve as an opportunity for resource mobilization to scale up implementation of IRS as recommended by WHO. For example, prior to the EVD outbreak, there were discussions between the Government of Sierra Leone (GoSL) and private mining companies regarding the potential for IRS implementation and the NMCP has expressed an interest in exploring this possibility again. Another crucial component of the Integrated Vector Management will focus on reduction of larval sources through larviciding and environmental management targeting the 14 health districts.

IPTp is provided as part of the focused antenatal care package using the recommended drug (SP). The NMCP has also incorporated the 2010 WHO recommendation of Intermittent Preventive Therapy for Infants (IPTi) using SP into the national strategy, which has been approved for use in areas of year-round, moderate to high transmission and where resistance to SP is not high.⁶ The intervention calls for the administration of a full dose of SP for infants at intervals corresponding to routine EPI vaccination activities at health facilities, specifically the second and third doses of Penta/DTP and measles/yellow fever vaccination (at 10 weeks, 14 weeks, and nine months of age, respectively). The NMCP plans to pilot IPTi activities in four districts (Kambia, Pujehun, Kenema, and Western Area Rural) before embarking on a national scale-up in 2017. The 2016 pilot will receive technical contributions and SP procurement from other partners and donors, and will undergo a thorough evaluation. Additionally, a national IPTi implementation task force was established to guide and coordinate implementation efforts, which includes participation from the Child Health/EPI and Health Education Divisions of the MoHS. PMI does not plan to support activities directly related to IPTi rollout with FY 2017 funds.

Objective 3: To provide knowledge to the population such that at least 80% of the population practices malaria prevention and treatment measures by 2018.

The strategic plan recognizes that the implementation and coordination of this multi-sectoral malaria control strategy by the MoHS will require a more vibrant social and behavior change communication (SBCC) approach. The NMCP aims to engage Civil Society Organizations (CSOs) and Community Based Organizations (CBOs) to empower and encourage community demand for services, increase communities' knowledge about their health rights, and require accountability from change agents.

The NMCP supports activities that seek to reduce malaria morbidity and related mortality by motivating every Sierra Leonean to take recommended actions to prevent, diagnose, and treat malaria and to bring

⁶ Areas with high resistance to SP defined as having more than 50% prevalence of pfdhps 540 mutations associated with resistance in the *P. falciparum* parasite.

about sustainable social and individual behavioral change. It acknowledges challenges in the areas of prevention and vector control, malaria in pregnancy, malaria in infants and case management and proposes strategies for effective communication with relevant stakeholders.

Objective 4: By 2020, at least 95% of health facilities report routinely on malaria program performance.

The NMCP aims to achieve at least 95% of health facilities reporting routinely on malaria program performance. All districts are expected to report routinely on malaria program performance through the District Health Information System-2 (DHIS2) with the support of district monitoring and evaluation officers. At the district level, all data from the lower level health centers, in addition to the data on community-level health services delivered, are compiled and entered into the health database using DHIS2 software which is electronically transmitted to the national level. Most of the implementation of routine interventions takes place at the district level where activity reports are collected. As such, partners implementing at district level should also generate reports and submit them to the district. The district structures will be strengthened to ensure that all health management information system (HMIS) data and activity reports are collected, collated and analyzed. To monitor the progress attained and aid planning, regular monitoring through program reviews and surveys will be given a high priority

Objective 5: By 2020, maintain and strengthen capacity for program management, coordination and partnership to achieve malaria program performance at all levels.

The NMCP is expected to have more challenging issues that will need to be addressed during this period 2016-2020. Some of these include new innovative tools in diagnosis, treatment, and vector control that may be introduced during this period. This strategic plan provides a common framework for the accelerated nationwide scale-up of evidenced-led malaria reduction interventions by the government, its development partners, the private sector and all other stakeholders. A key addition to this strategic plan is the introduction of intermittent preventive treatment in infants (IPTi). Another key change in the revised NMSP which is informed by lessons learned from the control of EVD is the institution of measures to enhance preparedness for prompt and efficient intervention during epidemics and complex emergencies. All malaria policies will be guided by coordinated operational research on malaria.

Other Interventions Supported by the NMCP

- **Mass Drug Administration (MDA)**
 - In December 2014, MDA for malaria with ASAQ was implemented as a response to the EVD epidemic, primarily to reduce the number of febrile illness that could be misdiagnosed as EVD at health facilities. The emergency intervention targeted approximately 3 million people over 6 months of age in selected chiefdoms of Bombali, Kambia, Koinadugu, Moyamba, Port Loko, Tonkolili, and the Western Area Urban and Western Area Rural districts. A second cycle of MDA was administered in January 2015. The WHO and NMCP conducted a rapid impact assessment of MDA on malaria morbidity at selected health facilities during the intervention period. The results indicate that the number of suspect malaria cases tested was reduced, but that within a few weeks returned to pre-MDA levels.⁷ Neither the NMCP nor PMI have current plans to support another MDA campaign in FY 2017.

⁷ Aregawi M, Smith SJ, Sillah-Kanu M, Seppah J, Kamara AR, Williams RO, et al. Impact of the mass drug administration for malaria in response to the Ebola outbreak in Sierra Leone. *Malar J.* 2016;15:480.

5. Integration, collaboration, and coordination

The NMCP chairs the RBM partners' meeting and plays a critical role in leading and coordinating the malaria control efforts in Sierra Leone. All partner activities are integrated into the national strategy and overseen by the program manager. According to a recent partner mapping exercise, 28 partners and stakeholders participate in malaria prevention and control activities in Sierra Leone.

The Global Fund has been the primary donor for malaria control activities in Sierra Leone since 2004. Currently, GoSL has a malaria grant (approximately US\$30 million) from the Global Fund that runs from July 2016 to June 2018, with the NMCP and Catholic Relief Service (CRS) as principal recipients. The NMCP is responsible for commodity procurement (ITNs, ACTs, and RDTs) and distribution⁸ across the entire country, and CRS is responsible for SBCC in about 2,000 communities (out of approximately 16,000 communities) in all districts. CRS, with the Global Fund support, commissioned and conducted (along with other partners) the MIS 2016. The final report is being prepared.

The Global Fund provides funding for health system strengthening (HSS) through a separate HSS grant (approximately US\$27 million) that supports the establishment of a new warehouse (US\$6-7 million) and provides 13 trucks for distribution of health commodities to the districts. With EU funding, UNICEF has also rehabilitated/constructed district medical stores in 13 out of the 14 districts.

The United Kingdom Department for International Development (DFID) also supports commodity procurement, particularly for routine ITN distribution at PHUs. DFID has covered 50% of the ITN needs for the 2017 mass campaign. While DFID and the Global Fund support ACTs and RDTs and SP for IPTp, there is currently no donor support for supplies for management of severe malaria.

UNICEF is a key partner for procurement and distribution of commodities through funding support from both DFID and the Global Fund, for national health campaigns, maternal and child health weeks, as well as routine distribution of ITNs. In addition, UNICEF conducted a geo-mapping of the 14,622 CHWs in Sierra Leone. Of these, about 6,000 are community-based promoters (CBPs) that have been trained to work and focus on malaria control. To date, these volunteers are provided incentives through the various partners and projects. In February 2017, the MoHS launched a CHW policy that details clear terms of reference, training packages and minimum qualifications as well as a formalized incentive plan for the CHWs. The goal is to have all CHWs implementing a comprehensive package that includes malaria control as one of several components. The CBPs are fully integrated into the CHW program to provide services according to the revised CHW policy (i.e., Reproductive, Maternal, Neonatal, and Child Health, iCCM, and related interventions.)

WHO provides the NMCP with technical assistance on malaria policies and guidelines. WHO also funded the NMCP to conduct an IRS pilot in 2010-2012 in four districts.⁹ Sprays were conducted with Lambda-cyhalothrin and insecticide monitoring data indicated that there was little resistance to the insecticide used. Due to lack of resources, IRS was not continued.

⁸ This does not cover severe malaria commodities.

⁹ Bombali, Bo, Western Area Rural, and Kono.

Several MoHS directorates play critical roles in malaria control activities in Sierra Leone. The Department of Policy, Planning, and Information (DPPI) is responsible for implementing and supporting the DHIS2. The DPPI coordinates with the NMCP to ensure that necessary malaria indicators are captured and reported through DHIS2. The Directorate of Drugs and Medical Supplies (DDMS) is responsible for the logistics management information system (LMIS), including quantification. In 2012, the parastatal National Pharmaceutical Procurement Unit (NPPU) was created to cover the procurement, storage, and distribution of medical drugs and supplies. The EVD crisis, among other factors, has delayed the NPPU from assuming the responsibilities of the Central Medical Stores (CMS). Currently, the NPPU is undergoing a reform to ensure that pharmaceutical supply chain management is more efficient and transparent. As a result, partners still continue to use parallel systems to procure, store, and distribute pharmaceuticals from the center to the districts and PHUs.

There are a number of partners that support *ad hoc* activities in various districts and chiefdoms, mostly in district capitals and big cities and towns. Some of the activities supported include SBCC, net distribution to private sector facilities, and community-based activities. While there are some examples of private sector collaboration, additional efforts are needed to map these activities and to ensure coordination and collaboration with the public sector. Some of the key potential areas of collaboration include malaria control efforts in rice plantations and mining areas, as well as construction and development projects involving logging and deforestation.

U.S. Government Partners

The U.S. Government reignited its programs in Sierra Leone in 2000, at the tail end of the ten-year civil war, with the aim of reducing threats of regional destabilization, raising awareness of the widespread atrocities that were committed during the civil war, and increasing international support for the government and the people of Sierra Leone. During the Transition Strategy from 2001-2003, the United States Agency for International Development (USAID) focused on the social and economic reintegration of war torn communities including disarmament and reconciliation, and since 2006 has supported strengthening democratic governance. USAID's Mission in Guinea provides overall coordination and oversight for the Sierra Leone program. Activities include support to enhance democratic governance, nutrition and food security and food assistance (particularly for Ebola-affected populations) as well as women's empowerment and leadership, in addition to health services and systems.

USAID and the U.S. Centers for Disease Control and Prevention (CDC) are supporting various health activities in Sierra Leone. USAID supports efforts to improve health service delivery and health system strengthening (including for HMIS and LMIS) as well as a long-term technical advisor embedded within the NMCP focusing on management and monitoring and evaluation. Other USAID health activities include support to the Global Health Security Agenda (GHS), ending neglected tropical diseases, tuberculosis, and preventing and controlling obstetric complications.

CDC, in addition to laboratory and human capacity building, is supporting the evaluation of the pilot of IPTi pilot. USAID and CDC also collaborate to strengthen capacity for effective laboratory services and disease surveillance, including HIV/AIDS. Under the GHS, both USAID and CDC are improving national laboratory capacity and disease surveillance (animals and human) to prevent, detect, and respond to human and animal infectious diseases threats. In addition, USAID is supporting the establishment of the One Health Platform, the revision and update of preparedness and response plans, as well as the Ebola Host Project that looks into potential reservoirs of EVD (and other zoonotic diseases) and investigates human behavior and interaction with animals.

Peace Corps re-established its programs in 2000 in the post-civil war period, but there was a gap in programming during the EVD outbreak. The program has now returned and will increase its presence with more than 65 health and education volunteers expected to serve in-country by 2017.

6. 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:

- Reduce malaria mortality by one-third from 2015 levels in PMI-supported countries, achieving a greater than 80% reduction from PMI's original 2000 baseline levels;
- Reduce malaria morbidity in PMI-supported countries by 40% from 2015 levels;
- Assist at least five PMI-supported countries to meet the World Health Organization's (WHO) criteria for national or sub-national pre-elimination.¹⁰

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

- Achieving and sustaining scale of proven interventions
- Adapting to changing epidemiology and incorporating new tools
- Improving countries' capacity to collect and use information
- Mitigating risk against the current malaria control gains
- Building capacity and health systems towards full country ownership

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

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

¹⁰ http://whqlibdoc.who.int/publications/2007/9789241596084_eng.pdf

7. Progress on coverage/impact indicators to date

Table 3: Evolution of Key Malaria Indicators in Sierra Leone from 2008 to 2016

Indicator	DHS 2008	DHS 2013	MIS 2013	MIS 2016
% Households with at least one ITN	37% ^a	64%	62%	60%
% Households with at least one ITN for every two people	NA	15% ^b	17% ^b	16% ^b
% Children under five who slept under an ITN the previous night (all households)	28%	49%	45%	44%
% Pregnant women who slept under an ITN the previous night (all households)	28%	53%	47%	44%
% Households in targeted districts protected by IRS	NA	12.4%	19.7%	NA
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	30%	85%	63%	71%
% Children under five with fever in the last two weeks who had a finger or heel stick	15%	40%	37%	51%
% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs	15%	77%	84%	97%
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	12% ^c	45%	62%	71%

^a The 2008 DHS only asked about any net ownership, not specifically about ITNs, and did not ask about net use

^b This is out of all households

^c The 2008 DHS only asked about pregnant women who took any SP

8. Other relevant evidence on progress

Health Facility Surveys (HFSs) can provide useful information on the performance of malaria control activities at health facilities, including availability of malaria commodities and quality of case management. In 2014, a total of 1,185 health facilities, representing 100% of all health facilities in Sierra Leone, were surveyed looking at facility registers to assess data quality, availability of malaria commodities, and observation of malaria case management. In 2013, HMIS data showed that the number of under-five children treated for malaria had increased by 20% during the rainy season. However, from May to September 2014, the number of under-five children treated for malaria declined by 39% and remained at lower levels until January 2015 (HFS 2014). Also, during the same period, the

number of ITNs distributed during ANC visits dropped by 63% nationally due at least in part to the fact that the number of antenatal visits declined by 27% (HFS 2014). Results from the 2014 HFS were discouraging but expected due to the EVD outbreak

The MoHS in collaboration with partners will conduct field work for the Service Availability and Readiness Assessment (SARA) of health facilities in 2017, with support from the Global Fund. As of October 2016 the data collection protocol was still being finalized. The overall objective, protocol, and methodology of the 2014 HFS were different from the proposed 2016 SARA, which also aims to cover all public health facilities in the country.

III. OPERATIONAL PLAN

The FY 2017 MOP supports key evidenced-based malaria interventions and is aligned with the NMCP's national strategic plan. The MOP emphasizes vector control (building entomologic monitoring capacity, IRS, and support of ITNs), building district and sub-district monitoring and evaluation capacity, and strengthening improved case management practices, including improving severe malaria case management.

1. Vector Monitoring and Control

NMCP/PMI objectives

Sierra Leone's 2016-2020 National Malaria Strategic Plan (NMSP 2016-2020) includes the three vector control interventions: insecticide treated nets (ITNs), indoor residual spraying (IRS) and larval source management (LSM). The strategy states that these interventions will be deployed according to the current risk stratification context in Sierra Leone.

