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

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U.S. PRESIDENT'S MALARIA INITIATIVE

PRESIDENT'S MALARIA INITIATIVE

MOZAMBIQUE

Malaria Operational Plan FY 2018

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ABBREVIATIONS and ACRONYMS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
APE	*Agente polivalente elementare* (community health worker)
AS/AQ	Artesunate-amodiaquine
BES	*Boletim Epidemiologico Semanal* (bulletin for notifiable diseases)
CDC	Centers for Disease Control and Prevention
CHAI	Clinton Health Access Initiative
CISM	*Centro de Investigação em Saúde de Manhiça* (Manhiça Health Research Centre)
CMAM	*Central de Medicamentos e Artigos Médicos* (Central Medical Stores)
COST	Cost-effectiveness evaluation of vector control strategies in Mozambique study
DFID	United Kingdom Department for International Development
DHIS-2	District Health Information System-2
DHS	Demographic and Health Survey
DQA	Data quality audits
EPI	Expanded program on immunizations
EUV	End-use verification
FELTP	Field Epidemiology & Laboratory Training Program
FSN	Foreign Service National
FY	Fiscal year
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GRM	Government of the Republic of Mozambique
HMIS	Health management information system
HSS	Health system strengthening
IEC	Information, education, communication
IMASIDA	Immunization, Malaria, and HIV/AIDS Indicator Survey
IMCI	Integrated management of childhood illness
INE	*Instituto Nacional de Estatísticas* (National Statistics Institute)
INS	*Instituto Nacional de Saúde* (National Health Institute)
IPC	Interpersonal communication
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
IVM	Integrated Vector Management
LMIS	Logistics management and information system
MDRT	Malaria Diagnostic Refresher Training
MICS	Multiple Indicator Cluster Survey
MIP	Malaria in pregnancy
MNCH	Maternal, neonatal, and child health
MIS	Malaria indicator survey
MoH	Ministry of Health
MOP	Malaria Operational Plan
MTR	Mid-Term Review
NHS	National Health Service
NGenIRS	Next Generation IRS

NMCP	National Malaria Control Program
NMSP	National Malaria Strategic Plan
OTSS	Outreach training and supportive supervision
PCV	Peace Corps volunteer
PEPFAR	President's Emergency Plan for AIDS Relief
PMI	President's Malaria Initiative
QA/QC	Quality assurance / quality control
RA	Resident Advisor
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SBCC	Social and behavior change communication
SIS-MA	*Sistema de Informação para a Saúde–Monitoria e Avaliação* (Health information system-monitoring and evaluation)
SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine-pyrimethamine
UCC	Universal coverage campaign
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

I. EXECUTIVE SUMMARY

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

In 2015, PMI launched the next six-year strategy, setting forth bold and ambitious goals and objectives. The PMI Strategy for 2015-2020 takes into account the progress over the past decade and the new challenges that have arisen. Malaria prevention and control remains a major U.S. foreign assistance objective and PMI's Strategy fully aligns with the U.S. Government's vision of ending preventable child and maternal deaths and ending extreme poverty. It is also in line with the goals articulated in the Roll Back Malaria (RBM) Partnership's second generation global malaria action plan, *Action and Investment to defeat Malaria (AIM) 2016-2030: for a Malaria-Free World* and World Health Organization's (WHO) 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. Mozambique began implementation as a PMI focus country in FY 2007.

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

The proposed FY 2018 PMI budget for Mozambique is $24 million. PMI will support the following intervention areas with these funds:

Entomologic monitoring and insecticide resistance management:
Strong entomological data are essential for implementation of Mozambique's revised vector control strategy, which calls for use of entomological and epidemiological data to inform vector control programming. PMI has provided important support to build Mozambique's national and provincial entomological capacity. PMI has supported year-round entomological data collection at sentinel sites

throughout the country, along with IRS residual efficacy monitoring and annual insecticide resistance testing as part of supported IRS activities.

With FY 2018 funds, PMI will continue entomologic surveillance and insecticide monitoring and support for insecticide resistance testing, residual efficacy testing, and vector bionomics at the national sentinel sites. In addition, PMI will support technical assistance visits by the Centers for Disease Control and Prevention (CDC) entomology branch to build Ministry of Health (MoH) entomological monitoring capacity.

Insecticide-treated nets (ITNs):
The scale up of ITNs has been a cornerstone of Mozambique's vector control strategy, which calls for universal coverage throughout the country. Coverage and use of ITNs by key target groups has increased, as shown by the increase from 7% in 2007 to 48% in 2015 of children under five years of age who reported sleeping under an ITN the previous night. Access will be further improved by Mozambique's first national ITN campaign in 2016/17. PMI is also supporting monitoring of the 2017 national campaign for ITNs.

With FY 2018 funds, PMI will continue to support continuous ITN distribution through antenatal care (ANC) clinics and through a school channel pilot. Appropriate social and behavior change communication (SBCC) activities to encourage pregnant women to use ITNs will be supported (see SBCC section). PMI will procure 1.6 million ITNs for this continuous channel and support distribution costs from the port-of-entry to provincial level warehouses nationally, from provincial warehouses to district level warehouses, and from district level warehouses to the facility in target provinces.

Indoor residual spraying (IRS):
The national vector control strategy prioritizes coverage with IRS when there is evidence of pyrethroid resistance and/or epidemic malaria transmission. While its geographic spread is limited, PMI's IRS coverage of approximately 2 million people a year is equal to approximately 7% of the country's population.

In FY 2018, PMI will conduct IRS with a Global Fund-procured, non-pyrethroid insecticide. Districts will be targeted based on criteria laid out in the revised NMCP vector control strategy, including status of insecticide resistance, malaria burden, and population density. PMI will also continue to provide capacity building of provincial and district-level officials to plan, train, implement, supervise, and deliver high quality IRS campaigns. Additionally, a routine environmental assessment for IRS activities will be conducted.

Malaria in pregnancy (MIP):
Prevention of malaria in pregnant women, through the use of sulfadoxine-pyrimethamine (SP) for IPTp and ITN distribution, has been promoted in Mozambique since 2006 and implemented through the Integrated Reproductive Health/Maternal-Neonatal-Child Services Package since 2012. PMI has supported the development of national policies and guidelines through training, improvement of the quality of care, and revision of maternal and child health registers. As a result of this effort, routine data shows continuing improvement of IPTp2 coverage nationally from 20% in 2011, 36% in 2013, 44% in 2014 and 56% in 2015 to 49% in 2016.

With FY 2018 funds PMI will: 1) procure approximately 3 million SP treatments; 2) continue to provide central level support for MIP policy and planning, with an increased focus on strengthening coordination

between the NMCP and Maternal and Child Health program; 3) provide support and on-the-ground mentoring to provincial and district staff to ensure rigorous supervision and training is provided to ANC staff to provide a comprehensive package of malaria interventions to pregnant women; and 4) focus on the quality collection and timely reporting of key MIP indicators.

Case management:
The national malaria treatment guidelines require parasitological diagnosis before treatment with an antimalarial, which is consistent with WHO recommendations. However, access to quality diagnosis and treatment is still low throughout the country. Supply gaps, unmet training and supervision needs, as well as limited access to facilities all play a role, particularly in the highly endemic center and north of the country. PMI and the Global Fund are the primary suppliers of ACTs and rapid diagnostic tests (RDTs) in Mozambique. Additionally, with PMI's support to the delivery system of health facility kits, stock levels are steadily improving.

With FY 2018 funds, PMI will continue to support the procurement and distribution of RDTs and ACTs. PMI will provide technical support at central level to update guidelines and policies related to case management. PMI will also continue its decentralized support through training and supervision of malaria case management and laboratory quality assurance/quality control activities at the provincial, district, and health facility levels. The government supply chain system will be strengthened through technical assistance to the Central Medical Stores, capacity building of provincial and district health managers, and continued improvements in the key areas of warehousing, supervision, and logistics management information systems to manage malaria commodities.

Health systems strengthening and capacity building:
One of the objectives of the new 2017-2021 National Malaria Strategic Plan is to ensure that all districts of the country have the capacity to adequately manage and implement malaria control activities by strengthening program management skills at central, provincial & district levels. PMI supports a broad array of health system strengthening activities which cut across intervention areas, such as training of health workers, improvements in supply chain management, health information systems strengthening, drug quality monitoring, and NMCP capacity building.