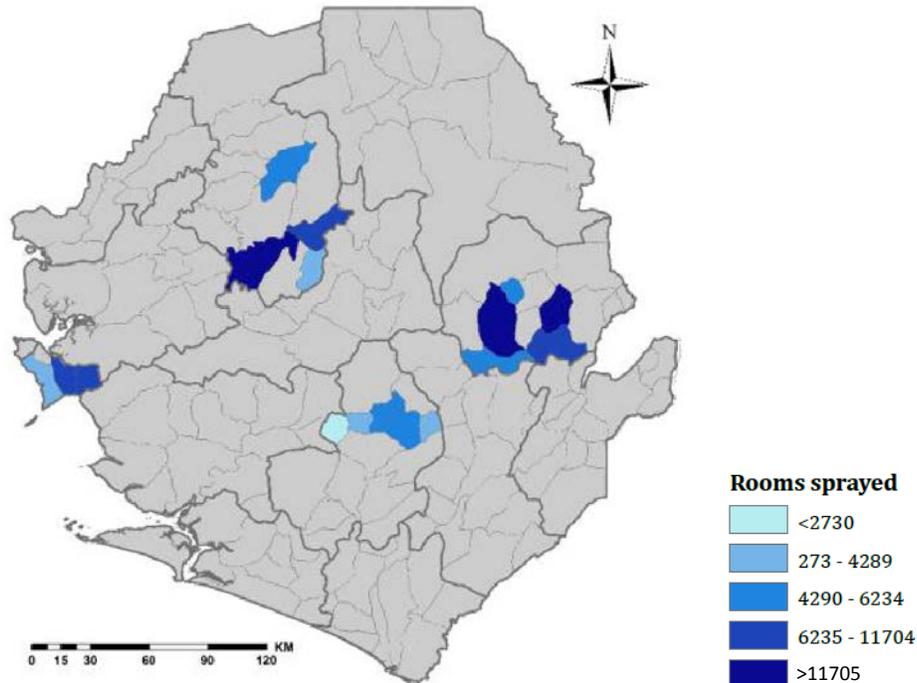
Key pillars within NMCP's vector control strategy are to strengthen capacity in entomology surveillance, to conduct insecticide resistance monitoring, and to evaluate vector behavior. This strategy will equip the NMCP, partners, and districts with knowledge and skills to implement an informed and evidence-led vector control program in order to achieve maximum impact.

NMCP plans to ensure universal access through mass ITN campaigns conducted every three years. Sierra Leone follows the WHO definition of universal coverage as one net per two people. Currently, mass campaigns are the main distribution method, reinforced by routine distribution of nets during EPI visits, as well as the first ANC visit (and at the time of delivery in a registered health care institution to encourage delivery in facilities).

Sierra Leone has a long history of IRS trials from as early as 1940 and a modest IRS program that was carried out until the early 1950s. More recently, a pilot of IRS was conducted in selected Chiefdoms of Bo, Bombali, Kono, and Western Rural districts. Figure 4 illustrates the districts which received IRS in 2010-2012 using Lambda-cyhalothrin¹¹.

¹¹ National Malaria Control Programme (2012). The implementation of IRS in Sierra Leone in 2010-2012. Ministry of Health and Sanitation, Government of Sierra Leone, 2012.

Figure 4. Chiefdoms covered with IRS with Lambda-cyhalothrin in 2010-2012



Source: National Malaria Control Programme (2015). Sierra Leone: A Profile of Malaria Control and Epidemiology, December 2015

Although larval source management is part of the current malaria control strategy in Sierra Leone, it has never been implemented.

According to NMCP strategy, there are four regional sites that are intended to provide annual information on vector composition, vector behavior, and susceptibility of local vectors to insecticides as well as information on ITN longevity and effectiveness. Additionally, these sites will be linked to the antimalarial efficacy and safety studies. Four sentinel sites will provide annual information on vector composition, behavior, inoculation rates, and susceptibility to insecticides.

In keeping with the 2016-2020 goals set forth in the Malaria Control Strategic Plan, PMI aims to:

1. Support the development and implementation of an updated integrated vector control strategy to ensure sustained ITN coverage through both routine and campaign channels and rational IRS use;
2. Support an integrated, evidence-based approach to IRS that results in a more cost-effective and efficient targeted strategy for the entire country;
3. Support an insectary and laboratory, to include: electricity, internet, general maintenance, security, and maintenance of biological specimens (mosquitoes and animal blood).

A. Entomologic Monitoring and Insecticide Resistance Management

Intervention overview/Current status

The NMCP conducted insecticide resistance testing in one site during early 2010 and 2016. A study conducted in Freetown from June – July 2010 demonstrated *Anopheles gambiae* s.l. were susceptible to bendiocarb (carbamate), DDT, malathion, permethrin, lambda-cyhalothrin, and deltamethrin after 24-hr post exposure. However, a second study in 2016 demonstrated mosquitoes were not susceptible, demonstrating high resistance against seven insecticides (Table 4). Mosquitoes were not susceptible to any of the pyrethroids and DDT tested. *Anopheles gambiae* s.l. were susceptible to bendiocarb and fenitrothion (organophosphate) with mortality ranging from 90.7 to 100%, respectively.

Table 4: Susceptibility of *Anopheles gambiae* s.l. to seven insecticides (24 hr. post-exposure) in 4 districts of Sierra Leone, 2016 using the WHO tube test

Insecticide	District	Site	No. of Mosquitoes tested (N)	Mean Corrected Mortality (%)
Permethrin	Bombali	Bangura Lane-Makeni	121	50.4
	Kono	Njaima Sewafe	100	60.0
	Bo	Gbaima-Songa	100	27.0
	Western Rural	Waterloo	100	66.0
Deltamethrin	Bombali	Bangura Lane-Makeni	100	57.0
	Kono	Njaima Sewafe	118	58.0
	Bo	Gbaima-Songa	100	49.0
	Western Rural	Waterloo	100	38.0
Lambda-cyhalothrin	Bombali	Bangura Lane-Makeni	100	53.0
	Kono	Njaima Sewafe	100	51.0
	Bo	Gbaima-Songa	100	43.0
	Western Rural	Waterloo	100	32.0
Cyfluthrin	Bombali	Bangura Lane-Makeni	100	50.0
	Kono	Njaima Sewafe	93	77.4
	Bo	Gbaima-Songa	100	43.0
	Western Rural	Waterloo	100	36.0
DDT	Bombali	Bangura Lane-Makeni	100	31.0
	Kono	Njaima Sewafe	100	47.6
	Bo	Gbaima-Songa	100	28.0
	Western Rural	Waterloo	100	7.0
Bendiocarb	Bombali	Bangura Lane-Makeni	100	91.0
	Kono	Njaima Sewafe	100	93.0
	Bo	Gbaima-Songa	75	90.7
	Western Rural	Waterloo	100	91.0
Fenitrothion	Bombali	Bangura Lane-Makeni	100	99.0
	Kono	Njaima Sewafe	100	99.0
	Bo	Gbaima-Songa	100	100
	Western Rural	Waterloo	75	94.7

Source: NMCP 2016

Plans and justification

PMI will support the NMCP in building capacity for a comprehensive mosquito surveillance program including establishing four sentinel sites in Sierra Leone in order to monitor entomology and insecticide resistance indicators and the quality and coverage of malaria vector control interventions. Monthly data collection will be conducted using pyrethrum spray catch and human landing catch to assess vector

species distribution and density, seasonality, and behavior. Mosquitoes will be sorted and identified and members of the *Anopheles gambiae* s. l. will be further identified using PCR to identify members of the complex. In addition, those species will be tested using ELISA for the presence of *Plasmodium* spp. Insecticide resistance monitoring will be carried out in FY 2018 at four sites and include susceptibility testing for deltamethrin, malathion, permethrin, lambda-cyhalothrin, bendiocarb, pirimiphos-methyl, and fenitrothion to confirm any resistance observed in the 2016 study.

WHO cone bioassays will be conducted to assess the quality and efficacy of IRS operations in 2019 and to determine insecticide decay rates. To build entomological capacity at the NMCP, PMI will also support an insectary in a location to be determined (but accessible to IRS areas) to rear a susceptible mosquito colony.

Proposed activities with FY 2017 funding: (\$579,000)

- **Increase NMCP entomology capacity and entomological monitoring.** PMI will provide equipment, supplies, and mentoring for NMCP entomology technicians. PMI will provide mosquito surveillance equipment to the NMCP to enable them to scale-up mosquito density, behavior, species identification, and insecticide resistance activities. Entomological monitoring will be conducted monthly in four sites and resistance testing will occur annually in at least six sites so that over the course of three years all districts in the country will be covered. PMI will also support a full-time entomologist to sit with the NMCP to help build capacity and support on-the-job training. (\$500,000)
- **Support an insectary.** PMI will consult with NMCP about establishing an insectary in a location to be determined that is accessible to IRS areas. PMI will provide equipment, supplies, and mentoring to establish a functional mosquito insectary to maintain susceptible strains of *Anopheles gambiae* s.l. (\$50,000)
- **Technical assistance for vector control activities.** CDC staff will conduct two technical assistance (TA) visits to assist with training and to monitor planning and implementation of vector control activities, including use of WHO tube and CDC bottle assays for resistance monitoring, mosquito collection techniques, rearing, and morphological identifications. In addition, assistance with the establishment of a susceptible mosquito colony will be provided. (\$29,000)

B. ITNs

Intervention overview/Current status

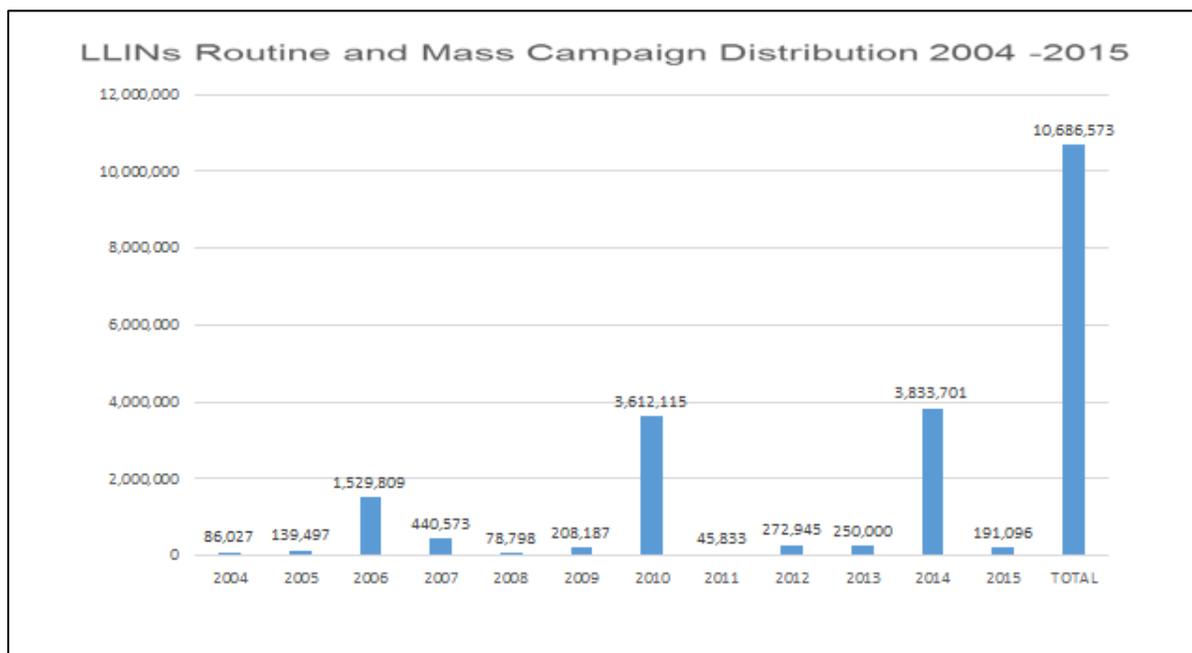
The NMCP aims to ensure universal access to free long-lasting ITNs by reaching 100% of households primarily through mass campaigns conducted every three years. Sierra Leone follows the WHO definition of universal coverage of one net per two people. Currently, mass campaigns are the main distribution method, reinforced by continuous routine distribution of free nets through ANC and EPI (i.e., provision at the first ANC visit to pregnant women and to children 12-59 months with successful completion of their Penta 3 immunization). In the past, the NMCP has supported expanding channels for continuous ITN distribution such as during maternal and child health weeks. To promote ITNs, the NMSP supports SBCC efforts on the use and maintenance of nets in households, which are conducted prior to the mass campaigns and continuously for routine distribution.

The NMCP has conducted three rounds of mass ITN distribution campaigns (2006, 2010, and 2014) and has plans to conduct a fourth campaign in June 2017. In 2006, the NMCP distributed 1.1 million nets in

a mass campaign for children under one year of age alongside a measles vaccination campaign. In 2010, the NMCP distributed a total of 3,264,927 ITNs for scaling-up to achieve universal coverage. In 2014, the NMCP distributed a total of 3,523,873 ITNs to maintain and achieve universal coverage. This mass campaign was conducted in June 2014 as part of the malaria response to the EVD outbreak.

The NMCP has also supported distribution of ITNs through routine delivery channels including ANC and EPI clinics, and continued to distribute nets through these routine delivery channels during all three of the mass distribution campaigns. The NMCP estimates over 10.6 million ITNs have been distributed through mass distribution campaigns and routine distribution channels between 2004- 2015 (see Figure 5 below).

Figure 5: Routine and Mass Campaign Distribution 2004-2015



The next mass distribution campaign is planned for June 2017 over a 10-day period. The NMCP has estimated 4,186,517 ITNs are needed to maintain and achieve universal coverage (the estimate is calculated using an average of 1.8 people per ITN and 6 people per household). The Global Fund has committed to financing half of the needed ITNs (or 2,093,258 ITNs) and DFID through UNICEF has committed to a one-time financing for the other half of the needed ITNs.

According to the preliminary MIS 2016 results, 60% of households owned an ITN, 37% of the population has access to at least one ITN and 39% of the population used an ITN. Only 16% of households owned enough ITNs (defined as at least one ITN for every two people) to cover all household members. While overall ITN-access appears to be low, ITN-use appears to be high in households with at least one ITN. The percentage of children and pregnant women sleeping under an ITN (in households with an ITN) was 71% and 75% respectively (MIS 2016). Similar results were reported in the DHS 2013. While 64% of households owned an ITN, 69% of children under five years of age and 76% of pregnant women used an ITN (in households with at least one ITN). However the national percentages of ITN use among children under five years and pregnant women in all households (with and without an ITN) remain low at 44% for both groups. According to the MIS 2016, the primary distribution channels that households reported having received an ITN was through a mass campaign

(77%) and at ANC (11%). Trends in household ITN ownership and ITN use among children under five years of age by district in Sierra Leone are indicated below in Figures 6 and 7.

Figure 6. Trend in ITN ownership by District

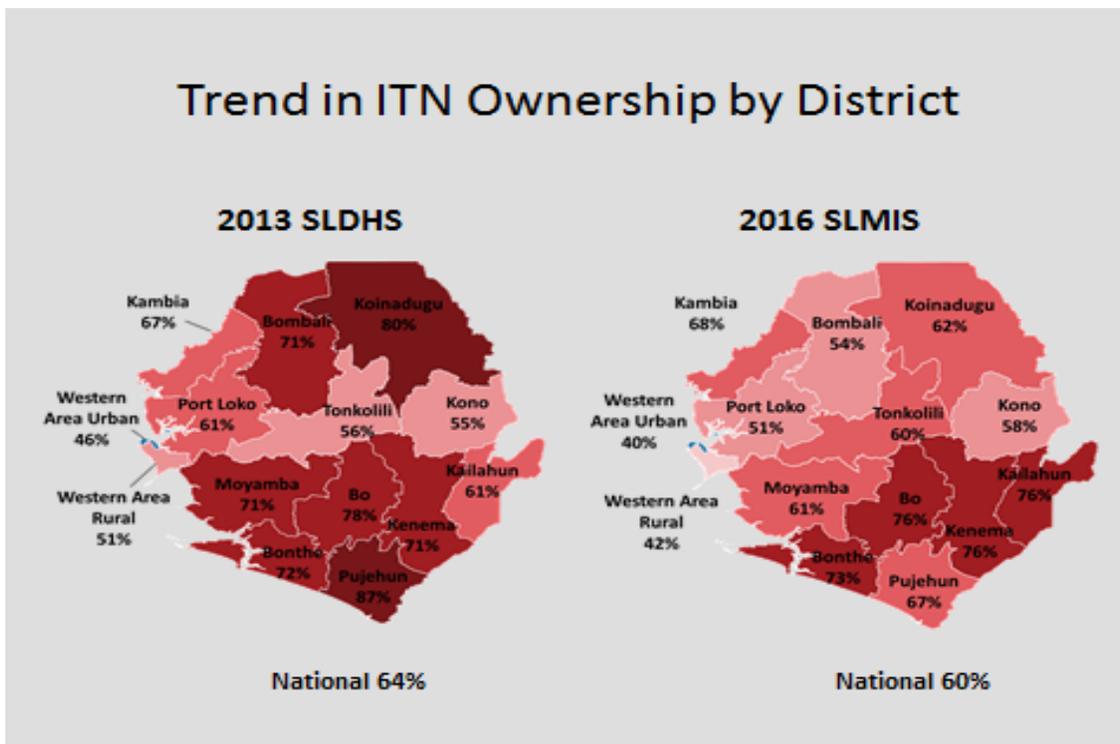
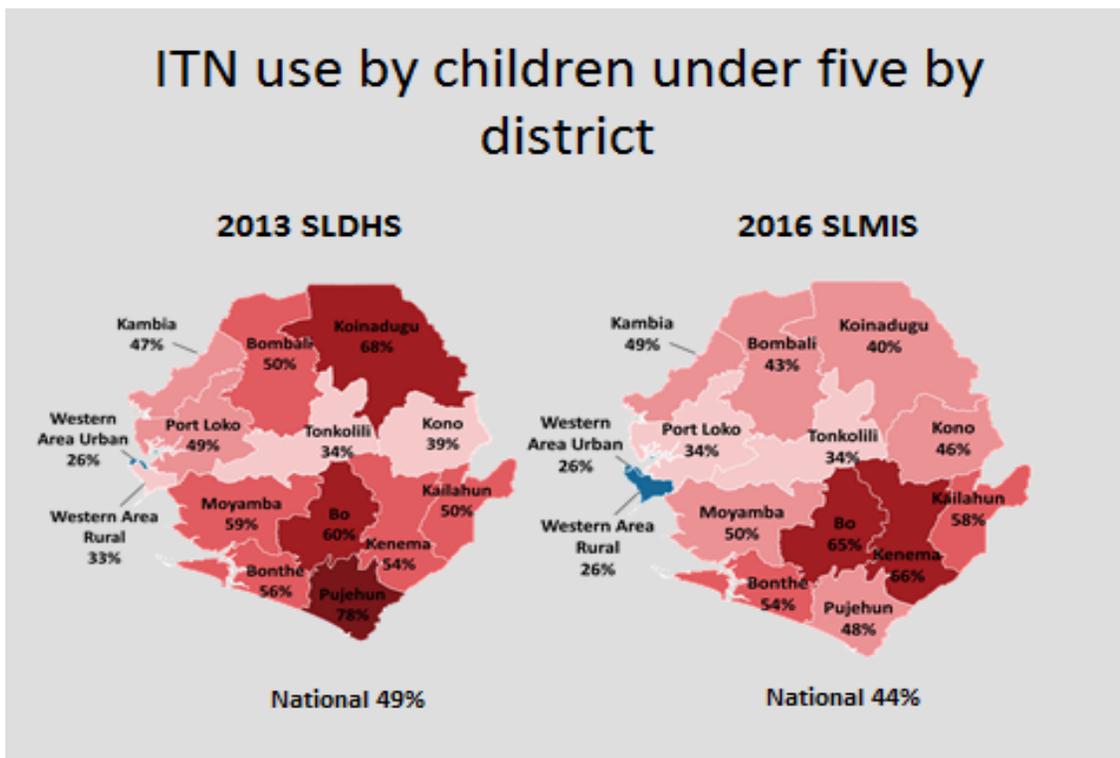


Figure 7. ITN use by children under five years of age by district



The NMSP supports the procurement of WHO Pesticide Evaluation Scheme (WHOPES)-recommended nets. Under the Global Fund malaria grant, the NMCP contracted with UNICEF to procure and distribute all ITNs to the district medical stores for the 2017 mass distribution campaign as well as nets for routine distribution channels throughout the country. Upon arrival in country, ITNs for mass distribution campaigns as well as the routine channels are prepositioned at the district level. For the routine distribution channels, health facilities are responsible for transporting the nets from the district warehouses and distributing to pregnant women and fully immunized children at ANC and EPI. The Global Fund-procured nets for the mass distribution campaign will arrive in March 2017 in containers and will be transported from the port of entry directly to the districts and designated distribution sites. The DFID-supported ITNs will arrive in December 2016 and will also be distributed by UNICEF from national to district levels.

The NMCP recognizes some key challenges remain to achieving and maintaining universal coverage including periodic stockouts of ITNs for the routine distribution channels. Despite high household ownership of ITNs, the overall proportion of children under five years using an ITN in all households has remained low (44%, MIS 2016). Also, NMCP has limited experience with insecticide resistance monitoring, and entomological work in general, despite the presence of large scale use of insecticides with the distribution of ITNs for malaria control.

Commodity gap analysis

Table 5: ITN Gap Analysis

Calendar Year	2016	2017	2018
Total Population	7,302,062	7,535,727	7,776,871
Continuous Distribution Needs			
Channel #1: ANC (pregnant women = 4.4% of population)	321,291	331,572	342,182
Channel #2: EPI (children under one year = 4% of population)	292,082	301,429	311,075
<i>Estimated Total Need for Continuous</i>	613,373	633,001	653,257
Mass Distribution Needs			
2017 mass distribution campaign	0	4,186,517	0
<i>Estimated Total Need for Campaigns</i>	0	4,186,517	0
Total Calculated Need: Routine and Campaign	613,373	4,819,518	653,257
Partner Contributions			
ITNs carried over from previous year	0	0	0
ITNs from Global Fund (mass + routine)	274,996	2,660,849	292,877
ITNs from DFID / UNICEF	0	2,093,258	0
ITNs planned with PMI funding	0	0	675,000
Total ITNs Available	274,996	4,754,107	967,877
Total ITN Surplus (Gap)	(338,377)	(65,411)	314,620
<p>*4.4% national population pregnant in a given year with 90% ANC1 coverage and 4% national population children fully immunized. - Note the 2016 net gap is due to the fact that the current Global Fund grant covers the ITN need for only the second half of the year from July through December 2016. - Note the 2018 net gap is due to the fact that the current Global Fund grant covers the ITN need for only the first half of the year from January through June 2018.</p>			

The NMCP estimates approximately 4,186,517 million ITNs (calculated for procurement purposes using the ratio of one net for every 1.8 persons in the target population) are needed for the 2017 mass distribution campaign and more than 613,000 ITNs are needed annually to support the routine distribution channels (estimating that 4.4% of the population consists of pregnant women and that 4% of the population consists of fully immunized infants). The Global Fund malaria grant, covering the period of June 2016 – July 2018, supports half of the net needs for the mass distribution campaign and all of the routine net needs in 2017. DFID will procure the remaining nets for the 2017 mass campaign. The NMCP procured nets to cover half of the annual net need for routine distribution channels in 2016 and 2018 since the Global Fund malaria grant provided the quantity of nets needed for six months in these

two years. Therefore, PMI plans to contribute to the annual net need for the routine distribution channels in 2018 to ensure sufficient nets are available for pregnant women and fully immunized children at ANC and EPI services. The NMCP also intends to begin its durability monitoring of the 2017 campaign nets at selected sites in August/September 2017; due to this timing, PMI will be unable to assist with the durability monitoring activities but instead will offer to link the NMCP with PMI's durability and monitoring protocols and tools, allowing for standardized data reporting.

Plans and justification

PMI will procure approximately 675,000 ITNs to contribute to the annual net need in 2018 for the routine distribution channels (ANC and EPI). PMI will ensure ITNs are distributed from port of entry to districts and on to health facilities as needed, as the national system to move routine ITNs from national to district levels is not fully functional yet. Based on findings from the Global Fund-supported SBCC assessment and barrier analysis in 2017 (see SBCC section), PMI will support strengthening of SBCC activities to ensure ITNs distributed during the 2017 mass campaign and through the routine distribution channels are being used and maintained correctly by households. A national household survey in 2018 (e.g., an MIS or DHS) will provide coverage indicators for the 2017 campaign as well as from the routine distribution channels.

Proposed activities with FY 2017 funding: (\$3,591,000)

- **Procurement of ITNs.** PMI will procure approximately 675,000 ITNs for distribution through routine channels including at ANC and EPI visits, contributing to meeting Sierra Leone's routine distribution needs for calendar year 2018. (\$2,241,000)
- **Distribution of ITNs.** PMI will support the routine distribution of ITNs, including warehousing and transportation to the districts, and to facility level as needed, to ensure ITNs are available at ANC and EPI services. (\$1,350,000)
- **Support the NMCP to update the national SBCC strategy, support the development of a cohesive and standardized SBCC package to be used by partners, and contribute to the roll-out of SBCC in core malaria interventions.** PMI will provide support for strengthening malaria prevention and control messages (with a focus on increased ITN use) offered by facility-level health providers, CHWs, and community and religious leaders. This activity will build upon the assessment and barrier analysis for SBCC conducted and planned and conducted by Global Fund in calendar years 2016/2017. (See SBCC section.)

C. IRS

Intervention Overview/Current Status

The NMCP, with funding from WHO, conducted an IRS pilot study in 2011 and 2012 using lambda-cyhalothrin in selected Chiefdoms of Bo, Combai, Kono, and Western Rural districts.¹² The aim of this pilot in the four districts was to assess feasibility and community acceptability and to generate the evidence for scaling up IRS in Sierra Leone as a key component of the NMCP's IVM strategy. Spraying was carried out by the NMCP and the Department of Environmental Health and Sanitation of Sierra Leone, with the involvement of the four districts. The IRS pilot project was implemented in two phases: the first which was initiated in December 2010 and covered planning and collection of baseline data.

¹² Implementation of Indoor Residual Spraying to Assess Feasibility In Sierra Leone: Final Report : WHO, Regional Office for Africa, Brazzaville 2015 (<http://www.who.int/iris/handle/10665/205918>)

The spraying with lambda-cyhalothrin was carried out during the second phase in May to June 2012. Insecticide was applied only once to select homes and the entomological impact was not evaluated. However, a significant number of personnel were trained in IRS application and the logistical capacity to conduct a future operation may still exist.

The information collected during the first phase included vector susceptibility and community perception of IRS. In each district, three to four sentinel villages or chiefdoms were selected for entomological monitoring including monthly collection of adult mosquitoes. In each sentinel village or chiefdom, a simple random sampling was used to select houses or sites for adult mosquito collections. Window traps were used to collect mosquitoes exiting from the sprayed houses in each sentinel site in the district and pyrethrum spray collections were also used collect mosquitoes resting inside the houses.

Six different insecticides recommended by WHOPES were also evaluated for potential use in IRS operations before the spraying began. Results of the susceptibility testing indicated that malaria vectors were fully susceptible to pyrethroids (permethrin, lambda-cyhalothrin and deltamethrin), carbamate (bendiocarb) and organophosphate (malathion) but results showed reduced susceptibility to DDT.

A more recent follow-up survey carried out in 2016 however, indicates that malaria vectors are now resistant to pyrethroids (permethrin, lambda-cyhalothrin, cyfluthrin and deltamethrin) and DDT but maintained their susceptibility to carbamate (bendiocarb) and organophosphate. The trend of susceptibility status of malaria vectors to insecticides in Sierra Leone in 2010 and 2016 is shown in Table 6. A rapid decrease in susceptibility status across sentinel sites in Sierra Leone has occurred.

Table 6: Trend of insecticide resistance in malaria vectors in 2010 and 2016 in Sierra Leone

INSECTICIDE	DISTRICT	Mean corrected mortality (%)	
		2010	2016
Permethrin	Bombali	100	50.4
	Kono	100	60.0
	Bo	98.3	27.0
	Western Rural	100	66.0
Deltamethrin	Bombali	100	57.0
	Kono	100	58.0
	Bo	100	49.0
	Western Rural	100	38.0
Lambda-cyhalothrin	Bombali	100	53.0
	Kono	100	51.0
	Bo	100	43.0
	Western Rural	100	32.0
Cyfluthrin	Bombali	-	50.0
	Kono	-	77.4
	Bo	-	43.0
	Western Rural	-	36.0
DDT	Bombali	96.7	31.0
	Kono	96.7	47.6
	Bo	93.3	28.0
	Western Rural	96.7	7.0
Bendiocarb	Bombali	100	91.0
	Kono	100	93.0
	Bo	100	90.7
	Western Rural	100	91.0
Fenitrothion	Bombali	100	99.0
	Kono	100	99.0
	Bo	100	100.0

	Western Rural	100	94.7
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Source: Government of Sierra Leone, Ministry of Health and Sanitation, National Malaria Control Program: Insecticide Resistance Monitoring and Management Plan, 2016

A summary of IRS coverage rates in the four districts is shown in Table 7. A total of 76,393 households targeted protecting approximately 380,862 people. Based on the focus group meetings held in all four IRS pilot villages, community perception and acceptance of IRS was positive and people in the houses sprayed appreciated the broad-spectrum effect of the insecticide on other insects such as cockroaches. No incident of chemical reaction to or poisoning involving operators was reported.¹³

Table 7: Summary of households or rooms sprayed with lambda-cyhalothrin and percentage coverage in 2012

District	Total Rooms Targeted	Coverage Rate	Household Population	Population Protected
Western Area Rural	21,936	98.0	35,029	130,592
Bombali	24,810	95.0	78,603	97,078
Kono	11,312	99.5	30,509	101,495
Bo	18,335	99.0	45,004	51,661
Total	76,393	97.8	189,145	380,826

Source: Implementation of Indoor Residual Spraying to Assess Feasibility In Sierra Leone: Final Report: WHO, Regional Office for Africa, Brazzaville 2015

There are currently no IRS activities implemented by NMCP. Prior to the EVD outbreak, private mining companies articulated an interest in conducting IRS activities, but there are no current plans for private sector engagement in this area. The NMCP and partners would like to explore this type of partnership and leverage of resources.