With FY 2018 funds, PMI will work to support the capacity of the NMCP and provincial and district-level staff in two high burden provinces to better plan, manage, and analyze and use data to improve the quality of service delivery at health facility and community levels. To improve epidemiologic capacity, PMI will support two new Field Epidemiology and Laboratory Training Program residents. At the community-level, PMI will support one third year Peace Corps volunteer (PCV) in Maputo and one third year PCV in a PMI target province, while supporting the malaria advisory committee and continued provision of PMI-supported small project assistance grants for PCV projects.

Social and behavior change communication (SBCC):
The Mozambican MoH recognizes SBCC as a priority area for technical assistance and investment. PMI is the primary donor supporting malaria SBCC activities in Mozambique. This support has been through stand-alone SBCC programs and through incorporation of SBCC into IRS, MIP, ITN, and case management programming. Progress has been made, but important challenges to appropriate vector control use and malaria care seeking and management remain.

With FY 2018 funding, PMI will work with the SBCC technical working group to consolidate SBCC materials and approaches, while also continuing to scale up of interpersonal communication and suitable mass media activities in high burden provinces.

Surveillance, monitoring, and evaluation (SM&E):
The National SM&E plan will be updated to reflect the priorities of the new 2017-2021 National Malaria Strategic Plan. Mozambique has strong SM&E activities, but data quality and use challenges remain. Sources of data and information include the routine health information system, integrated disease surveillance, activity reports from districts, and periodic household and facility surveys. PMI will use FY 2017 funding to support the next Malaria Indicator Survey (MIS) in Mozambique.

With FY 2018 funding, PMI/Mozambique will continue to support implementation of the NMCP SM&E plan through support for a national data manager and for provincial and district-level training and supervision of health facility, district, and provincial personnel on the collection, processing, analysis, presentation, interpretation, and use of routine malaria data. PMI will also continue support for end-use verification surveys and the development of reports from supply chain data collected throughout the country. In addition, PMI will support one technical assistance visit by a CDC SM&E advisor to help the MoH better analyze and use programmatic data collected through its routine systems.

Operational research (OR):
Operational research has been identified as a priority for the MoH. Aligned with MoH priorities, PMI has previously supported an ITN durability study and is currently co-funding a cost-effectiveness study of different vector control activities. PMI has also begun preliminary planning of the cost-effectiveness evaluation of different SBCC interventions. The goal of this project is to guide PMI Mozambique and the NMCP on the appropriate balance and composition of SBCC programming.

There are no additional OR studies planned using FY 2018 funds. The two NMCP and PMI Mozambique priority studies, evaluations of the cost-effectiveness of different vector control strategies and of different SBCC interventions, are both fully funded.

II. STRATEGY

1. Introduction

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

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2. Malaria situation in Mozambique

Malaria is endemic throughout Mozambique, and its entire estimated population of 26.4 million (2016) people is at risk. Most of the country has year-round malaria transmission with a seasonal peak during the rainy season from December to April. In addition, Mozambique is prone to natural disasters such as

drought, cyclones, and floods, which have likely contributed to increases in malaria transmission in recent years, particularly in low-lying coastal areas and along major rivers.

Malaria is considered the most important public health problem in Mozambique and accounts for 29% of all deaths, followed closely by AIDS at 27% (2008 Post-Census Mortality Survey). Among children less than five years old, malaria accounts for 42% of the deaths, followed by AIDS at 13%. *Plasmodium falciparum* accounts for 90% of all malaria infections, with *P. malariae* and *P. ovale* responsible for about 9% and 1%, respectively. The major vectors in Mozambique are *Anopheles gambiae* s.s., *An. arabiensis*, and *An. funestus* s.s. Of the major subspecies of the *An. gambiae* complex, *An. arabiensis* is more prevalent in the south and *An. gambiae* s.s. in the north.

The last national cross-sectional survey to measure community parasitemia prevalence was the 2015 combined Immunization, Malaria, and HIV/AIDS Indicator Survey (IMASIDA). This survey showed that under five parasitemia (by RDT) varied from 2% in the capital, Maputo, to 68% in Zambézia Province, with point prevalence higher in the northern region (varying from 29% to 68%) than in the southern region (varying from 2% to 23%). The 2015 IMASIDA underscored the reality that malaria is a rural disease in Mozambique: prevalence in rural areas was over two times as high as the prevalence in urban areas (47% versus 19%, respectively).

Additionally, malaria cases reported through routine health information systems increased from 2013 through 2016. Reported cases increased 17% from 6,418,526 cases in 2015 to 7,546,091 cases in 2016. Eighteen percent of the cases reported in 2016, were identified by community health workers locally referred to as APEs (*Agentes Polivalentes Elementares*). Despite the increase in total cases, the reported number of severe malaria cases reduced by 6% from 85,785 in 2015 to 80,829 in 2016, and the number of deaths due to malaria decreased by 32% from 2,465 in 2015 to 1,685 in 2016.

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

In Mozambique, the public sector–the National Health Service (NHS)–dominates health service delivery. Although there is a growing private sector, it is largely limited to major cities. The public sector reaches an estimated 60% of the population.

The NHS consists of four levels. Level I includes health centers and health posts. These level I health facilities provide a package of primary health care services and usually have a maternity ward but do not provide inpatient services. According to a 2004 World Bank report, Level I facilities represent at least 40% of all health services and are typically the first point of contact with the health system for a large portion of the population. Level II includes district, general, and rural hospitals and usually serve as the referral facility for more than one district. Facilities at this level offer diagnostic, surgical, and obstetric services and have general medical doctors on their staff. Level III consists of provincial hospitals, which offer curative services, have diagnostic services/equipment, and are training centers. They are the referral facility for the level II facilities. Finally, Level IV consists of the country's three referral hospitals in Maputo, Beira, and Nampula, serving the southern, central, and northern regions, respectively.

Recognizing the limitations of the NHS and the shortage of professionally trained health workers, the country, with U.S. Government support, has begun revitalizing the community health worker program, which employs health workers known as APEs. The APEs provide preventive and basic curative services, including malaria diagnosis (using RDTs) and treatment (with ACTs). In addition to malaria curative and preventative services, APEs provide services related to integrated community case

management (iCCM), family planning, management of post-partum hemorrhage, prevention of umbilical infections in neonates, distribution of vitamin A and adherence to antiretroviral and tuberculosis treatments. APEs are expected to cover between 500 and 1,200 inhabitants and work outside the catchment area of the nearest health facility. A national strategy for the APE program is under development. A number of national and international nongovernmental organizations also work within the NHS to assist in the provision of health services.

Malaria control in the public health system consists of three administrative levels: central, provincial, and district. At the central level the NMCP is benefiting from strong leadership, allowing it to improve its ability to manage and coordinate programs. Each province has a provincial malaria focal point who coordinates the implementation of malaria control activities at that level. Recently, district malaria focal points were created as a way to improve data management and reporting for malaria at that level.

4. National malaria control strategy

The NMCP is responsible for developing policy, establishing norms, planning, organizing, and coordinating all malaria control activities in the country. Additional responsibilities include periodic assessment of the impact of malaria control activities, development of training materials on malaria case management for health workers at all levels, mobilization of domestic and external funds for malaria control activities, promotion of malaria awareness and advocacy, and guiding operational research.

Mozambique is currently in the process of finalizing the 2017-2021 National Malaria Strategic Plan (NMSP), with support from PMI and other partners. The revised NMSP is expected to include the following objectives:

1. Provide 100% access and at least 85% coverage of the population with a minimum of one vector control intervention, in every district of the country, by 2021;
2. Test 100% of suspected malaria cases & treat 100% of confirmed malaria cases at health facility & community level, as per national guidelines, by 2021;
3. Implement an effective SBCC approach to ensure at least 70% of people seek appropriate & timely healthcare & at least 80% of the population uses an appropriate protection method, by 2021;
4. Strengthen the surveillance system so 100% of health facilities & districts are reporting complete, timely & quality data for evidence-based decision-making at all levels of the health system by 2019;
5. Strengthen program management skills at central, provincial & district levels, to effectively achieve the strategic plan objectives by 2021;
6. Accelerate efforts towards malaria elimination by implementing epidemiologically appropriate interventions in defined areas of low and very low transmission by 2021.

There is a complete draft of the NMSP and it is currently under review for approval in 2017.

5. Updates in the strategy section

The strategy section includes the following updates:

- Inclusion of 2017-2021 NMSP objectives and status update.

6. Integration, collaboration, and coordination

Integrated health activities

Within the U.S. Government, the U.S. Agency for International Development (USAID) Mozambique Health Team is merged into one Integrated Health Office, maximizing the programmatic synergies among the President's Emergency Plan for AIDS Relief (PEPFAR), PMI, and other health programs. The interagency PMI team is part of the Ending Preventable Child and Maternal Deaths team. This organizational structure encourages technical synergies and avoids duplication of efforts, as well as facilitates a broader health systems approach across all U.S. Government programs, including maternal and child health (MCH), reproductive health/family planning, tuberculosis, HIV, malaria, and nutrition. An example of integration of USAID's health projects is the Maternal and Child Survival Project (MCSP), which PMI is supporting jointly with funds from MCH, reproductive health, family planning, nutrition, and PEPFAR. The project prioritizes the implementation and scale up of evidence-based, high-impact maternal, neonatal, and child health (MNCH) service delivery interventions. MCSP contributes directly to one of USAID's principal global health priorities: Ending Preventable Child and Maternal Deaths.

Other examples of integration are in strengthening supply chain management and supporting the implementation of the District Health Information System-2 (DHIS-2). PMI, PEPFAR, and family planning leverage their resources to strengthen the capacity of the MoH's supply chain management system through the Central Medical Stores (*Central de Medicamentos e Artigos Médicos*- CMAM) and improve the supply chain at different levels. In addition, PMI and PEPFAR funds complemented each other to support the development and rollout of the new DHIS-2, including the malaria module. PEPFAR and PMI partners are currently supporting implementation of the system in complementary areas. It is expected that the DHIS-2 system will facilitate timely, quality data on malaria indicators among others. Additionally, PMI support for the Field Epidemiology and Laboratory Training Program (FELTP) leverages existing CDC PEPFAR financing to strengthen national epidemiological capacity.

Collaboration and Coordination

PMI actively collaborates with other donor partners, including the Global Fund, to ensure investments are complementary and to support the NMCP. The Global Fund's New Funding Model (NFM) concept note was written with direct input from PMI. The activities and funding were tailored so that an activity not funded by one donor was supported by the other. An example of this distribution of activities is ITN coverage: PMI supports procurement and continuous distribution of ITNs through ANCs for pregnant women, and Global Fund supports the procurement and distribution of the ITNs for mass universal coverage campaigns. PMI is providing technical support to ensure a successful implementation of the 2016/17 national ITN campaign which is being funded through the NFM. Similarly, PMI and the Global Fund coordinate to procure all the ACTs and RDTs needed by the country. Another example of collaboration between PMI and the Global Fund is the IRS activity in Zambézia. The insecticide used in Zambézia is generally procured by the Global Fund and this has allowed PMI to direct its limited resources to other critical areas that the Global Fund cannot support directly, such as technical assistance. PMI also regularly meets with a group of partners, including United Nations Children's Fund (UNICEF), the World Health Organization (WHO), and the Clinton Health Access Initiative (CHAI) to facilitate collaboration. Another donor that played an important role in malaria in FY 2016 was the Department for International Development (DFID), who provided financial support for the Government-led IRS campaign, through UNICEF.

PMI has been involved in the discussions around malaria elimination activities in southern Mozambique. Currently, there are three malaria elimination initiatives, all focusing on southern Mozambique: two Gates-funded projects, one led by *Centro de Investigação em Saúde de Manhiça* (CISM) and the other led by CHAI, and the Malaria Elimination 8, launched by the Southern African Development

Community. The Malaria Elimination 8 has secured funding from the Global Fund. The expectation is that these initiatives will bring additional resources to push the malaria elimination agenda in southern Mozambique, while PMI resources and most of the NFM resources will continue to be concentrated on the high burden areas of central and northern Mozambique. PMI also coordinates closely with all these partners to avoid duplication of efforts, especially at central level, and to identify gaps that need to be addressed. One example is the joint support to NMCP on entomological monitoring.

Finally, with the increase of gas and coal prices in the international market and the potential revival of the private sector in Mozambique, PMI is again exploring opportunities to collaborate with this sector.

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

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

1. Reduce malaria mortality by one-third from 2015 levels in PMI-supported countries, achieving a greater than 80% reduction from PMI's original 2000 baseline levels.
2. Reduce malaria morbidity in PMI-supported countries by 40% from 2015 levels.
3. Assist at least five PMI-supported countries to meet the WHO criteria for national or sub-national pre-elimination.[1]

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

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

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

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

[1] http://whqlibdoc.who.int/publications/2007/9789241596084_eng.pdf

- Proportion of women who received two or more doses of IPTp for malaria during ANC visits during their last pregnancy

8. Progress on coverage/impact indicators to date

The 2015 IMASIDA provides the first up-to-date information on key malaria indicators at the national level since the 2011 Demographic and Health Survey (DHS). The 2015 IMASIDA data showed improvement in ITN coverage when compared with the 2011 DHS. Specifically, the proportion of households with at least one ITN increased from 51% in 2011 to 66% in 2015. Similarly, the proportion of children under five and pregnant women who slept under an ITN the previous night increased from 36% and 34%, respectively, in 2011 to 48% and 52% in 2015. The proportion of women who received two or more doses of IPTp during their last pregnancy during the last two years remains low, but increased from 19% in 2011 to 34% in 2015 (three or more doses of IPTp was 22% in 2015).

Table 1: Evolution of Key Malaria Indicators in Mozambique from 2007 to 2015

Indicator	2007 MIS (%)	2008 MICS (%)	2009 INSIDA (%)	2011 DHS (%)	2015 IMASIDA (%)
% Households with at least one ITN	16	31	NA	51	66
% Households with at least one ITN for every two people	NA	NA	NA	23	39
% Children under five who slept under an ITN the previous night	7	23	NA	36	48
% Pregnant women who slept under an ITN the previous night	7	NA	NA	34	52
% Households in targeted districts protected by IRS*	97	96	97	70	88
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	36	NA	NA	56	59
% Children under five with fever in the last two weeks who had a finger or heel stick	18	23	NA	30	40
% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs	NA	NA	NA	60	93
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	16	43	33	20	34
Under-five mortality rate per 1,000 live births	NA	NA	NA	64	NA
% Children under five with parasitemia (by **microscopy,** if done)	38	NA	NA	35	NA
% Children under five with parasitemia (by **RDT**, if done)	51	NA	NA	38	40

*The data sources for coverage obtained by the PMI-supported IRS campaign in Zambezia are PMI programmatic data.

Parasite prevalence for each province, based on RDT positivity, are compared between the 2011 and 2015 in Figure 1. Overall, prevalence decreased in most provinces between the two surveys. Prevalence did, however, increase from 43% to 66% in Nampula, 55% to 68% in Zambézia, and remained fairly constant in Sofala at 32%. The largest decreases were noted in Cabo Delgado and Inhambane.