Plans and justification

PMI will support IRS based on evidence from epidemiological and entomological surveillance conducted in 2017-2018 to target at least two of the highest burden districts in 2019 (contingent upon the availability of funding) in consultation with the NMCP. PMI will focus on building capacity of the NMCP to conduct IRS and entomological monitoring. Based on collection of quality entomological data for decision-making about IRS, PMI will also advocate for the inclusion of Sierra Leone as a recipient country for the UNITAID NgenIRS Project which provides co-payment for long-lasting IRS insecticides, and which potentially could allow for the expansion of IRS from two to four districts. PMI resources will support procurement of personal protective equipment, environmental compliance assessments, and entomological monitoring which evaluates both IRS impact and vector susceptibility to

¹³Implementation of Indoor Residual Spraying to Assess Feasibility In Sierra Leone: Final Report : WHO, Regional Office for Africa, Brazzaville 2015

a range of insecticides. Four sites across the country will be monitored for vector insecticide susceptibility and provide the necessary data to target programs. The sites will be specifically monitored for vector pyrethroid resistance, which threatens ITN performance, as well as pre- and post-IRS impact-related entomological indicators (i.e., vector density, taxonomy, and parity rates).

Proposed activities with FY 2017 funding: (\$1,951,000)

- **Procurement of insecticides and supplies for indoor residual spraying (IRS).** Procurement of insecticides and supplies to cover IRS in two districts (protecting approximately 1.2 million people). This procurement would prepare for one spray cycle in early 2019 of insecticide selected based on entomological monitoring data collected between 2017 and 2018. Training and other implementation expenses would be budgeted for with FY 2018 MOP funds, contingent upon the availability of funding. (\$1,916,000)
- **Support for environmental compliance inspection.** PMI will support the costs associated with appropriate environmental compliance visits and documentation prior to insecticide procurement. (\$35,000)

2. Malaria in pregnancy

NMCP/PMI objectives

The NMCP supports the WHO multi-pronged approach toward MIP with the provision and use of an ITN during pregnancy, intermittent preventive treatment during pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP), and prompt and effective case management of malaria and anemia. The NMSP (2016-2020) aims to protect at least 80% of pregnant women with three doses of IPTp-SP by 2020. The NMCP supports the full integration of MIP within the MoHS's Directorate of Reproductive and Child Health (DRCH). The NMCP is responsible for updating guidelines and job aids on IPTp, orienting health workers on updated IPTp guidelines, producing integrated data collection tools for MIP, procuring SP for the public and private sector and mobilizing communities on antenatal care attendance in collaboration with the DRCH. Currently however, there is no MIP task force that meets regularly to coordinate MIP efforts.

Intervention overview/Current status

In 2014, the NMCP adopted the 2012 WHO policy recommendations which ensure pregnant women receive IPTp-SP doses starting early in the second trimester of pregnancy (13 weeks) and continue to receive IPTp-SP until delivery with a minimum interval of one month between doses. IPTp is provided as part of the focused antenatal care (FANC) package of services at health facilities aimed at making pregnancy safer. Other components of the minimum FANC package include use of ITNs, Tetanus Toxoid immunization, effective and prompt malaria treatment, the treatment and prevention of anemia including sound nutritional guidance, provision of iron-folate, de-worming, and prevention of mother to child transmission of HIV. Pregnant women receive combined iron and folate daily supplements (30 mg iron and 0.4 mg folic acid) at ANC. Facility-based outreach services are used as a channel to deliver the minimum antenatal package closer to households including IPTp and ITNs to pregnant women. As an extension of health facility services, the NMCP has also trained traditional birth attendants (TBAs) to administer IPTp at the community level and to identify danger signs in pregnancy and promote early referrals. In 2013, the NMCP trained a total of 2,224 PHU staff and 1,888 TBAs in MIP. The Global Fund is the primary donor supporting the NMCP to achieve its MIP program objectives, including for the procurement of SP and ITNs.

ITNs are provided for free to pregnant women at first ANC visit and to the fully immunized child through EPI. The national treatment policy for the treatment of uncomplicated malaria cases during pregnancy is oral quinine plus clindamycin in the first trimester and an ACT in the second and third trimesters. The NMCP is concerned about anecdotal reports of medical practitioners reluctant to use the recommended treatment during the first trimester because of side effects of quinine.

According to the MIS 2016, IPTp2 and IPTp3 coverage is 71% and 31%, respectively. The MIS 2013 reported IPTp2 at 62%, which indicates an increase in IPTp2 uptake over the last three years. ANC attendance is generally high; the 2013 DHS reported 97% of women attended at least one ANC visit during their pregnancy and 76% completed all four recommended ANC visits. Use of an ITN by pregnant women is high in households with at least one ITN; 75% of pregnant women in households with an ITN reported sleeping under an ITN (MIS 2016).

The NMCP recognizes key challenges remain in supporting MIP implementation including the need to revise and update the IPTp policy guidelines, periodic SP stockouts at peripheral health facilities due to poor supply chain management practices, the lack of private sector engagement in MIP and IPTp administration, and inadequate monitoring and supervision of IPTp at the community level. Furthermore, during the 2014-2015 EVD outbreak, MIP services were impacted by weakened referral systems, strained health workers, and declines in hospital and ANC clinic attendance because of public fears over contracting EVD. Health facility staff and TBAs were unable to perform outreach and community activities during this period. In addition, some health facilities were converted into holding centers for EVD patients, thus further limiting access to ANC services.

MIP data is collected through two major sources: the routine HMIS system and national surveys (i.e., DHS and MIS). Health facility staff are responsible for collecting MIP monitoring data in the mother and neonate registers, ITN registers, health facility summary forms, and TBA registers. Monthly reports from the districts on the quantity of ITNs distributed and IPTp-SP administered are sent to the HMIS as well as the NMCP. Quarterly monitoring and supervision is conducted from the national level to districts using an integrated supervisory checklist. The HMIS has not yet been updated to capture IPTp3.

Table 8: Status of IPTp policy in Sierra Leone

National policy updated to reflect 2012 WHO guidance	2014
Status of training on updated IPTp policy	Health facility staff and TBAs have been informed of the new policy and there is a plan for training all staff by 2017.
Number of health care workers trained on new policy in the last year	All have been informed but not officially trained.
Are the revised guidelines available at the facility level?	No
ANC registers updated to capture 3 doses of IPTp-SP?	In process
HMIS/ DHIS updated to capture 3 doses of IPTp-SP?	In process; to be completed in 2017.

Commodity gap analysis

Table 9: SP Gap Analysis for Malaria in Pregnancy

Calendar Year	2016	2017	2018
Total Population (Population Growth Rate estimated at 3.2%)	7,302,062	7,535,727	7,776,871
SP Needs			
Total number of pregnant women attending ANC (estimated 97% ANC1, 85% ANC2, and 80% ANC3) *	841,782	868,719	896,518
Total SP Need (in treatments)	841,782	868,719	896,518
Partner Contributions			
SP carried over from previous year	0	462,510	1,608,005
SP from MoHS	0	0	0
SP from Global Fund through UNICEF	1,304,292	2,014,214	1,165,267
SP from Other Donors	0	0	0
SP planned with PMI funding	0	0	0
Total SP Available	1,304,292	2,476,724	2,773,272
Total SP Surplus (Gap)	462,510	1,608,005	1,876,754

*NMCP estimates pregnant women comprise 4.4% of the total population

The NMCP quantifies the annual IPTp - SP need for approximately 321,000 pregnant women (estimated at 4.4% of the total population with a 3.7% growth rate per year) who will receive SP at least 3 times during their pregnancy. Under the Global Fund malaria grant, the NMCP has planned for sufficient quantities of SP treatments to support all annual IPTp needs for pregnant women provided at ANC and in the community by trained TBAs.

Plans and justification

Although the national policy was updated in 2014 to reflect the 2012 WHO IPTp policy, the guidelines and training materials have not yet been updated. PMI will support the NMCP with updating the guidelines and training materials in line with the WHO IPTp policy recommendations and assist the NMCP and DRCH in establishing a national MIP working group for addressing technical issues and challenges. To ensure health providers are familiar with the new guidelines, PMI will support the NMCP's plan to train peripheral health providers including health facility staff, community health workers, midwives and public and private sector hospital staff on the updated MIP policy and guidelines. PMI will also support SBCC activities for improving a priority set of standard MIP messages focused on early initiation of ANC visits, uptake of IPTp and early and continuous ITN use by pregnant women.

Proposed activities with FY 2017 funding: (\$350,000)

- **Technical assistance in MIP at national level.** PMI will support the NMCP with updating the guidelines and training materials to reflect the 2012 WHO IPTp policy recommendations and support the national MIP working group. (\$100,000)

- **Training of health providers in MIP at district level.** PMI will support the NMCP's plan to train health providers in the updated MIP guidelines including health facility staff, community health workers, midwives, and public and private sector hospital staff. (\$250,000)
- **Support the NMCP to update the national SBCC strategy, support the development of a cohesive and standardized SBCC package to be used by partners, and contribute to the roll-out of SBCC in core malaria interventions.** PMI will provide support for strengthening malaria prevention and control messages (with a focus on the uptake of MIP interventions) offered by facility-level health providers, CHWs, and community and religious leaders. This activity will build upon the assessment and barrier analysis for SBCC conducted and planned and conducted by Global Fund in calendar years 2016/2017. (See SBCC section.)

3. Case management

A. Diagnosis and Treatment

NMCP/PMI objectives

The revised 2016-2020 Malaria Control Strategic Plan highlights two key case management objectives: (1) all suspected malaria cases should receive confirmatory diagnosis, and (2) all malaria cases should receive effective treatment. The malaria test-treat-and-track (T3) policy was introduced in 2010, with a focus on RDT use in most health facilities and in the community. Additionally, the 2015 Guidelines for Case Management of Malaria and the 2016-2020 National Quality Assurance Management Plan both outline NMCP objectives to improve scale and quality of case management practices, and the training, supervision, and quality control to accompany those practices at the facility and community levels. National policy requires quarterly supervision visits from the national to district level, monthly from district to the PHU, and monthly from the PHU to CHW.

Another strategic objective of the NMCP is to scale up and strengthen community case management of malaria (CCMm), with the intention to participate in an integrated (or iCCM) platform. The NMCP strategy states that they will contribute to CCMm by producing training materials for CHWs, coordinating supervision efforts of CHWs with trained NMCP staff, implementing partners, DHMTs, and PHU staff, and ensuring adequate supply of RDTs, ACTs, equipment, registers, treatment algorithms, and job aids in partnership with other partners. A national scale-up of the CHW program is planned for 2017, targeting up to 15,000 CHWs for training and equipping in iCCM. This aligns with PMI's objective to strengthen and improve the quality of community-based efforts in malaria case management, specifically through standardized training and supervision.

Intervention Overview/Current status

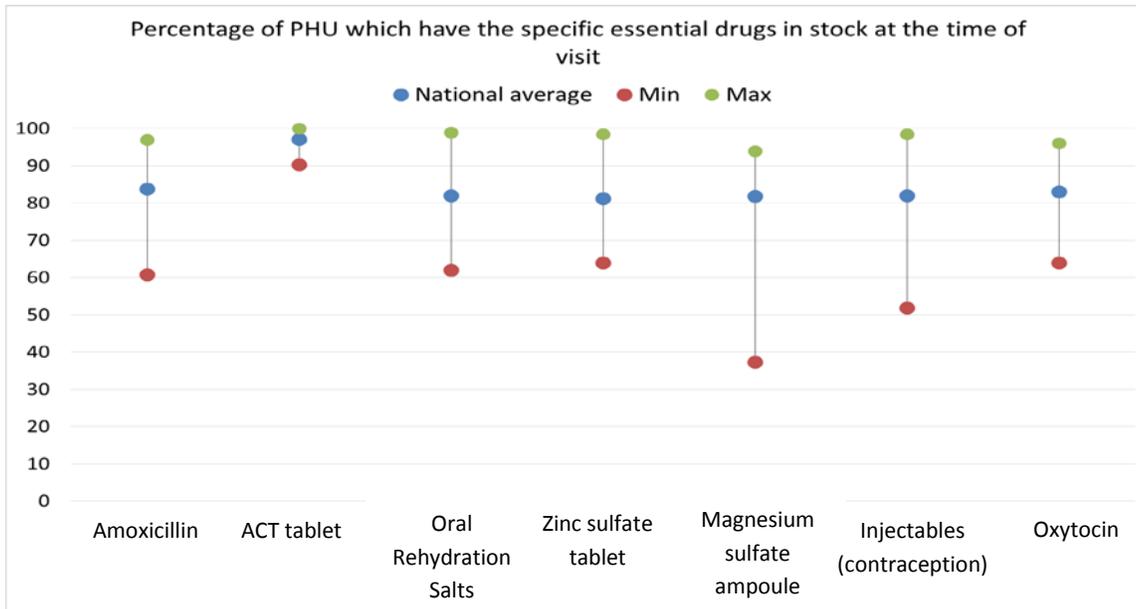
The national malaria policy of Sierra Leone recommends that all cases of suspected malaria should have a parasitological test conducted with either microscopy or RDT before administering antimalarial treatment. According to HMIS data, 94.5% of all malaria cases in Sierra Leone are parasitologically confirmed. RDTs are used across all levels of the health system, including at the community level by CHWs. National policy states that antimalarial treatment should be limited to cases with positive tests, and that patients with negative test results should be reassessed for other conditions and treated appropriately. According to the policy, treatment based solely on clinical suspicion should only be considered when parasitological diagnosis is not possible.