Figure 1: Parasite Prevalence in 2011 and 2015

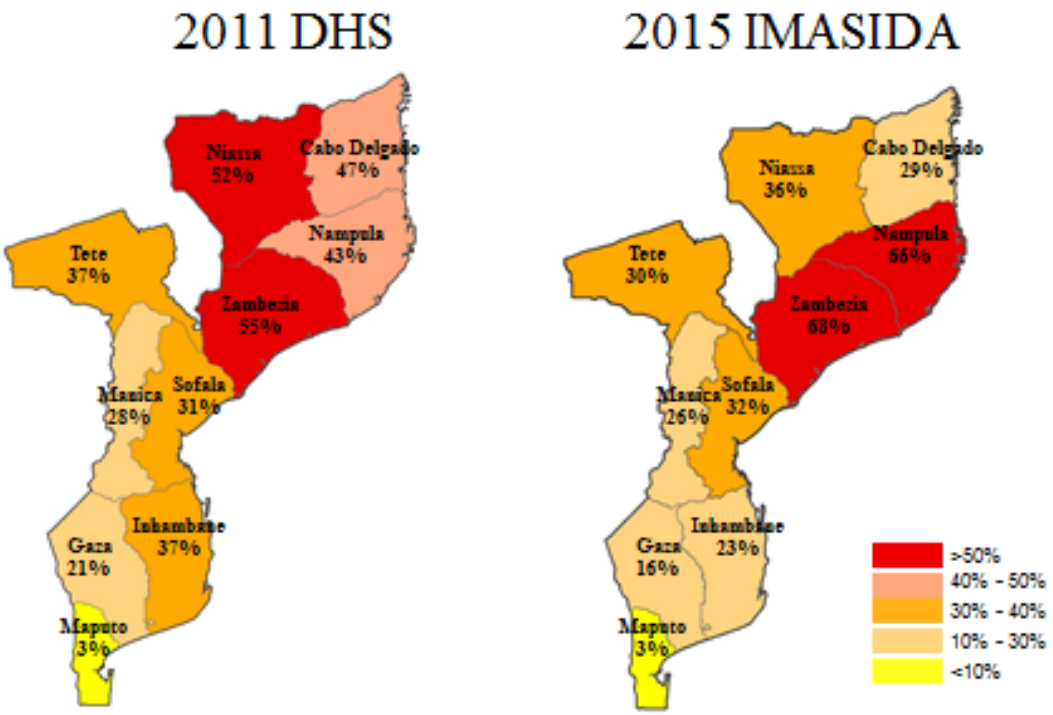


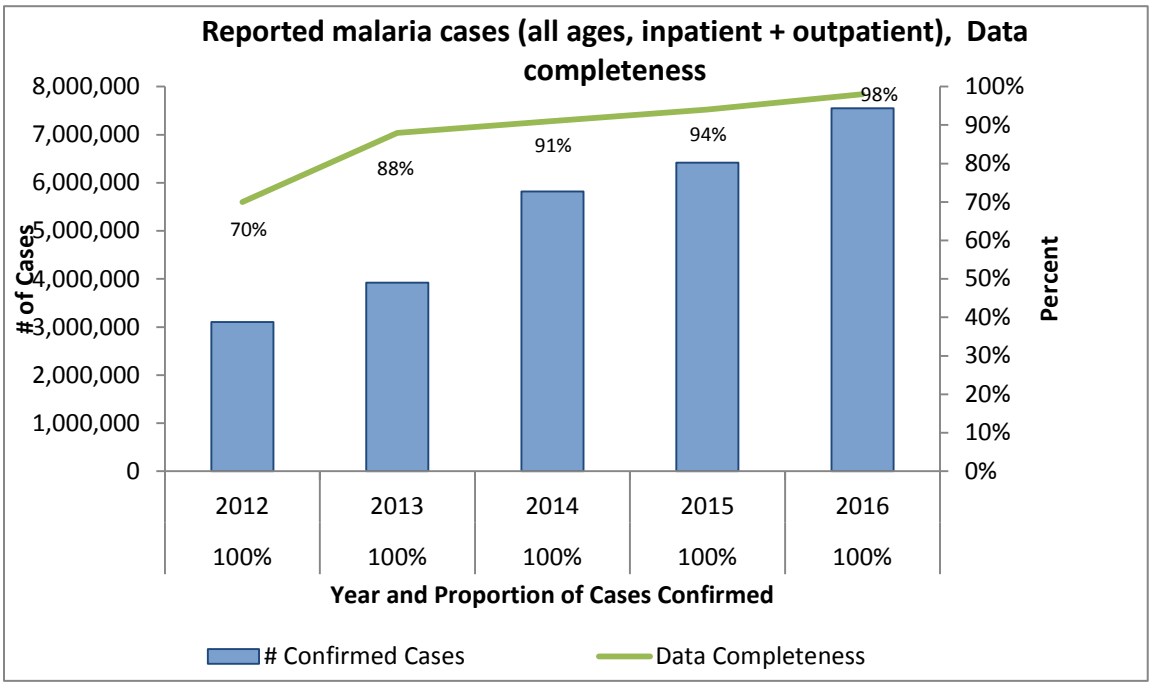
Table 2: Evolution of Key Malaria Indicators reported through routine surveillance systems in Mozambique from 2012 to 2016

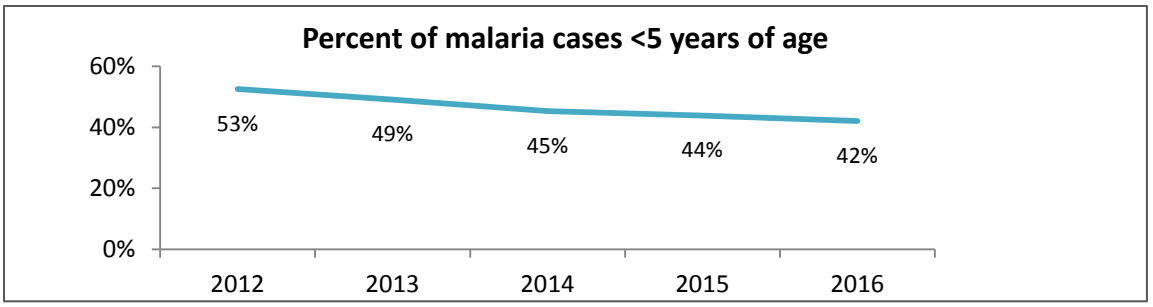
Indicator	2012	2013	2014	2015	2016
Total # Cases	3,101,573	3,924,832	5,820,380	6,418,526	7,546,091
Total # Confirmed Cases	3,101,573	3,924,832	5,820,380	6,418,526	7,546,091
Total # Clinical Cases	NA	NA	NA	NA	NA
Total # <5 Cases	1,629,051	1,925,172	2,635,064	2,811,797	3,173,735
Total # inpatient malaria deaths	2,811	2,941	3,245	2,465	1,685
Data Completeness* (%)	70%	88%	91%	94%	98%
Test Positivity Rate (TPR)	NA	55%	48%	55%	56%

*Percentage of health facilities reporting each month

As shown in Table 2 above, the country has observed a dramatic increase in reported malaria cases in the past few years. There are a number of different probable explanations for this increase. One factor associated with the continued increase in the number of cases is the fact that the routine health management information system (HMIS) data continue to improve, including data completeness and quality. For example, the World Malaria Report estimated that there were between 6.3 million and 11 million malaria cases in Mozambique in 2015, but the number of confirmed cases reported in the HMIS data was 6.4 million cases. Thus, the HMIS data likely did not capture all cases. The reported number of cases in 2016, 7.5 million, more closely approximates the expected number of cases and is an indication that Mozambique's more complete data are improving. Nevertheless, the increase in cases is not fully explained by the improvements in the HMIS data. For example, the national under-five malaria prevalence during low transmission season increased from 38% in 2011 to 40% in 2015, which was driven by increases in the most populous provinces. Potential explanations for this increase include sub-optimal implementation and uptake of available malaria prevention strategies, insecticide resistance, improved access to malaria diagnosis (e.g. through APEs), and climatic changes such as increased overnight minimum temperature and increased number of days with at least 50mm precipitation.

Figures 2-3: Trends in Key Routine Based Malaria Indicators





9. Other relevant evidence on progress

N/A

III. OPERATIONAL PLAN

PMI support to Mozambique is in line with the Government of the Republic of Mozambique's (GRM's) 2017-2021 draft NMSP. PMI funding is planned in consideration with other donor support and NMCP priorities so that resources can be allocated in an efficient and complementary manner, according to disease burden and the added value of each organization. Development of the NMSP included a mapping of current resource requirements and gaps. The findings from this mapping informed the review of current PMI activities during the development of this operational plan. These activities supported the continued relevance of the PMI 2017 operational plan orientation towards provision of technical assistance predominantly in the center and north of the country where the malaria burden is highest.

Based on this perspective, PMI will continue to support national level coordination and commodity procurement, and will concentrate implementation support to those provinces with the highest malaria transmission. PMI will continue to focus on maintaining high coverage of malaria commodities nationally through routine distribution systems. This will include pooling PMI commodities with those purchased from other donors and distribution countrywide through the government supply chain.

PMI implementation support interventions will be geographically targeted to the areas of most need. PMI began targeting support to the provinces and districts that have the highest malaria burden beginning with FY 2013 funding. The objective of this approach is to implement service delivery activities to strengthen malaria in pregnancy (MIP) interventions and case management, and supportive activities such as social and behavior change communication (SBCC), strengthening supply chain management, and responsive surveillance, monitoring, and evaluation (SM&E) in the high burden target provinces. This support will focus on provincial and district level planning and coordination and health facility service delivery improvement. PMI will also support targeted IRS to complement national universal coverage ITN campaigns.

Based on the findings of the 2015 IMASIDA that showed an increasing burden of malaria in the two most populous provinces, Zambézia and Nampula, the MoH requested that PMI continue to focus its technical activities intensively in these two provinces beginning in FY 2017. This request is well-aligned with PMI's plan to concentrate its technical support where the burden of malaria is highest, as these two provinces represent nearly 40% of the national burden of malaria and the prevalence in these two provinces increased from 2011 to 2015. Concentration of efforts on these provinces will allow for more comprehensive coverage of the districts, facilities and communities in the two provinces. Scale up of key activities in FY 2018 to two additional high burden provinces, Cabo Delgado and Tete, will be informed by the successes and lessons learned from implementation in Zambézia and Nampula.