Microscopy capacity primarily exists at the hospital level and, in the 2015 HMIS data, accounted for around 2.5% of all confirmed malaria cases. There are currently 10 microscopists and 30 laboratory technicians trained in malaria microscopy in Sierra Leone in the public sector. A National Laboratory Manual for Malaria Diagnosis was updated and published in 2012 and includes guidance on laboratory management, quality control and assurance, and supervisory checklists. However, the country currently lacks a national slide bank for malaria microscopy, as well as adequate capacity for supervision, training, and quality control. Because of other post-EVD laboratory strengthening efforts, the public health system in general is supplied with operational microscopes, slides, etc. The NMCP is interested in integrating and building on the diagnostic infrastructure and capacity of existing TB microscopy to benefit malaria diagnostics.

The 2015 Guidelines for Case Management of Malaria outline that for uncomplicated malaria, the recommended first-line drug is artemether-lumefantrine (AL), except for pregnant women in their first trimester who should receive oral quinine-clindamycin. The recommended second-line drug is artesunate-amodiaquine (ASAQ). For severe malaria, the preferred initial treatment of all cases is parenteral artesunate (intravenous or intramuscular). When artesunate is not available, parenteral artemether or quinine (in that order of preference) may be used. If a severe case is recognized and requires referral to a higher level facility, the first dose of intramuscular artesunate or rectal artesunate (particularly at the community level) should be administered. In 2013, staff across all 1,200 PHUs received a refresher training in malaria case management. The next refresher training is scheduled for calendar year 2017.

Data suggest that availability of ACTs in Sierra Leone is relatively high, and the LMIS shows low frequencies of ACT stockouts in the health facilities compared to other essential medicines (See Figure 8). According to the 2013 MIS survey, 84% of under-five children with a fever and offered some form of treatment were administered an ACT (and preliminary data from the 2016 MIS survey indicate that this indicator increased to 97%). Although these indicators are encouraging, more investigation is needed on patient adherence to drug therapy and other aspects of malaria treatment. Additionally, due to lack of donor investment, management of severe malaria is an area where both commodity availability and health worker training are in need of strengthening. There are frequent stockouts of injectable artesunate at health facilities, and although a part of training and pre-referral treatment protocol for severe malaria, rectal artesunate is not currently distributed or purchased in Sierra Leone.

Figure 8. Percentage of PHU with essential drugs in stock at time of visit, October 2014.*



*Stock-level data accessed.

Source: NMCP 2016 MOP Planning Presentation.

To date, there have been three antimalarial therapeutic efficacy studies (TESs) conducted in Sierra Leone (in 2003¹⁴, 2011¹⁵, and 2016). Although the NMCP recommends drug resistance monitoring every two years, the 2014 study was cancelled and postponed to 2016 due to the EVD epidemic. The 2003 study included chloroquine (which was replaced with ASAQ as the first-line treatment in 2006) and SP day 28, with clinical failure rates of 39-78% and 17-46%, respectively. The 2011 study demonstrated efficacy of ASAQ and AL above 84% in the treatment of uncomplicated *P. falciparum* malaria among children under five years in four sentinel sites (Bo, Kenema, Rokupa, and Makeni). Results from this study indicated that both ASAQ and AL remain efficacious in Sierra Leone with presently no observed emergence of resistant strains to both drugs. AL became the first line treatment when the national case management policy was revised in October 2015. Additionally, during the mass drug administration of ASAQ in response to the EVD outbreak (see “Other Interventions” below), the NMCP noted multiple reports of side effects due to ASAQ, including dizziness and fatigue. The 2016 TES led by WHO is currently ongoing and is looking at efficacy and safety of AL, ASAQ, and Dihydroartemisinin-piperazine (DHAPQ) across four sentinel sites, and will incorporate K13 genotyping. There is a TES scheduled for 2018 to be led by WHO in the same four sites.

In the MIS 2013, 53% of children under five with a fever sought care from the public sector (with an additional 11% seeking care from the private sector, and 10% from other sources). Preliminary data from the MIS 2016 show that healthcare seeking in the public sector among children under five with a fever increased to 63%. The NMCP has identified a gap in accessing reliable data on the number of cases hospitalized for severe malaria in the public sector.

¹⁴ F. Checchi et al. *Evidence basis for antimalarial policy change in Sierra Leone: five in vivo efficacy studies of chloroquine, sulphadoxine-pyrimethamine and amodiaquine*. American Journal of Tropical Medicine. 2005

¹⁵ F. Sahr et al. *Assessment of the Therapeutic Efficacy of Two Artemisinin-Based Combinations in the Treatment of Uncomplicated Falciparum Malaria among Children Under 5 Years in Four District Hospitals in Sierra Leone*. Sierra Leone Journal of Biomedical Research. 2013

The national policy to expand CHWs was launched in 2012 with the aim to support the Basic Package of Essential Health Services, which included CCM as part of an iCCM platform covering pneumonia and diarrheal disease. For malaria services, CHWs are to be equipped with RDTs, ACTs, rectal artesunate suppositories for pre-referral treatment of severe malaria, SBCC materials, and basic patient registers and reporting forms, and should be supplied, trained, and supervised by their respective PHUs. In 2013, 6,515 CHWs were trained in community based malaria RDT use and treatment. The MoHS aims to scale up the CHW program in 2017 by increasing the total number of trained CHWs to 15,000 nationwide (around 1 CHW per 200-250 people within areas with a PHU within 3km distance, and 1 CHW per 100-150 people within areas with a PHU over 3km distance). A national CHW database will keep track of all trainings, status, and assigned health center. The current CHW program data flows into the HMIS and will continue to do so under program expansion. Implementation also includes plans for paid incentives with possible support from Global Fund, UNICEF, and DFID. A CHW Task Force has also been established to assist in coordinating efforts among partners and other MoHS sectors.

In 2010, the GoSL instituted the Free Health Care Initiative which eliminated user fees for under-fives and pregnant women, and in 2012 this was expanded to include everyone for diagnosis and treatment of malaria in the public and private sectors. However, some private facilities and clinics do not comply with the policies and guidelines on management of malaria, particularly those that have not signed a memorandum of understanding with the MoHS. Additional concerns on quality of care and data reporting plague private sector facilities.

Commodity gap analysis

The NMCP works with RBM, Global Fund, and MSH/SIAPS with the Quantimed software to prepare gap analyses for malaria commodities. The primary contributor of ACTs and RDTs in Sierra Leone is the Global Fund, and the current grant covers the time period from July 2016 to June 2018.

Table 10: RDT Gap Analysis

Calendar Year	2016	2017	2018
RDT Needs			
Total country population	7,302,062	7,535,727	7,776,871
Population at risk for malaria	7,302,062	7,535,727	7,776,871
PMI-targeted at-risk population*	7,302,062	7,535,727	7,776,871
Total number of projected fever cases**	8,535,110	8,809,265	9,091,162
Percent of fever cases tested with an RDT***	38%	43%	49%
Total RDT Needs	3,221,705	3,810,312	4,443,309
Partner Contributions			
RDTs carried over from previous year	0	0	754,818
RDTs from Government	0	0	0
RDTs from Global Fund****	3,181,488	4,565,130	2,359,856
RDTs from Other Donors	0	0	0
RDTs planned with PMI funding	0	0	0
Total RDTs Available	3,181,488	4,565,130	2,359,856
Total RDT Surplus (Gap)****	(40,217)	754,818	(1,328,635)
<p>*National quantification, based on 2015 Population Census and a growth rate of 3.2%.</p> <p>**Calculation of projected fever cases were quantified based on the following assumptions: According to the 2015 Population Census, the under 5 age group represents 16.9% of the population and it is assumed that this group will experience an average of 2 fever episodes annually. For the remaining population, one fever episode per year is assumed.</p> <p>***Calculation of the percent of fever cases tested with an RDT was based on the following assumptions: Based on data from the 2013 MIS survey, the percentage of fever cases seeking care for the under 5 population was set at 90%, 91%, and 92% for 2016, 2017, and 2018 respectively. Based on 2014 HMIS data, the percentage of fever cases seeking care for the population aged 5 and above was set at 50.2%, 60%, and 70% for 2016, 2017, and 2018 respectively. Out of those fever cases seeking care, 78% of the population is expected to present at public health facilities (2013 MIS). If the target is that 100% of presenting fever cases will receive a diagnostic test in the public sector, it is assumed that 85% will receive an RDT result with 15% receiving a result from microscopy (based on country estimates). The resulting percentage of all fever cases receiving an RDT in the public sector is 38%, 43% and 48% for 2016, 2017, and 2018 respectively.</p> <p>****RDTs contributed by the Global Fund only reflects the current grant period of July 2016 to June 2018. The gaps observed in 2016 and 2018 exist because only half of the Global Fund's total contribution is presented. The assumption is that Global Fund will continue to be the primary procurer of RDTs in July 2018 and will fill the remaining gap in calendar year 2018. The July 2016 Global Fund procurement was inclusive of a 3-month buffer.</p>			

Table 11: ACT Gap Analysis

Calendar Year	2016	2017	2018
ACT Needs			
Total country population	7,302,062	7,535,727	7,776,871
Population at risk for malaria	7,302,062	7,535,727	7,776,871
PMI-targeted at-risk population*	7,302,062	7,535,727	7,776,871
Total projected number of malaria cases**	2,438,937	2,884,531	3,363,731
Total ACT Needs	2,438,937	2,884,531	3,363,731
Partner Contributions			
ACTs carried over from previous year	0	397,495	318,814
ACTs from Government	0	0	0
ACTs from Global Fund***	2,836,432	2,805,850	1,320,653
ACTs from Other Donors	0	0	0
ACTs planned with PMI funding	0	0	0
Total ACTs Available	2,836,432	3,203,345	1,639,467
Total ACT Surplus (Gap)***	397,495	318,814	(1,724,264)
<p>*National quantification, based on 2015 Population Census and a growth rate of 3.2%.</p> <p>**Calculation of projected number of malaria cases were quantified based on the following assumptions: According to previous RDT calculations for the projected number of fever cases seeking care in the public sector receiving any diagnostic test (please see footnotes in RDT Gap Analysis Table), malaria test positivity rates were applied to calculate the number of ACTs needed. The 2014 HMIS data suggest that the positivity rate is 64.5% for the under 5 population and 58.3% for those aged 5 and above. An additional 5% of malaria cases was added to account for non-adherence to negative diagnosis, based on an RBM recommendation.</p> <p>***ACTs contributed by the Global Fund only reflects the current grant period of July 2016 to June 2018. The gap observed in 2018 exists because only half of the Global Fund's total contribution is presented. The assumption is that Global Fund will continue to be the primary procurer of ACTs in July 2018 and will fill the remaining gap in calendar year 2018. The July 2016 Global Fund procurement was inclusive of a 6-month buffer.</p>			

For severe malaria drug quantification, it was assumed that around 5% of uncomplicated malaria cases progress to severe disease. Taking into account the need for injectable artesunate at the facility level, PMI plans to contribute to the national annual commodity pool using FY 2017 funds. This would cover an estimated 600,000 vials of 60mg injectable artesunate. In addition, to complement the efforts to expand the CHW program and improved case management training at all levels, PMI plans to support a pilot of rectal artesunate for pre-referral treatment at the community level. An estimated 6,000 suppositories (100mg) would be supplied to CHWs covering a defined area, to be determined.

Plans and justification

PMI does not plan to procure ACTs or RDTs in FY 2017 based on results of commodity gap analyses and the anticipated coverage of the next Global Fund grant, and will instead contribute to drugs for

severe malaria (specifically injectable artesunate for facility use and a proportion of rectal artesunate for use by CHWs) and the associated storage and distribution costs. The procurements will be added to the national stock, and will be stored and distributed through a parallel system set up by the Global Fund and UNICEF (see Pharmaceutical Management section).

Despite adequate availability of diagnostic tests and antimalarial treatments in Sierra Leone, malaria morbidity and mortality remain high. To help reduce malaria burden, PMI will focus on training and supervision, as well as improving the quality of malaria diagnosis and case management practices. PMI plans to fund activities at all levels of the health delivery system, including the national laboratory, public and private health facilities, and at the community:

- CDC has been conducting efforts to strengthen overall laboratory capacity in Sierra Leone through the GHSA, and PMI will provide technical assistance and support to strengthen malaria microscopy capacity through the creation of a national slide bank and improving quality control and assurance efforts.
- At facility and community levels, PMI will strengthen malaria case management practices through training, supervision, and quality assurance, with a particular emphasis on severe malaria management (which has been identified as neglected area of services provided). Additionally, PMI will work to standardize key SBCC messages for improved care seeking behaviors and practices in the community, particularly early care-seeking for children under five years of age.
- The NMCP has attempted to partner with the private sector, where private sector facilities sign memoranda of understanding (MOUs) with the MoHS that ensure that malaria diagnosis and treatment is provided for free in those facilities. In general, it seems that private facilities have been reluctant to follow the Free Health Care Initiative guidelines and sign the MOUs. Since 17% of Sierra Leone's population seeks malaria services in the private sector (2013 MIS), PMI will assist the NMCP to establish stronger linkages with private providers to improve the quality and capacity of case management practices through training, encouraging compliance, and improving data collection and reporting.

Proposed activities with FY 2017 funding: (\$4,150,000)

- **Procurement of severe malaria treatments.** PMI plans to procure approximately 600,000 vials of injectable artesunate treatments and 6,000 pre-referral rectal artesunate suppositories for use by health facilities and for a pilot by CHWs in the expanded community program, respectively. (\$1,550,000)
- **Distribution and storage of severe malaria treatments.** PMI will contribute funds to support distribution and storage of severe drug commodities. The current storage and distribution system for all malaria commodities is handled via UNICEF. (\$50,000)
- **Strengthening the national laboratory diagnostics (microscopy) capacity, quality assurance, and national slide bank development.** PMI will coordinate and complement other partners' laboratory strengthening efforts by focusing on malaria diagnostics and microscopy at the national reference laboratory level, including the development of a national slide bank. (\$200,000)
- **Strengthening case management practices at the public facility level, with particular emphasis on severe malaria.** PMI will strengthen supportive supervision and training of

health care workers in diagnostics and treatment, with particular emphasis on improving severe malaria diagnosis and case management. (\$1,000,000)

- **Support scale-up of CHWs and case management at the community level.** Collaborating with other donors, PMI will support the planned scale-up of the iCCM program by contributing resources for training and supervision of CHWs. Training on severe malaria case management will be emphasized. (\$1,200,000)
- **Support training in case management and data sharing in the private sector.** PMI will assist the NMCP in improving the engagement of the private sector by focusing on case management training and data collection and reporting. (\$150,000)
- **Support the NMCP to update the national SBCC strategy, support the development of a cohesive and standardized SBCC package to be used by partners, and contribute to the roll-out of SBCC in core malaria interventions.** PMI will provide support for strengthening malaria prevention and control messages (with a focus on improved care seeking behavior) offered by facility-level health providers, CHWs, and community and religious leaders. This activity will build upon the assessment and barrier analysis for SBCC conducted and planned and conducted by Global Fund in calendar years 2016/2017. (See SBCC section.)

B. Pharmaceutical management

NMCP/PMI objectives

Under the MoHS, the Directorate of Drug and Medical Supplies (DDMS) is responsible for pharmaceutical management activities. The primary drug regulatory body is the Pharmacy Board of Sierra Leone (PBSL), which oversees quality and pharmacovigilance activities. Established in 2012, the National Pharmaceutical Procurement Unit (NPPU) was to be responsible for procurement, storage and distribution of general health commodities. The NPPU was to take on that full responsibility in 2014, however a number of challenges, including the EVD outbreak, have prevented that from happening. After a series of challenges and concerns regarding transparency and accountability, the NPPU is currently undergoing a reform which involves both the macro-level governance, as well as technical pharmaceutical supply management. The new body that will replace the NPPU, the National Medical Supply Agency (NMSA), is expected to be established by early 2017. In the meantime, Free Health Care Initiative drugs and supplies, as well as malaria commodities, are distributed through separate parallel systems. Building off of previously published documents on procurement practices (ex. 2012 National Medicines Policy and the 2010 Sierra Leone LMIS Standard Operating Procedure Manual), in 2016 a Malaria Procurement and Supply Management Plan was developed in close collaboration with the PBSL and the TB and HIV/AIDS national programs.

Current status

Since 2012, the national stocks of ACTs and RDTs have remained relatively stable in Sierra Leone. The NMCP has maintained adequate supplies of SP for IPTp with Global Fund and UNICEF support, although the NMCP mentioned that periodic stock outs have occurred at peripheral levels. The supply chain for malaria commodities is semi-integrated, and the NMCP conducts forecasting and inventory for ITNs, drugs for uncomplicated and severe malaria, SP for IPTp and RDTs. There are two major central medical stores at the national level and one in each district. Since 2013, malaria commodities have been

distributed through a parallel system. The NMCP has a Memorandum of Understanding with UNICEF to facilitate delivery from the central to the district level on a quarterly-basis, and then from the district to the PHU level using a “push system” managed by the district-level malaria focal persons. The expectation is that the NPPU will eventually take over distribution in an integrated system. Inventory of malaria commodities is kept across all levels and data within the LMIS is reported through paper-based and electronic formats (currently Channel, but being updated to mSupply). In its current form, the LMIS system still struggles with data quality (including completeness and timeliness) and data use to inform forecasting and quantification, especially at the secondary and tertiary levels of the health system. Supervision is to be conducted at the PHU-level by District Pharmacists or District Logistic Officers (DLOs).

The PBSL conducts post market surveillance, inspection of medical stores, and drug safety monitoring activities. The PBSL drug quality laboratory is currently not accredited nor WHO prequalified. Since Global Fund policy requires that samples be tested at an accredited and prequalified laboratory, Sierra Leone must send their samples out of the country to be tested at an annual cost of over \$100,000. This highlights the NMCP’s motivation and urgency to secure certification for the PBSL, and that process has been initiated.

For the last two years, USAID has supported strengthening governance and leadership in supply chain and procurement at the national level, as well as strengthening supply chain and pharmaceutical monitoring and supervision at the district and facility levels. USAID has also supported capacity building and improvements in the data quality, flow, and use across all levels of the health system.

Plans and justification

In FY 2017, PMI plans to procure severe malaria drugs which will be distributed through the parallel storage and distribution system (already in place for Global Fund malaria commodities, i.e., quarterly delivery through UNICEF). However, PMI and other donors share the vision that an integrated pharmaceutical management system is the ultimate goal, and the capacity of the central level and national supply chain and procurement system must be strengthened in the long-term. As a first short-term step in this process, PMI will focus on building in-country capacity for drug testing and quality assurance including support for the accreditation process of the PBSL drug quality laboratory so that national level skills are strengthened and limited resources are not spent on testing samples out of the country overseas. PMI will also provide limited support for LMIS training and equipment (including computers, printers, and other hardware) in order to improve the country’s capacity to collect quality inventory data across all levels and support commodity forecasting.

Proposed activities with FY 2017 funding: (\$350,000)

- **Support the International Standards Organization (ISO) accreditation of the pharmacy laboratory (drug testing and quality control/assurance).** This activity will build on existing efforts to support ISO accreditation to help support the national pharmacy laboratory. (\$100,000)
- **Strengthen LMIS.** PMI will support training and procurement of equipment required for LMIS implementation and management, with the aim to improve availability and use of consumption data at the district and facility level. (\$250,000)

4. Health system strengthening and capacity building

PMI supports a broad array of health system strengthening activities which cut across intervention areas, such as training of health workers, supply chain management and health information systems strengthening, drug quality monitoring, and NMCP capacity building.

NMCP/PMI objectives

The Sierra Leone health system has significant challenges, including a shortage of qualified staff at all levels of the system. The recent EVD outbreak has further stressed the system. The MoHS has prioritized human resources for health, health financing, health management information system, and logistics management as the priorities for health systems strengthening. To improve ownership and management of malaria activities, the NMCP's strategic plan prioritizes capacity building as a cross cutting intervention by strengthening the national and districts' capacity to deliver malaria control services at all levels. The NMCP aims to conduct capacity needs assessments to identify staffing gaps and to address infrastructure gaps (office space and equipment). The NMCP prioritizes strengthening core MoHS-wide management systems that are essential for effective delivery and management of malaria services, such as strengthening procurement and supply chain management of malaria commodities, improving malaria data collection and reporting through HMIS, and strengthening coordination and partnerships in malaria.

Current status

The NMCP supports districts to hold monthly coordination meetings with partners implementing malaria control activities and DHMTs where feedback is provided and key issues relating to malaria control are discussed. The NMCP also supports annual district integrated health sector planning to include key malaria interventions in their work plans, and conduct regular integrated supportive supervision.

Quantification of malaria pharmaceuticals and non-pharmaceuticals should be the responsibility of the DDMS working in collaboration with the NMCP. The supply of ACTs at health facilities has improved over time with the increase in commodity availability through improved national forecasting as well as distribution through a parallel malaria commodity supply system (UNICEF). However, supply of antimalarials from health facilities to CHWs still remain a challenge. Currently, procurement of antimalarials is through the Global Fund-supported Voluntary Pooled Procurement system.

In line with the targets of the MoHS stipulated in the public-private partnership strategy framework, the NMCP commits to spearhead a strong partnership through coordination meetings with the private sector medical providers specifically to address effective malaria treatment and prevention strategies. This plan has embraced a multi-sectoral approach to ensure implementation and lobbying for support from the private sector. The NMCP conducts monthly/quarterly coordination meetings and joint supervisions with other ministries, government departments and implementing partners.

The NMCP has targeted donor investment towards building the capacity of technicians across various areas, including support for trainings in entomology and monitoring and evaluation, but more resources are needed for these activities to improve both the quantity and quality of technicians at national and district levels. The NMCP also intends to address programmatic issues and challenges with informed evidenced-based solutions. To this end, the NMCP plans on strengthening research capacity in-country and partnering with research/academia and other national and international research institutions, and will develop an operational research agenda and strategy.

Since 2015, USAID has supported a long-term technical advisor (LTTA) embedded in the NMCP to assist with building capacity in management, leadership and governance. The advisor has developed a capacity building and training plan for key staff on SM&E, surveillance, and other technical areas. The advisor also assists with the coordination and development of Global Fund grants and concept notes including analysis of commodity gaps.

CDC has initiated a short-term training on basic epidemiology through the Field Epidemiology and Laboratory Training Program (FELTP). The three-month course is comprised of a one-month didactic course followed by a two-month field practicum. Three cohorts (each cohort has approximately 15 participants) have been trained so far, and two additional cohorts will be trained before the course is lengthened to a medium-term training (9-12 months in duration). The medium term training is scheduled to begin September 2017. Students are selected from the sub-district chiefdom level and are typically the community health officer assigned to the chiefdom.

The U.S. Peace Corps has increased its presence in Sierra Leone post-EVD outbreak and the volunteers are located in communities where they would be able provide key malaria messages.

Plans and justification

PMI plans to continue supporting an embedded long-term technical assistance provider to assist with coordination with Global Fund grant processes and help build overall leadership and capacity at the national level. Additionally, to build capacity in operational research, PMI will support the development of a Malaria Operational Research Priority agenda in order to prioritize and streamline efforts in Sierra Leone across partners and to help identify and address bottlenecks in malaria prevention and control efforts. In addition, PMI will support training activities focused on malaria related activities including surveillance, monitoring and evaluation at the chiefdom level. Finally, PMI will support Peace Corps education and health volunteers to work in malaria prevention and control and to assist the NMCP to identify and address programmatic gaps in community malaria interventions.

Proposed activities with FY 2017 funding: (\$630,000)

- **Long-term technical assistance for NMCP.** PMI will continue to support one long-term technical advisor embedded at the NMCP to provide management and leadership assistance and support. (\$400,000)
- **Strengthen epidemiologic and disease surveillance capacity through training activities.** PMI will build in-country epidemiologic capacity through the support of malaria focused trainees identified at the district and chiefdom levels. (\$150,000)
- **Strengthen community capacity in malaria interventions through Peace Corps.** PMI will support up to three Peace Corps Volunteers, linked with an implementing partner, to coordinate malaria activities and projects at the community level. (\$30,000)
- **Support the development of Malaria Operational Research Priority Agenda.** PMI will support the NMCP to develop a streamlined operational research agenda, including a workshop and strategy document. (\$50,000)

Table 12: Health Systems Strengthening Activities

HSS Building Block	Technical Area	Description of Activity
Health Services	Case Management	Improve the quality of malaria clinical services through training and supportive supervision. Focus on severe case management.
Health Workforce	Health Systems Strengthening	Build host country managerial and leadership capacity for effective malaria control through training and technical assistance and the provision of long term technical assistance.
Health Information	Surveillance, Monitoring, and Evaluation	Through training, supportive supervision and provision of equipment: <ul style="list-style-type: none"> • Support analysis and use of routine malaria data at the national, district, chiefdom, and facility levels. • Support decentralization of data management responsibilities from districts to chiefdom.
		Support the strengthening of LMIS including district and chiefdom levels.
		Build epidemiological, surveillance & SM&E capacity.
Essential Medical Products, Vaccines, and Technologies	Pharmaceutical Management	Support improved forecasting, procurement, quality control, storage, and distribution of malaria commodities, such as insecticide-treated nets, artemisinin-based combination therapies, and rapid diagnostic tests
		Strengthen the regulatory environment for pharmaceutical management and routine monitoring of drug quality
Leadership and Governance	Health Systems Strengthening	Strengthen NMCP and national coordinating and regulatory bodies to direct and manage malaria resources, develop guidelines, and improve quality of services; and strengthen the managerial and technical capacity of Country Health Teams

5. Social and behavior change communication

NMCP/PMI objectives

For social and behavior change communication (SBCC), Sierra Leone’s 2016-2020 national strategy outlines an objective to provide knowledge to the population such that at least 80% practice correct malaria prevention and treatment measures by 2018. As a part of the iCCM platform, SBCC messaging is also an important component of CHW trainings. The NMCP and PMI are aligned in their goals to provide quality messaging around consistent and correct use of ITNs, ANC attendance and IPTp delivery, prompt care-seeking for fever and for more severe disease symptoms, adherence to prescribed treatment, and overall knowledge about the cause of malaria. The NMCP chairs a national malaria

SBCC task force comprised of many stakeholders and public and private sector partners implementing SBCC activities. The last national SBCC was developed for the period of 2009-2013.

Current status

Findings from MISs indicate that there is a relatively high level of awareness of malaria prevention and control at the community level. Of women interviewed between the ages of 15 and 49, for example, 94% reported knowledge that mosquito bites led to malaria and 90% reported knowledge that treated mosquito nets could help prevent malaria (MIS 2016). Despite high awareness regarding ITNs, there are still gaps in improved practice on indicators such as ITN use and IPTp uptake. Additionally, given the high disease burden and case fatality seen due to malaria, there is a need to further encourage prompt care-seeking behavior and recognition of severe disease, especially in small children. The EVD outbreak also impacted on the health system and community structures, and influenced social and community norms, including timely malaria care-seeking practices during the outbreak.

To date, the majority of malaria-specific SBCC activities in Sierra Leone have utilized interpersonal communication channels through health facilities, CHWs, street theater via local drama groups, and community leaders. In addition, community and school-based health clubs (2,236 and 780, respectively) have been supported by the Global Fund malaria grant, focus on face-to-face communication activities within a given community and are tied to nearby PHUs, where they are to receive training in malaria prevention and control. In addition, mass media has been utilized in the form of radio broadcasts (with 39 participating stations) and billboard signs (in all 14 districts).

The interfaith community in Sierra Leone has also played an important role in malaria SBCC. Between 2011 and 2016, the Tony Blair Faith Foundation engaged religious leaders, both imams and pastors, in training on malaria prevention and control, Approximately 700 faith leaders were trained to offer messaging during religious services and interactions, and 20,000 “faith champion volunteers” visited households providing interpersonal communication. Messages focused on treatment-seeking behaviors, use of IPTp, and ITN use. The project closed in September 2016 and evaluation results are pending. The NMCP is currently looking for opportunities to continue this work through faith-based organizations and in particular will ask faith leaders to assist with mobilizing the community during the 2017 mass ITN campaign.

In 2016, a partner mapping exercise was conducted by the NMCP and CRS/Global Fund to identify how many partners are working in the field, where they are concentrated, and what types of malaria interventions they are focusing on. A total of 28 partners were identified as conducting malaria activities in Sierra Leone, with each district having between 8 and 17 total partners present. The results of this exercise suggested that 22 of the 28 partners implement malaria SBCC activities, raising concern that with the roll-out of multiple methodologies and messages, there is a lack of cohesiveness in key communication and mobilization efforts. The latest national SBCC strategy was developed for the period 2009-2013, and needs to be updated to allow for better coordination among partners. Although multiple partners may be present in a given district, this analysis also showed an imbalance in the chiefdoms covered within each district. As a result, malaria SBCC interventions reached only 45% of the total population.

The NMCP also plans to conduct a more detailed and in-depth assessment of SBCC messages and activities, building on the findings from the partner mapping exercise. Under the Global Fund malaria grant, the NMCP will conduct a malaria-specific assessment and barrier analysis in 2016-2017:

- The three-week SBCC assessment will look at all malaria-focused SBCC activities conducted in Sierra Leone, with a particular focus on methodologies and identification of key stakeholders in an effort to learn more about implementing quality of SBCC.
- The barrier analysis will consist of focus groups and key stakeholder interviews. Discussions will pinpoint barriers to uptake of SBCC implementation, drivers of behaviors, and gaps and inconsistencies in malaria messaging.