1. Vector monitoring and control

NMCP/PMI objectives

One of the objectives of the 2016-2021 NMSP is to ensure that 100% of the population of Mozambique has access to at least one method of malaria vector control (defined as living in an area targeted for IRS or for universal coverage with ITNs) with at least 85% coverage of the population in targeted areas. Mozambique's integrated vector management (IVM) strategy prioritizes universal access to ITNs complemented with IRS implemented to manage insecticide resistance, to reduce malaria burden in areas with high transmission and to support regional malaria elimination commitments. This plan has been supported through the implementation of Mozambique's national ITN campaign which began in November 2016. This 2016-2017 universal coverage campaign (UCC) is the first national ITN campaign

in Mozambique as previous UCCs were planned to cover only a limited number of districts that were not covered by the national IRS program.

In keeping with the goals set forth in the NMSP, PMI aims to:

1. Support the implementation of the IVM strategy to ensure sustained ITN coverage through both continuous and campaign channels;
2. Implement a semi-parallel ITN supply chain for continuous channels;
3. Support post-campaign surveys to ensure successful implementation and impact of mass ITN campaigns;
4. Support collection and use of quality entomological data;
5. Support an integrated, evidence-based approach to IRS that results in a more cost-effective and efficient targeted strategy; and
6. Strengthen the MoH-led entomology, IRS, and ITN programs.

These objectives are in line with the IVM strategy and the new 2017-2021 NMSP.

a. Entomologic monitoring and insecticide resistance management

Progress since PMI was launched

PMI has provided important support to build Mozambique's entomological capacity at both national and provincial levels since 2007. PMI support for entomological monitoring and insecticide resistance management is through direct implementation by PMI's IRS partner in Zambézia and through support for the NMCP's national efforts.

PMI has directly supported entomological data collection in Zambézia since 2008, including IRS residual efficacy monitoring, year-round entomological monitoring, and annual insecticide resistance testing. This testing has provided important guidance for the national and provincial IRS programs regarding insecticide and intervention selection. The PMI-supported entomology laboratory and insectary in Quelimane, Zambézia Province, serves as a regional center for entomologic monitoring and surveillance for IRS and ITN activities in the central provinces of Mozambique.

The PMI-supported central entomology laboratory and insectary at the National Institute of Health (*Instituto Nacional de Saúde*- INS) in Maputo is operational and serves as the reference laboratory for in-country molecular processing of mosquito material and immunodiagnostic testing of mosquitoes for malaria parasites. The INS lab also performs monitoring of insecticide resistance and its mechanisms. Similarly, PMI supported the establishment of an entomology laboratory in Pemba, Cabo Delgado Province, which served as a regional center for entomological monitoring and surveillance. In addition to laboratory support, PMI has supported the implementation costs for entomological data collection throughout the country.

Progress during the last 12-18 months

PMI has worked closely with the NMCP and the provincial health department in the past 12-18 months to directly conduct entomological monitoring in Zambézia, the province where IRS has been implemented since 2006. Integrated teams of MoH and PMI partner staff conducted monthly mosquito collections at four sentinel sites (Milange, Morrumbala, Mocuba, and Maganja da Costa). This included three sites in exclusively IRS districts and one site in a comparable non-intervention district (Maganja da Costa). Additionally, monthly collection in intervention and non-intervention villages in Mopeia district began in September 2016 as part of a cost-effectiveness study of different vector control activities. This

study is co-funded by PMI and by UNITAID through Innovative Vector Control Consortium (IVCC) as part of the Next Generation IRS (NGenIRS) Project.

Entomological collections included human landing catches, pyrethrum spray collections, and CDC light trap collections. A total of 3,320 adult female *Anopheles* mosquitos were captured from July 2015 to June 2016. All methods in all sites captured *An. gambiae* s.l. and *An. funestus* s.l. The majority of mosquitoes collected were *An. funestus*, but the dominant species in Mocuba was *An. gambiae.* In all areas, 81% of the mosquitoes collected by pyrethrum spray catches, 66% of the mosquitoes collected by landing catches, and 96% of the mosquitoes collected by light traps were *An. funestus* s.l. In particular, high numbers of *An. funestus* s.l. were collected in July.

A total of 1,787 *Anopheles* mosquitoes were collected from July 2015 to June 2016 from human landing collection, 63% of which were collected in the non-IRS area, followed by 27% in Milange, an IRS area. In all districts, *An. gambiae* were more exophagic and in three of the four sites *An. funestus* were endophagic. The peak indoor biting time for *An. gambiae* in all districts was from 1-2AM and the peak outdoor biting times were 10-4AM. For *An. funestus*, the peak indoor biting times were 12-4AM in Milange and 12-3AM in Maganja da Costa. Outdoor biting for *An. funestus* peaked from 10PM-5AM in Milange and Maganja da Costa. Molecular analysis of 734 mosquitoes collected from July to November 2015 confirmed 92% accuracy from the *An. funestus* complex morphological identification and 86% accuracy from *An. gambiae* complex morphological identification. The predominant species identified were *An. funestus* s.s, *An. gambiae* s.s. and *An. arabiensis*.

During the four months before the 2015 IRS campaign (July – October 2015), the average indoor resting density in the three IRS areas was 0.43 mosquitoes/collection and in the non-IRS area it was 5.58 mosquitoes/collection. During two-month post-spray (Nov – Dec), the average indoor resting density decreased to 0.05 and 0.5 mosquitoes/collection in the IRS and non-IRS areas respectively, the main decrease being in the numbers of *An. funestus* collected in IRS sites.

Insecticide resistance testing was carried out in three IRS districts and the control district from September to December 2016 and in the remaining four IRS districts from January to March 2017 on *An. gambiae* s.l. Preliminary results are shown in Table 3.

Table 3: Insecticide resistance testing on *An. gambiae* s.l. in PMI IRS districts – 2016 & 2017, including repeat tests

District	Alphacypermethrin (0.5%)		Permethrin (0.75%)		Pirimiphos-Methyl (0.25%)		DDT (4%)		Bendiocarb (0.1%)	
	Sept- Oct 2016	Jan-March 2017	Sept-Oct 2016	Jan-March 2017	Sept-Oct 2016	Jan-March 2017	Sept-Oct 2016	Jan-March 2017	Sept-Oct 2016	Jan-March 2017
Mocuba		99 (100)		97 (100)		99 (100)		100 (100)		97 (100)
Morrumbala		97 (100)		91 (100)		100 (100)		100 (100)		100 (100)
Milange		99 (100)		91 (300)		99 (100)		99 (100)		100 (100)
Molumbo	96 (100)	97 (100)	71 (100)	96 (100)	100 (100)	90 (200) *	100 (100)		99 (100)	
Derre	99 (100)	100 (100)	96 (100)	98 (100)	100 (100)	100 (100)	100 (100)	100 (100)	99 (100)	
Mopeia		100 (100)				100 (100)				
Maganja da Costa	97 (100)	95 (300)	79 (100)	97 (300)	100 (100)	100 (100)	98 (100)	98 (100)	95 (100)	99 (100)

% 24-hour mortality (number tested); >98% = susceptible, 90-97% = possible resistance, <90% = resistance
* Average of two tests - the first test had 80% mortality and the second had 100% mortality. The difference could be due to the quality of the test papers.

Important progress was made in strengthening the capacity of the Zambézia insectary and plans were underway to further support and expand its role as a regional center for entomology. These plans were, however, delayed by a fire in February 2017, which destroyed the Zambézia colony and all entomological equipment. Raw data and specimen samples from recent collections were also lost in the fire. PMI is currently working to rebuild the insectary, including progressing towards an animal-fed colony.

To strengthen entomological activities throughout the country, PMI has led efforts to revitalize and strengthen the national entomology working group under the stewardship of the PMI-supported senior entomologist seconded to the NMCP. In the past 12-18 months, the group has established its terms of reference, has regularly met, and has drafted the operational plan for the IVM strategy. The group has also made progress in developing standardized operational procedures and timelines for entomological data collection throughout the country.