Plans and justification

PMI plans to support the NMCP in updating the national SBCC strategy, with a focus on supporting the development of a cohesive and standardized SBCC package. The 2016 partner mapping exercise mentioned above demonstrated that there are multiple organizations on the ground conducting SBCC in malaria. However, after understanding the presence and geographic distribution of SBCC partners, a logical next step is to help the NMCP coordinate efforts, standardize messages, and improve the quality of the communication and delivery of malaria-focused SBCC. PMI will also partner to roll-out the updated national strategy and implement SBCC activities where there are identified gaps in partner presence and lack of capacity. Planned support for SBCC implementation will be based on a thorough review of the results from the 2016/2017 SBCC assessment and barrier analysis that will become available in the coming months. Contingent on available funding, PMI would plan to support any additional research that might be needed with FY 2018 funds.

PMI will support the NMCP's efforts to strengthen and standardize SBCC messages and improve coordination among partner activities based on findings and recommendations from the assessment and barrier analysis. By supporting the NMCP to update the SBCC strategy around messaging and implementation approaches, PMI will assist Sierra Leone to coordinate efforts by various existing partners, thus extending the reach of knowledge and practice of preventive and care-seeking behaviors.

Proposed activities with FY 2017 funding: (\$450,000)

- **Support the NMCP to update the national SBCC strategy and support the development of a cohesive and standardized SBCC package to be used by partners.** PMI will provide support for strengthening malaria prevention and control messages (for increased ITN use, MIP intervention uptake, and care seeking behaviors) offered by facility-level health providers, CHWs, and community and religious leaders. This activity will build upon the assessment and barrier analysis for SBCC planned and conducted by Global Fund in calendar years 2016/2017. (\$100,000)
- **Support the NMCP by contributing to the roll-out of SBCC in core malaria interventions.** PMI will offer implementation support in the geographic and technical areas identified in the results of the assessment and barrier analysis for SBCC planned and conducted by Global Fund in calendar years 2016/2017. (\$350,000)

6. Surveillance, monitoring, and evaluation

NMCP/PMI objectives

The Sierra Leone NMCP's SM&E strategic objective is to strengthen surveillance, monitoring, evaluation and operational research for effective program management. The NMCP aims for at least 95% of health facilities reporting routinely on malaria program performance by 2020. To achieve this objective, the NMCP supports the following key strategies: (1) improve on malaria data collection and reporting through HMIS (public and community); (2) improve on data demand and use at all levels; (3) conduct regular malaria surveys/evaluations; (4) strengthen routine epidemiological, parasitological and

entomological capacity for malaria surveillance; and (5) develop and implement an Operational Research Agenda to generate evidence for decision making. The NMCP's SM&E strategy is coordinated with the national SM&E strategy and is currently supported by the Global Fund, with UNICEF and WHO providing technical and material assistance. The Global Fund, in particular, is focusing on strengthening the overall SM&E system by providing resource to the DPPI to train staff on DHIS2 software and to engage University of Oslo to provide on-going technical support. The Global Fund is also providing resources to train SM&E officers at the district level, but their efforts are across the entire health program and not specific to malaria.

Current status

The NMCP has four SM&E officers and three data entry clerks, including a senior SM&E focal person. The SM&E staff are responsible for ensuring that malaria data are captured in a timely manner and reported to the NMCP program manager for donor reporting and programming. The Sierra Leone HMIS is based on the DHIS2 platform and is managed by DPPI. Each health facility captures daily data on several registers, and at the end of the month, register information is summarized on eight monthly summary forms (PHU1 – PHU8). These forms are then sent to the district SM&E officer by the fifth of the month. Upon receipt of the forms, the district SM&E officer and data entry clerk are supposed to input the information into DHIS2 by the fifteenth of the month. However, there are significant delays and completeness challenges due to several factors, including the work load. For example, the number of health facilities per district range from 62 in Bonthe to 149 in Western Area, which means that for some districts over 1,000 pages of data need to be entered every month within 10 days of receipt of the forms. A quick review of the DHIS2 reporting completeness and timeliness data show that both indicators are very low, with reporting completeness ranging from 0 to over 90%, with many districts far below 50%. Some districts currently do not have an SM&E officer or data clerk.

There are several NMCP specific summary forms at the district level that capture data from the eight summary forms (PHU1 – PHU8). NMCP summary forms are completed by the district malaria focal persons manually and sent to the NMCP every month. NMCP enters district summary forms upon receipt. Unfortunately, malaria, along with many other vertical programs, divert the PH forms for their own data summary needs before returning them, delaying the overall data entry by the district SM&E officer. This may be one of the reasons for observed delay in reporting.

NMCP is currently integrating their data collection with the mainstream collection into DHIS2. Upon completion, DHIS2 will be used to generate NMCP summary forms rather than relying on district malaria focal persons to manually complete the summary forms. NMCP expects that the integration of the malaria routine reporting will be completed by February 2017.

Surveys

Sierra Leone recently completed a MIS in 2016, with field data collection taking place between July and August 2016. Data are currently being analyzed and the final MIS report will be available by December 2016. A data analysis and writing workshop for the MIS was held in October 2016 by a MEASURE consultant. The last DHS was completed in 2013 and the next DHS is scheduled for 2018. A SARA health facility survey funded by the Global Fund is scheduled to be conducted December 2016. The SARA will be a census of all public health facilities in the country and will include the malaria quality of care (exit interview) module.

Table 13: Surveillance, Monitoring, and Evaluation Data Sources

Data Source	Survey Activities	Year					
		2013	2014	2015	2016	2017	2018
Household surveys	Demographic Health Survey (DHS)	X					(X)
	Malaria Indicator Survey (MIS)	X			X		
Health Facility and Other Surveys	Health facility survey				X*		(X)
Malaria Surveillance and Routine System Support	Support to HMIS/DHIS2					(X)	(X)
	Support to malaria surveillance system					(X)	(X)
Therapeutic efficacy monitoring	<i>In vivo</i> efficacy testing				X		(X)
Entomology	Entomological surveillance and resistance monitoring					(X)	(X)

*Planned for November 2016. For all health programs and includes malaria exit interview module. Will assess all health facilities in the country. Will use the SARA tool.

(X) – Planned activities, any funding source

Routine Information System

Sierra Leone's HMIS uses the DHIS2 software. The system is deployed in all districts. Currently, most large vertical programs (malaria, reproductive health, TB, etc.) also collect district level monthly program specific data in addition to DHIS2, although efforts are underway to eliminate duplicative disease-specific vertical reporting systems. Among various MoHS programs, the NMCP may be the strongest technically to help coordinate improvements to the DHIS2, and is leading the efforts to strengthen it.

DPPI's strategy is to further decentralize HMIS data management down to the chiefdom level (there are a total of 149 chiefdoms in the country). The plan is to have PHUs submit the PH forms monthly to the chiefdom, instead of to the districts for compiling and data entry. By shifting data entry activities to the chiefdom level, district level staff (SM&E officer, malaria focal persons) will have time to focus their efforts on data quality, analysis and use, and supportive supervision.

Table 14: Routine Surveillance Indicators

Indicators – 2015	Value	Comments
1. Total number of reported malaria cases Data source: HMIS		
Total diagnostically confirmed cases	1,483,376	Microscopy: 37,820 (2.5%)
Total clinical/presumed/unconfirmed cases	1,569,606	
2. Total number of reported malaria deaths Data source: HMIS		
Aggregate “malaria” deaths	1,107	
3. Malaria test positivity rate Data source: HMIS		
Numerator: Number of confirmed malaria cases	1,483,376	TPR: 65.9%
Denominator: Number of patients receiving a diagnostic test for malaria (RDT or microscopy)	2,251,067	Microscopy: 75,025 (3.3%) RDT: 2,176,042
4. Completeness of monthly health facility reporting Data source: HMIS		
Numerator: Number of monthly reports received from health facilities	1,218*	
Denominator: Number of health facility reports expected (i.e., number of facilities expected to report multiplied by the number of months considered)	1,223	

*The number provided may be inflated based on comparison with actual DHIS2 data that were reviewed during the MOP.

Plans and justification

The NMCP SM&E plan (2016–2020) is currently integrated and financed by the Global Fund and the GoSL, with additional activities supported by WHO. PMI support to the NMCP’s SM&E strategy will complement Global Fund support and will help provide key malaria data for monitoring malaria program implementation. The NMCP SM&E capacity includes four SM&E staff and three data clerks. This is sufficient to manage current level of work, with part time assistance from the embedded long term technical assistance.

HMIS (DHIS2) data reporting and use are key priorities for the NMCP. The Global Fund is providing resources for the NMCP and DPPI to work at the national level to strengthen DHIS2 through training and technical assistance. The Global Fund is also providing resources at the district level for SM&E training (across all health programs). As described previously, DPPI’s strategy is to further decentralize data management down to the chiefdom level. Therefore, PMI will focus on improving malaria data quality and timeliness by strengthening the capacity and infrastructure at the district and chiefdom levels, including appropriate use of data for decision making, and supportive supervisions. At the national level, PMI will provide support to the NMCP SM&E team and DPPI for supportive supervision.

At the district and chiefdom levels, the focus will be on training (improving data quality, data analysis and use), and provision of computer and information technology equipment. These activities will help with timeliness and completeness of DHIS2 reporting from the district and lead the way for integration of other vertical disease programs into a single data capture/reporting system using DHIS2. Support for

supportive supervision from districts to health facilities will help with mentoring facilities that are not reporting, continue to be late in reporting, or submit poor quality data.

PMI will provide support to the 2018 DHS efforts in order to better understand the malaria profile and intervention coverage in the country. As a follow-up to the 2016 HFS that used SARA tool to examine all health facilities in the country, PMI will support a HFS in 2018 to assess changes in health facility malaria indicators including quality and practice of case management. The 2018 HFS will not be a census, but a sample of health facilities.

Proposed activities with FY 2017 funding: (\$1,220,000)

- **Strengthen data collection, analysis and use (national level).** PMI will support improving the analysis and use of various sources of data including survey data (household and facility), HMIS data, implementing partner data for decision-making at the national level by the NMCP. The activity will also provide support to DPPI for strengthening DHIS2 through supportive supervision. (\$100,000)
- **Strengthen data collection and use (district and sub-district chiefdom level).** PMI will support improving the collection, reporting, and use of routine malaria data at the district and chiefdom levels through capacity building of malaria focal persons, SM&E teams, and community health officers and ensuring that sufficient infrastructure capacity exist to collect, analyze and report quality malaria data using DHIS2. District level efforts will also strengthen data from the supply chain to ensure that commodity consumption is reported and to minimize stock-outs. The activity will embed technical assistance at districts for mentoring district and chiefdom level staff, assist with the analysis and dissemination of malaria data, and participate in supervision and training of lower level staff. (\$650,000)
- **Support for the 2018 DHS.** PMI will contribute to supporting the malaria module in the 2018 DHS. (\$200,000)
- **Health facility survey (HFS) (2018).** Sierra Leone does not currently have reliable data on health facility capacity and readiness to provide quality malaria care. PMI plans to support a health facility survey in 2018 as a follow-up activity to the scheduled 2016 HFS in order to assess efforts in training and capacity building in malaria case management at the district level. PMI will support the use of a malaria survey tool in 2018 to assess commodity availability, human capacity, data quality and case management practices. This survey will be coordinated with other donors to ensure that the information is useful to all stakeholders. (\$250,000)
- **Technical Assistance for SM&E.** CDC will conduct two technical assistance visits to support the NMCP on SM&E activities. (\$20,000)
- **Strengthen Logistics Management Information System (LMIS).** PMI will purchase equipment, provide training, and strengthen the availability and use of district and facility level consumption data. (See case management section for more details.) (See Case Management/Pharmaceutical Management section.)

7. Operational research

NMCP/PMI objectives

Under the NMSP-2016-2020, NMCP plans to strengthen its capacity for implementing an evidence-based malaria program. This will include plans to establish strong collaborative research initiatives with national and international research and academic institutions. The NMCP in collaboration with these institutions and other partners will define a malaria operational research agenda and provide a forum for dissemination of research results. The NMCP also intends to work with its RBM partners to mobilize the required funding for the research agenda.

Current status

According to a recent review¹⁶ conducted with DFID support, there have been a number studies undertaken in the past five years whose findings are key to policy and decision making for malaria in Sierra Leone.

A recent study on presumptive treatment of self-diagnosed malaria by Ansumana et al, in 2013 found that that the majority of febrile illnesses in Bo district are self-diagnosed without clinical examination or laboratory testing, including more than half of suspected malaria cases that are treated presumptively without any clinical diagnostics.

In November 2010, Sierra Leone distributed over 3 million ITNs with the goal of providing protection from malaria to individuals in all households in the country. A study of 4,620 households with equal representation in each of the 14 districts was undertaken to measure household possession and use of ITNs in Sierra Leone 6 months after a national mass distribution campaign. The study showed that 87.6% of households were found to own at least one ITN and 36% of households were found to possess at least one ITN per two household members; rural households were more likely than urban households to have one ITN per every two household members, but there was no difference by socioeconomic status or household head education. Among individuals in households possessing one ITN, 76.5% slept under an ITN the night preceding the survey. The study concluded that the mass distribution campaign was effective at achieving high coverage levels across the population, notably so among rural households where the malaria burden is higher. These important gains in equitable access to malaria prevention will need to be maintained to produce long-term reductions in the malaria burden.

As an emergency response to the EVD epidemic, the GoSL and its partners implemented a large-scale mass drug administration (MDA) with ASAQ covering more than 2.5 million people in the districts hardest hit by EVD during December 2014 - January 2015 and with high malaria transmission. An evaluation of the impact of the MDA on malaria morbidity and the number of EVD alerts at health facilities was conducted by the NMCP and WHO. The study revealed that the number of suspected malaria cases tested with RDT decreased by >42% (95% CI) starting week one after the first MDA; RDT positive cases decreased by >46% starting week one; and the RDT test positivity rate (TPR) declined by 25% starting week two after the first MDA. The total malaria (clinical + confirmed) cases decreased by 45% and the proportion of confirmed malaria cases among all outpatient consultations fell significantly by >33%. However, the trends of non-malaria outpatient cases did not change. The number of EVD alerts (reported to a "117 hotline") captured in the District Ebola Response Centers (DERCs) covered by MDA decreased by 30% in the first week and decreased further (>40%) in the four weeks after the second MDA. The non-MDA chiefdoms also saw moderate but significant changes in key malaria indicators but EVD alerts increased during the same periods.