In addition to the work in Zambézia, PMI has also supported the NMCP to collect entomological data from new and existent entomological sentinel sites in ten provinces. Data were collected to monitor entomology and insecticide resistance indicators and the quality and coverage of malaria vector control interventions. PMI and the WHO supported the Ministry of Health to conduct entomological data collection in 29 sites in 2016. These data are used by the NMCP, with PMI support, to inform IRS programming, but data management has been an important challenge. To address this challenge, PMI supported training of NMCP, INS and Zambézia Provincial staff on a new Disease Data Management System in 2016 and has helped establish this as the national entomological data management system in 2017. The sentinel sites currently collect larvae and pupae and conduct susceptibility testing and density

monitoring. Susceptibility monitoring is underway in 41 sites (including the 7 in Zambézia) in 2017 and these data are forthcoming. Data on insecticide susceptibility from all sites are collected annually. The most recent available susceptibility data were collected from 29 sentinel sites from February to March 2016 (Tables 4 and 5). Susceptibility testing of *An. gambiae* s.l. determined that there is resistance or possible resistance to lambdacyhalothrin in districts in Cabo Delgado, Nampula, Zambézia, Tete, Inhambane, and Maputo City. Deltamethrin resistance or possible resistance was detected in Cabo Delgado, Nampula, Zambézia, Tete and Maputo Province. Bendiocarb resistance or possible resistance was detected in Nampula and Tete. DDT resistance or possible resistance was detected in Nampula, Tete, Maputo Province and Maputo City. All sites showed full susceptibility to pirimiphos-methyl (Table 4).

Table 4: Results of susceptibility testing of *Anopheles gambiae* s.l., 2016

Province	Sentinel Site	Lambdacyhalothrin (0.05%)		Deltamethrin (0.05%)		Bendiocarb (0.01%)		DDT (4%)		Pirimiphos-Methyl		Phenitrition 1%	
		n	% Mort.	N	% Mort.	n	% Mort.	n	% Mort.	n	% Mort.	n	% Mort.
Cabo Delgado	C. Pemba	0	0	100	95	0	0	0	0	100	100	-	-
	Metuge	100	91	100	93	100	100	100	100	100	100	-	-
	Montepuez	0	0	100	99	100	100	100	100	100	100	-	-
Nampula	C. Nampula (Namicopo)	100	73	100	80	100	100	100	88	100	100	-	-
	C. Nampula (Muatala)	100	85	100	87	100	92	100	78	100	100	-	-
	Meconta	100	38	100	96	100	85	100	85	100	100	-	-
	Monapo	100	73	100	87	100	92	100	78	100	100	-	-
Zambézia	Mocuba	100	52	100	40	100	98	100	98	100	100	100	100
	Morrumbala	100	33	100	34	100	100	100	100	100	100	100	100
	Milange	100	45	100	71	100	100	100	100	100	100	100	100
Manica	Gondola	100	100	100	100	100	100	100	100	100	100	-	-
	Chimoio	100	99	100	100	100	100	100	100	100	100	-	-
Tete	C. Tete	100	91	100	60	100	92	100	88	100	100	-	-
Sofala	Beira	100	98	100	100	100	98	100	100	100	100	-	-
	Dondo	100	98	100	100	100	99	100	100	100	100	-	-
Inhambane	C. de Inhambane	100	71	100	99	100	100	100	100	100	100	-	-
	Maxixe	-	-	100	100	-	-	-	-	-	-	-	-
Gaza	Chokwe	100	100	100	100	100	100	100	100	100	100	-	-
	Xai-Xai	100	100	100	100	100	100	100	98	100	100	-	-
Maputo Province	Boane	100	100	100	99	100	99	200	96*	100	100	-	-
	Magude	-	-	330	99	182	100	347	100	194	100	-	-
	Manhiça	-	-	91	95	121	100	136	100	100	100	-	-
	Moamba	100	98	100	99	100	99	100	100	100	100	-	-
	Marracuene	-	-	100	100	-	-	-	-	-	-	-	-
	Matutine	100	100	100	99	100	100	100	98	100	99	-	-
	C. Matola			125	100	100	99	100	97	100	100	-	-
Maputo City	Ka Maxaquene	100	89	100	98	100	100	100	97	100	100	-	-

>98% = susceptible, 90-97% = possible resistance, <90% = resistance; * Resistance confirmed

Susceptibility testing of *An. funestus* s.l. determined that there is resistance to lambdacyhalothrin in Niassa and Tete, to deltamethrin in Niassa, Tete and Inhambane, and to bendiocarb in Niassa and Tete (Table 5).

Table 5: Results of susceptibility testing of *Anopheles funestus* s.l., 2016

Province	Sentinel Site	Lambdacyhalothrin (0.05%)		Deltamethrin (0.05%)		Bendiocarb (0.01%)		DDT (4%)		Pirimiphos Methyl	
		n	% Mort.	n	% Mort.	n	% Mort.	n	% Mort.	n	% Mort.
Niassa	Lichinga	100	24	100	23	100	83	100	100	100	99
Tete	Moatize	100	86	100	68	100	81	100	93	100	100
Inhambane	Maxixe	0	0	100	71	0	0	0	0	0	0
	Massinga	0	0	100	89	0	0	0	0	100	100
Maputo Province	Manhiça			33	100	0	0	154	100	66	100

>98% = susceptible, 90-97% = possible resistance, <90% = resistance

Over the past year, PMI continued to support field entomologic activities at the central and provincial levels with training, supervision, and standardization of entomology techniques. Laboratory training and support for mosquito identification and malaria parasite detection was provided to the INS laboratory and to other partners for capacity strengthening. At the request of the NMCP, PMI also continued support for the salaries of two technicians in the Maputo provincial entomology laboratory/insectary.

Plans and justification

In 2018, PMI plans to continue entomological surveillance in Zambézia including assessment of malaria vector density, species composition, vector feeding time and location, monitoring of the quality of IRS operations and insecticide decay rates, and assessing vector susceptibility and mechanisms of resistance. PMI will lead the set-up of a replacement insectary and entomology laboratory in Zambézia Province and in transitioning the mosquito colony to an animal-feed system, to increase the ability of the insectary to provide susceptible mosquitoes for IRS monitoring.

PMI will assist in strengthening Nampula Province's capability for entomologic monitoring of its vector control activities and provide technical support for the establishment and maintenance of an insectary and entomology container laboratory in Nampula Province. This will include the secondment of an entomologist to lead entomological activities and manage the insectary in Nampula. At the central level, PMI will continue to support the NMCP's IVM Program, which includes insecticide resistance testing, residual efficacy testing of IRS, and vector bionomics from established entomological sentinel sites. PMI support will include continued support of the senior entomologist seconded to the NMCP to strengthen capacity for vector control activities and will begin support for undergraduate and graduate students' entomological capacity-building. With PMI's support to the central laboratory, the INS will continue to process mosquito samples from the NMCP. Mosquitoes collected from entomological monitoring activities in Zambézia Province are currently being processed at the University of Witwatersrand, South Africa. Discussions are currently ongoing to explore the possibility of processing the samples collected in Zambézia domestically. PMI will continue to support the use of the Disease Data Management System for the central level (NMCP and INS) and in Zambézia and Nampula as the platform for all entomological data.

Proposed activities with FY 2018 funding: ***($679,000****)*

- *Entomological monitoring and capacity building in Zambézia and Nampula Provinces*: Support entomological monitoring activities in eight sites in Zambézia and four sites in Nampula. This funding includes support for assessment of malaria vector density, species composition, vector feeding time and location, monitoring of the quality of IRS operations and insecticide decay rates, and assessing vector susceptibility (including resistance intensity in both *An. gambiae* and *An. funestus*), as well as assessing mechanisms of resistance. It also includes training for provincial staff, as well as technical assistance for insectary and animal house support in Zambezia and Nampula, including secondment of an insectary technician in Zambezia and an entomologist to Nampula, but no other payment for government staff salaries at the provincial level. ($400,000)

- *Support to national and provincial government for entomologic monitoring*: Support for the national government entomological program, including entomological collection at established sentinel sites, consistent with the National IVM Strategy. This line item includes support toward the government's approximately 11 entomological monitoring sites in the center and north of the country. This support is complementary to support from WHO and the Bill and Melinda Gates Foundation for entomology collection in the center and south. Funding will also provide continued laboratory support at the central level for mosquito processing and analysis, as well as support for a seconded senior entomologist. ($250,000)

- *CDC technical assistance on entomology activities*: Two TDY visits from CDC entomology branch to provide technical assistance and build MoH entomological monitoring capacity. ($29,000)

b. Insecticide-treated nets

Progress since PMI was launched
Mozambique introduced free distribution of ITNs to children less than five years of age and pregnant women as a national policy in 2006. In 2009, Mozambique adopted the policy of universal coverage, defined as one ITN for every two persons. The two main channels used to deliver ITNs are routine distribution of ITNs to pregnant women at ANC visits and implementation of mass UCCs. The national policy also includes distribution to children less than five years of age via the expanded program on immunizations (EPI) and school based distribution, but these two channels have not yet been introduced. The NMCP asked PMI to focus on making sure that the ANC distribution system was functioning well before expanding to a second routine distribution channel.