¹⁶ Sierra Leone: A Profile of Malaria Control and Epidemiology 2015 funded by DFID

The study concluded that MDA implementation as a temporary measure helped in reducing malaria morbidity and febrile cases that would have potentially been diagnosed as suspected EVD cases and ultimately increase the risk of nosocomial infections. The intervention also helped reduce patient case-load to the health services that were overloaded at the peak of the EVD outbreak. The effect of the MDA waned in a matter of weeks and malaria intensity returned to the pre-MDA levels. Hence, the MDA was an appropriate public health intervention in the context of the EVD epidemic even in the high malaria transmission areas of Sierra Leone involved, but the study also showed the relatively short-term impact of MDA in high transmission areas.

Plans and justification

No PMI-supported OR is planned for FY 2017. However, PMI will support efforts to improve discussions and coordination between the NMCP and its partners to develop an operations research agenda, including support for a meeting/workshop and the development of an OR strategic plan. The next NMCP Malaria Program Review will also present an opportunity to think critically about operational research needs in Sierra Leone.

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

No PMI-supported OR is planned; however PMI will support the development of a malaria operational research priority agenda including a workshop and development of a strategy document (costs are covered in the HSS/Capacity Building section of the MOP).

8. Staffing and administration

Two health professionals will serve as Resident Advisors (RAs) to oversee PMI in Sierra Leone, one representing CDC and one representing USAID. In addition, one Foreign Service National (FSN) will work as part of the PMI team. All PMI staff members are part of a single interagency team led by the USAID Mission Director. All USAID Sierra Leone programs are coordinated and overseen by the USAID/Guinea Mission. 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 office in Freetown but are expected to spend approximately half of their time with and providing TA 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, in addition to the U.S. Global Malaria Coordinator.

Proposed activities with FY 2017 funding: (\$1,729,000)

- **In-country staffing and administration.** Coordination and staff salaries and benefits, office equipment and supplies, and routine expenses for PMI activities in Sierra Leone.
 - CDC resident advisor staffing and administration costs (\$863,000)
 - USAID resident advisor, FSN and USAID/Sierra Leone Office/Mission-wide costs (\$866,000)

Table 1: Budget Breakdown by Mechanism

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

Mechanism	Geographic Area	Activity	Budget (\$)	%
GHSC-PSM	National	Procurement of ITNs	\$2,241,000	35.9%
	National	Distribution of ITNs	\$1,350,000	
	National	Procurement of severe malaria treatment	\$1,550,000	
	National	Strengthen the Strengthen Logistics Management Information System (LMIS)	\$250,000	
UNICEF	UNICEF	Distribution and storage of severe malaria treatment	\$50,000	0.3%
TBD - IRS Project	4 sites (locations TBD)	Increase NMCP entomology capacity and entomological monitoring	\$500,000	16.4%
	National	Support an insectary	\$50,000	
	2 districts (locations TBD)	Procurement of insecticides and supplies for indoor residual spraying (IRS)	\$1,916,000	
GEMS II	2 districts (locations TBD)	Support for environmental compliance inspection	\$35,000	0.2%
MCSP	National	Technical assistance in MIP at national level	\$100,000	2.3%
	Targeted districts (locations TBD)	Training of health providers in MIP at district level	\$250,000	

TBD - New Service Delivery Award	National	Strengthening the national laboratory diagnostics (microscopy) capacity, quality assurance, and national slide bank development	\$200,000	17.3%
	Targeted districts (locations TBD)	Strengthening case management practices at the public facility level, with particular emphasis on severe malaria.	\$1,000,000	
	Targeted districts (locations TBD)	Support scale-up of community health workers and case management at the community level	\$1,200,000	
	Targeted districts (locations TBD)	Support training in case management and data sharing in the private sector	\$150,000	
	National	Support the development of Malaria Operational Research Priority Agenda	\$50,000	
USP	National	Support the International Standards Organization (ISO) accreditation of the national pharmacy laboratory (drug testing and quality control/assurance)	\$100,000	0.7%
HRH2030	National	Long-term technical assistance for NMCP	\$400,000	2.7%
Peace Corps	Targeted districts (locations TBD)	Strengthen community capacity in malaria interventions through Peace Corps	\$30,000	0.2%

TBD - Central SBCC Mechanism	National	Support the NMCP to update the national SBCC strategy and support the development of a cohesive and standardized SBCC package to be used by partners.	\$100,000	3.0%
	Targeted districts (locations TBD)	Support the NMCP by contributing to the roll-out of SBCC in core malaria interventions.	\$350,000	
TBD - Central SM&E Mechanism	National	Strengthen data collection, analysis, and use (national level)	\$100,000	8.0%
	Targeted districts (locations TBD)	Strengthen data collection and use (district and sub-district chiefdom level)	\$650,000	
	National	Support for 2018 DHS	\$200,000	
	National	Health Facility Survey (2018)	\$250,000	
TBD	Targeted districts (locations TBD)	Strengthen epidemiologic and disease surveillance capacity through training	\$150,000	1.0%
CDC-IAA	National	Technical assistance for vector control activities	\$29,000	6.1%
	National	Technical assistance for SM&E	\$20,000	
		CDC Staffing and Administration	\$863,000	
USAID		USAID Staffing and Administration	\$866,000	5.8%
Total			15,000,000	100%

Table 2: Budget Breakdown by Activity

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

Proposed Activity	Mechanism	Budget		Geographic Area	Description
		Total \$	Commodity \$		
PREVENTIVE ACTIVITIES					
VECTOR MONITORING AND CONTROL					
Entomologic monitoring and insecticide resistance management					
Increase NMCP entomology capacity and entomological monitoring	TBD - IRS Project	\$500,000	0	4 sites (locations TBD)	Support for vector surveillance and insecticide resistance monitoring in 4 sites during two transmission seasons, including: training; equipment and supplies; transport and analysis of samples; ELISA analysis of mosquito samples; capacity building and supervision support for NMCP staff.
Support an insectary	TBD - IRS Project	\$50,000	0	National	PMI will provide equipment, supplies, and mentoring to establish a functional mosquito insectary to maintain susceptible strains of <i>Anopheles gambiae s. l.</i>

Technical assistance for vector control activities	CDC-IAA	\$29,000	0	National	Funding for two technical assistance visits from CDC to help develop entomological capacity at the national level.
Subtotal Ento monitoring		\$579,000	0		
Insecticide-treated Nets					
Procurement of ITNs	GHSC-PSM	\$2,241,000	\$2,241,000	National	PMI will procure approximately 675,000 ITNs for distribution through routine channels including at ANC and EPI visits, contributing to meeting Sierra Leone's routine distribution needs for calendar year 2018.
Distribution of ITNs	GHSC-PSM	\$1,350,000	0	National	PMI will support the routine distribution of ITNs, including warehousing and transportation to the districts, and to facility level as needed, to ensure ITNs are available at ANC and EPI services.
Subtotal ITNs		\$3,591,000	\$2,241,000		
Indoor Residual Spraying					
Procurement of insecticides and supplies for indoor residual spraying (IRS)	TBD- IRS Project	\$1,916,000	\$1,916,000	2 districts (locations TBD)	Procurement of insecticides and supplies to cover IRS in 2 districts (protecting approximately 1.2 million people). This would prepare for 1 spray cycle in early 2019 (contingent on availability of funds) of insecticide selected based on monitoring results based on 2017-2018 data.
Support for environmental compliance inspection	GEMS II	\$35,000	\$0	2 districts (locations TBD)	PMI will support the costs associated with appropriate environmental compliance visits and documentation prior to insecticide procurement.
Subtotal IRS		\$1,951,000	\$1,916,000		

SUBTOTAL VECTOR MONITORING AND CONTROL		\$6,121,000	\$4,157,000		
Malaria in Pregnancy					
Technical assistance in MIP at national level	MCSP	\$100,000	0	National	Technical assistance to update MIP policy and guidelines; supporting the national Technical Working Group for MIP, including the NMCP and Directorate of Reproductive and Child Health.
Training of health providers in MIP at district level	MCSP	\$250,000	0	Targeted districts (locations TBD)	PMI will support the NMCP's plan to train health providers in the updated MIP guidelines including health facility staff, community health workers, midwives and public and private sector hospital staff.
Subtotal Malaria in Pregnancy		\$350,000	0		
SUBTOTAL PREVENTIVE		\$6,471,000	\$4,157,000		
CASE MANAGEMENT					
Diagnosis and Treatment					
Procurement of severe malaria treatment	GHSC-PSM	\$1,550,000	\$1,550,000	National	PMI plans to procure around 600,000 vials of injectable artesunate to be used at health facilities, as well as 6,000 suppository tablets of rectal artesunate to be used in a pilot by CHWs in the expanded community program.

Distribution and storage of severe malaria treatment	UNICEF	\$50,000	\$0	National	PMI will contribute funds to support distribution and storage of severe drug commodities. The current storage and distribution system for all malaria commodities is handled via UNICEF.
Strengthening the national laboratory diagnostics (microscopy) capacity, quality assurance, and national slide bank development	TBD - New Service Delivery Award	\$200,000	0	National	PMI aims to complement CDC laboratory strengthening efforts by focusing on malaria diagnostics and microscopy at the national reference laboratory level, which will include the development of a national slide bank.
Strengthening case management practices at the public facility level, with particular emphasis on severe malaria.	TBD - New Service Delivery Award	\$1,000,000	0	Targeted districts (locations TBD)	Includes supportive supervision and training of health care workers in diagnostics and treatment, with emphasis on severe malaria.
Support scale-up of community health workers and case management at the community level	TBD - New Service Delivery Award	\$1,200,000	0	Targeted districts (locations TBD)	Collaborating with other donors, PMI will support the planned scale-up of the iCCM program by contributing resources for training and supervision of CHWs. Training on severe malaria case management will be emphasized.
Support training in case management and data sharing in the private sector	TBD - New Service Delivery Award	\$150,000	0	Targeted districts (locations TBD)	PMI will assist the NMCP in improving the engagement of the private sector by focusing on case management training and data collection and reporting.
Subtotal Diagnosis and Treatment		\$4,150,000	\$1,550,000		
Pharmaceutical Management					

Support the International Standards Organization (ISO) accreditation of the national pharmacy laboratory (drug testing and quality control/assurance)	USP	\$100,000	0	National	This activity will build on existing efforts to support ISO accreditation to help support the national pharmacy lab.
Strengthen the Strengthen Logistics Management Information System (LMIS)	GHSC-PSM	\$250,000	0	National	Training and procurement of equipment; improved availability and use of consumption data at the district and facility level.
Subtotal Pharmaceutical Management		\$350,000	0		
SUBTOTAL CASE MANAGEMENT		\$4,500,000	\$1,550,000		
HEALTH SYSTEM STRENGTHENING / CAPACITY BUILDING					
Long-term technical assistance for NMCP	HRH2030	\$400,000	0	National	PMI will continue to fund one embedded technical advisor at the NMCP to assist with technical support, as well as issues related to the Global Fund grant and commodity gap analyses, management, leadership, and governance.
Strengthen epidemiologic and disease surveillance capacity through training	TBD	\$150,000	0	Targeted districts (locations TBD)	This investment would cover the training of select sub-district level health officers. Their training would focus on malaria activities, including epidemiology and surveillance.
Strengthen community capacity in malaria interventions through Peace Corps	Peace Corps	\$30,000	0	Targeted districts (locations TBD)	For 3 volunteers who would be linked with a partner to carry out malaria projects at the community level.

Support the development of Malaria Operational Research Priority Agenda	TBD - Case Management Project	\$50,000	0	National	To support the NMCP to develop a streamlined operational research agenda, including a workshop and strategy document.
SUBTOTAL HSS & CAPACITY BUILDING		\$630,000	0		
SOCIAL AND BEHAVIOR CHANGE COMMUNICATION					
Support the NMCP to update the national SBCC strategy and support the development of a cohesive and standardized SBCC package to be used by partners.	TBD - Central SBCC Mechanism	\$100,000	0	National	Strengthen malaria prevention and control messages (ITNs use, MIP uptake, and care seeking behaviors) offered by health providers, CHWs, and community and religious leaders. This will build on the planned 2016/2017 assessment and barrier analysis to be conducted by Global Fund.
Support the NMCP by contributing to the roll-out of SBCC in core malaria interventions.	TBD - Central SBCC Mechanism	\$350,000	0	Targeted districts (locations TBD)	PMI will offer implementation support in the geographic and technical areas identified in the results of the assessment and barrier analysis for SBCC planned and conducted by Global Fund in calendar years 2016/2017.
SUBTOTAL SBCC		\$450,000	0		

Strengthen data collection, analysis, and use (national level)	TBD - Central SM&E Mechanism	\$100,000	0	National	PMI will support the analysis and use of various sources of data including survey data (household and facility), HMIS data, implementing partner data for decision-making at the national level by the NMCP. The activity will also provide support to DPPI for strengthening DHIS2 through supportive supervision.
Strengthen data collection and use (district and sub-district chiefdom level)	TBD - Central SM&E Mechanism	\$650,000	0	Targeted districts (locations TBD)	PMI will support the collection, reporting, and use of routine malaria data at the district and chiefdom levels through capacity building of malaria focal persons, SM&E teams and community health officers and ensuring that sufficient infrastructure capacity exist to collect, analyze and report quality malaria data using DHIS2. District level efforts will also strengthen data from the supply chain to ensure that commodity consumption is reported and to minimize stock-outs. The activity will embed technical assistance at districts for mentoring district and chiefdom level staff, assist with the analysis and dissemination of malaria data, and participate in supervision and training of lower level staff.
Support for 2018 DHS	TBD - Central SM&E Mechanism	\$200,000	0	National	PMI will contribute to supporting the malaria module in the 2018 DHS.

Health Facility Survey (2018)	TBD - Central SM&E Mechanism	\$250,000	0	National	PMI plans to support a facility survey to follow up on scheduled 2016 SARA. The tool will be used to assess commodity availability, human capacity, data quality, and case management practices. PMI will coordinate with other donors to ensure that the information is useful to all stakeholders.
Technical assistance for SM&E	CDC-IAA	\$20,000	0	National	Support for two CDC TDYs to assist the NMCP in SM&E activities.
SUBTOTAL SM&E		\$1,220,000	0		
OPERATIONAL RESEARCH					
		\$0	0		No PMI-supported OR.
SUBTOTAL OR		0	0		
IN-COUNTRY STAFFING AND ADMINISTRATION					
CDC Staffing and Administration	CDC-IAA	\$863,000	0		Support for one CDC PMI Advisor.
USAID Staffing and Administration	USAID	\$866,000	0		Support for one USAID PMI Advisor and one USAID (FSN) locally-hired senior malaria specialist, as well as related local costs for the CDC PMI Advisor sitting in the USAID Mission. Also includes A&O cross-cutting funds.
SUBTOTAL IN-COUNTRY STAFFING		\$1,729,000	0		
GRAND TOTAL		\$15,000,000	\$5,707,000		