In order to help guide the country's allocation of resources for vector control, PMI and Global Fund supported a workshop in 2014 aimed at identifying the most cost-effective mix of IRS and ITNs. The results suggest allocating more resources to ITNs rather than IRS. This finding helped secure funding from the Global Fund to cover the entire country through the ongoing ITN UCC. There was also a significant change in the ITN distribution approach as the country decided to implement national level campaigns, as opposed to covering selected districts across the country.

Since late 2009, PMI has focused its support on the purchase of ITNs for ANC distribution. Because of weaknesses in the routine ITN logistics system, including issues with storage and logistics information,

PMI supports a semi-parallel distribution system for routine ITNs from port-of-entry to the provincial level, nationwide. As shown in Table 6, PMI and UNICEF have also supported distribution from provincial warehouses down to the district and facility level in targeted areas. However, UNICEF support ended in 2016. The MoH implements this activity in many areas without donor support.

Table 6: Provincial level support by partners for distribution of ITNs*

Province	From Provincial Warehouses to Districts		From Districts to Health Facilities
	UNICEF	PMI	PMI
Niassa			
Cabo Delgado		From 2015	
Nampula		From 2015	From 2017
Zambézia	From 2010 to 2016	From 2017	From 2017
Tete	From 2010 to 2016	From 2017	
Manica			
Sofala			
Inhambane			
Gaza	From 2010 to 2016		
Maputo			
Maputo City			

*The years described in the table are calendar years.

PMI also provides technical assistance for the implementation of mass UCCs, which started in 2010. Table 7 shows the number of districts covered from 2010 to 2017, among the existing 151 districts in the country. During each campaign the entire district was targeted and the districts covered in a given year were spread across the country.

Table 7: Number of districts covered with UCC per year, 2010 to 2015

Year of UCC	Number of districts covered
2010	11
2011	45
2012	21
2013	23
2014	64
2015	41
2016	23*
2017	128**

Note: The total number of districts in the country in 2015 was 151. Some districts were covered twice.
* All 23 districts in the province of Nampula were covered in the 2016 UCC pilot
** All districts throughout the country outside of Nampula will be covered in the 2017 UCC

Results of PMI's first ITN durability study were published in 2015[2]. The prospective evaluation measured the physical durability of two brands of ITNs (Olyset® and PermaNet 2.0®) distributed during a campaign in 2008 in Nampula Province. The study found that 75% (72–78%) of households retained at least one ITN after three years; and the most common cause of attrition was damage beyond repair

[2] http://www.ajtmh.org/content/92/2/286.full.pdf

(51%). Hole damage was evident after one year, and increased each year thereafter. Olyset® had a significantly greater mean number of holes and proportional hole index compared with PermaNet 2.0® (all *P* values ≤ 0.001). Data from this study will be used as part of a pooled analysis of durability across eight PMI focus countries.

Data from the 2015 IMASIDA showed some improvements in the ownership and use of ITNs. However, there are still some challenges. From the 2011 DHS to the 2015 IMASIDA, the proportion of households with at least one ITN increased from 51% to 66%. Correspondingly, the proportion of children less than five years old and pregnant women who slept under an ITN the previous night rose from 36% and 34% to 48% and 52%, respectively. The 2015 IMASIDA data showed that in households with at least one ITN, the proportion of children less than five years old and pregnant women who slept under an ITN the previous night was 79% in both cases. In the same survey, the proportion of the population with access to ITNs was 54%.

Progress during the last 12-18 months

During calendar year 2016, PMI procured approximately 2.2 million ITNs to meet the requirement for the ANC distribution channel. This amount included 0.7 million nets procured to create a pipeline and smooth out the supply chain. This measure was necessary to mitigate the effect of delayed arrival of ITNs for ANC distribution, as was observed in calendar years 2014 and 2015. According to preliminary data from the routine health management information system (HMIS), of the pregnant women attending their first ANC visit in calendar year 2016, 81.5% received an ITN.

PMI continued to support a semi-parallel distribution system for ITNs, from port-of-entry to the provincial level, nationwide. In addition, PMI supported the distribution from port-of-entry directly to the districts in Cabo Delgado and Nampula Provinces, as shown in Table 6. PMI has also started the process to initiate the distribution to health facilities in Nampula by hiring the necessary staff and establishing contracts with transportation companies. UNICEF supported similar activities in the provinces of Gaza and Tete, but this support ended in December 2016. In Zambézia, the UNICEF support was transitioned to PMI, which is taking over the transportation from provincial warehouses to district warehouses, and from district warehouses to health facilities. The MoH implements these activities in the provinces without donor support.

PMI also continued to provide support to improve the ANC distribution system nationwide. As a result, there were two major improvements during this period: 1) the introduction of a stock card for ITNs, which allows for better stock control; and 2) the revision of the ANC register to capture the number of pregnant women receiving an ITN. The latter was introduced in 2015 and the system is now reporting these data more consistently. Despite these improvements, data from end-use verification (EUV) surveys continue to show a lack of consistent availability of ITNs at the provincial and/or district warehouse and health facility levels. The last EUV report showed stockouts on the day of the visit in 33% of the 69 health facilities visited and in six of the 17 warehouses visited.

PMI continued to provide technical assistance for the planning and implementation of the first national ITN campaign, which is being implemented using a staged approach. The campaign was launched in Nampula Province in November 2016, where a total of 3.5 million nets were distributed. Overall, the campaign was regarded as a success in that over 3 million ITNs were distributed, but a number of challenges were experienced. Most of these challenges were related to the registration process and the logistic operations. After the campaign, the NMCP, with support of PMI, organized a workshop to document the lessons learned in Nampula in order to inform the planning in other provinces. In the next

stage, the campaign will be implemented in Zambézia, Niassa and Cabo Delgado provinces, followed by Sofala, Manica and Tete provinces, and finally in Inhambane, Gaza and Maputo provinces. The expected end of the campaign is December 2017.

PMI provided support for the introduction of a new continuous distribution channel. During this process, the NMCP decided to introduce school-based distribution but not EPI distribution. This decision was based on two factors. First, Mozambique faced several logistic challenges to establish and expand ITN distribution through ANC. The addition of the EPI channel would exacerbate those challenges, as the nets would have to be distributed via the same logistic system to reach the EPI clinics at the health facilities. Second, NetCalc modeling demonstrated that school-based distribution is the most efficient strategy to maintain universal coverage of ITNs in Mozambique. With national primary school attendance in Mozambique at 92% and 87% among boys and girls, respectively, the NMCP sees school-based distribution as a viable complementary continuous channel. In addition, these distributions can include malaria-related messaging to emphasize proper ITN use. The new Malaria Strategic Plan will reflect this updated policy.

To start the process of introducing school-based distribution, the NMCP recently hosted a meeting with key stakeholders to discuss the concept of a school-based distribution pilot. The pilot will be implemented in one district of Zambézia Province during a period of two years, 2018 and 2019. The results of the pilot will be used to inform the design of the next round of Global Fund funding, which should start in 2021. The details of how exactly the school-based distribution will be implemented in Mozambique will be finalized in the coming years, based on the results of the pilot and on experiences from Ghana and Tanzania, which are also implementing this channel. The initial plan was for PMI to provide technical assistance, to inform the design of the pilot and the evaluation component, while the implementation costs would be covered through the new Global Fund grant. However, given that Mozambique has applied for a continuation grant and that there was a need to prioritize other activities (such as the procurement of RDTs and ACTs), it is unlikely that this activity will be included in the new Global Fund grant. Given the importance of this pilot to inform future programming in this area, PMI will continue to work with the NMCP and other partners to explore other possibilities to support this activity, including support from PMI's supply chain partner in country.

Finally, PMI also continued to support durability monitoring of ITNs and post-campaign evaluations in three provinces (Nampula, Tete, and Inhambane). These ITNs were distributed early in the calendar year 2015, and there are two brands being followed: MagNet® and Royal Sentry.® The baseline data collection was completed in the calendar year 2015 and the 12-month data collection was carried out in May and October of 2016. Overall, 98% of the targeted households and 84% of campaign nets were recruited at baseline. The 12-month preliminary data indicates that the all-cause attrition was 13% in Tete, 15% in Inhambane and 23% in Nampula. The 24-month data collection is planned for May and October 2017, and the 36-month (final) data collection is planned for May and October 2018.

Commodity gap analysis

Table 8: ITN Gap Table

Calendar Year	2017	2018	2019
Total country population	27,128,530	27,843,933	28,571,310
Population at risk for malaria	27,128,530	27,843,933	28,571,310
PMI-targeted population	1,586,127	1,627,954	1,671,383
Continuous Distribution Needs			
Channel #1: ANC	1,506,821	1,546,556	1,587,814
Channel #2: School-based distribution		25,000	25,000
Estimated Total Need for Continuous Channels	1,506,821	1,571,556	1,612,814
Mass Campaign Distribution Needs			
2017 mass distribution campaign	11,510,953	0	0
Estimated Total Need for Campaigns	11,510,953	0	0
Total ITN Need: Routine and Campaign	**13,017,774**	**1,571,556**	**1,612,814**
Partner Contributions			
ITNs carried over from previous year	183,000	224,729	53,173
ITNs from MoH	0	0	0
ITNs from Global Fund	11,510,953	0	0
ITNs planned with PMI funding	1,548,550	1,400,000	1,597,814
Total ITNs Available	**13,242,503**	**1,624,729**	**1,650,987**
Total ITN Surplus (Gap)	**224,729**	**53,173**	**38,173**

Assumptions:

- The PMI-targeted population includes pregnant women only.
- ANC needs were based on the number of pregnant women who attended ANC in 2016, adjusted for population growth.
- The campaign ITNs are being distributed through a national UCC, which started in November 2016 (in Nampula Province) and is scheduled to end in October 2017. All 11 provinces will receive ITNs from the UCC.

Plans and justification
With FY 2018 funds, PMI will continue to support continuous ITN distribution through ANC clinics. PMI will procure approximately 1.6 million ITNs for ANC distribution. PMI will continue to support the distribution of ITNs through a semi-parallel supply chain: from port-of-entry to all 11 provincial warehouses nationwide. PMI will also support distribution from provincial warehouses to the district level in Nampula, Zambézia, Tete, and Cabo Delgado; and from the district level to health facilities in Nampula and Zambézia. PMI will also continue to support SBCC for ITN use (*SBCC section).*

As shown in Table 8, Mozambique is expected to have a gap of approximately 130,000 nets by the end of calendar year 2018. PMI expects this gap to be covered by leftover campaigns nets. If there are no extra campaign nets, PMI will cover this gap by reprograming funds.

*Proposed activities with FY 2018 funding: **($5,405,538**)*

- *Procurement of ITNs*: PMI will procure approximately 1.6 million ITNs for continuous distribution through ANC services and a school-based pilot. ($3,969,538)

- *Distribution of ITNs:* PMI will provide funds to distribute approximately 1.6 million ITNs from the port-of-entry to provincial level warehouses (national), as well as ITNs from provincial warehouses to district-level warehouses (Nampula, Zambézia, Tete and Cabo Delgado) and from district warehouse to health facilities (Nampula and Zambézia). In addition, PMI will support ITN distribution in one district for the school-based distribution pilot. ($1,336,000)

- *School-based distribution pilot:* PMI will support technical assistance, an end line survey, and dissemination of results of a school-based ITN distribution pilot. ($100,000)

- *ITN SBCC:* see SBCC section of the MOP.

c. Indoor residual spraying

Progress since PMI was launched
There are four groups currently supporting implementation of IRS in Mozambique: PMI, the MoH, the Global Fund, and Goodbye Malaria. PMI has historically focused its spray on high burden districts within Zambézia Province, and the MoH has sprayed the remaining target districts in the provinces outside of Zambézia. Goodbye Malaria began implementing IRS in Maputo Province in 2015 in support of elimination efforts in the south of the country. PMI has supported IRS implementation in as few as four and as many as eight districts in Zambézia since FY 2007. Historically, the Global Fund has provided funds for insecticide procurement for all IRS campaigns in Mozambique. However, due to the need to spray more structures than originally planned in 2014 and the switch from a pyrethroid to a long-lasting organophosphate for the 2015 campaign, PMI also procured insecticide in each of those years. The Global Fund procured all insecticide for PMI, the MoH, and Goodbye Malaria in 2016.

Table 9: PMI-supported IRS activities 2015 – 2019

Calendar Year	Number of Districts[1] Sprayed	Insecticide Used	Number of Structures Sprayed	Coverage Rate	Population Protected
2015	6	3 districts pyrethroid; 3 districts organophosphate	337,433	88.1%*	1,631,058
2016	7**	organophosphate	405,597	80.0%	1,929,654
2017#	7**	organophosphate	440,063	-	1,953,162
2018#	5	long-lasting, non-pyrethroid insecticide	339,000	-	1,547,000
2019#	5	long-lasting, non-pyrethroid insecticide	339,000	-	1,547,000

* This number may be lower, as indicated by discrepancies noted in the post-data spray quality assessment
** Only half of Mopeia district was sprayed as part of the vector control cost-effectiveness study
# Represents targets based on the 2017 IRS work plan, and/or projected targets based on national strategic plan and/or discussions with the NMCP.

Progress during the last 12-18 months

The PMI-supported IRS operations in 2016 targeted seven districts in Zambézia Province without universal ITN coverage: Milange, Morrumbala, Molumbo, Derre, Mocuba, Quelimane, and Mopeia. Only selected villages within Mopeia District were sprayed as part of the cost-effectiveness evaluation of vector control strategies in Mozambique (COST) study, co-funded by the Next Generation IRS (NGenIRS) Project and PMI (see OR Section). The calendar year 2016 spray campaign, carried out from October 5 through November 26, used the organophosphate Actellic CS in all districts. A total of 2,385 men and women were hired and trained as spray operators, team leaders, locality and district supervisors, coordinators, database coordinators and entry clerks, M&E assistants, and warehouse keepers, among other seasonal personnel.

Of the 481,296 structures targeted[3] in the seven districts, spray operators found 508,295 structures. This number of structures found was in the range of the number of structures found in 2014 and is indicative of higher quality household registration in 2016 than in 2015. Of the found structures, a total of 405,597 were sprayed, representing 80% coverage of eligible structures. The total number of persons protected was 1,929,654, including 115,639 pregnant women and 284,468 children less than five years of age. Data collection verification activities demonstrated large improvements in the quality of data from the 2015 to 2016 campaign.

[3] The number of targeted structures was based on the number of structures found in 2014 due to concerns with the quality of the 2015 data

Standard WHO cone bioassays were used to evaluate the quality of the 2016 spray operation. The bioassay tests were conducted 24 hours after spraying and monthly thereafter in Milange, Mocuba, Morrumbala, Mopeia, and Quelimane. Initial wall bioassay tests showed high mortality rates (100%) of susceptible mosquitoes (*Anopheles arabiensis*) exposed to organophosphate-treated walls in all sites. One month after spraying, bioassay mortality of susceptible mosquitoes exposed to organophosphate-treated walls remained acceptable (96.5% to 100% mortality). Five months post-IRS, mortality was measured between 88% and 98% in Morrumbala, Milange, Mocuba, and Quelimane; however, average mortality in Mopeia had dropped to approximately 75% in the month of March, five months post-IRS. The testing will continue in each district until mortality is below 80% for two consecutive months.

The NMCP and Goodbye Malaria conducted IRS in 22 additional districts in 2016. This included 18 districts with long-lasting organophosphate and 4 districts with deltamethrin. PMI supported the training of all provincial and district IRS focal points to strengthen the quality of planning for effective IRS. PMI also continued to coordinate regular IRS technical working group meetings with the NMCP and Goodbye Malaria in order to harmonize IRS operations and planning and supervision tools.

Mozambique was selected as a second round country in the UNITAID-funded NGenIRS Project. This market-shaping intervention includes a short-term co-payment to accelerate the reduction in price, and hence uptake, of long-lasting, non-pyrethroid IRS insecticides. The goal of the price reduction is to enable Mozambique to expand coverage of long-lasting IRS from baseline levels. Mozambique, through Global Fund support, became eligible to buy subsidized long-lasting organophosphate for the 2017 campaign.

Plans and justification

During 2017, PMI plans to spray an estimated 440,063 structures in seven target districts in Zambezia Province, namely Derre, Milange, Mocuba, Molumbo, Morrumbala, Maganja da Costa and Mopeia, covering an estimated 1,953,162 people. Spray targets are based on structures found by spray operators in 2016 in Derre, Morrumbala, Molumbo, and Milange districts. For Mopeia, only half of the district will be sprayed as part of the cost-effectiveness evaluation of vector control strategies in Mozambique study (COST study) with targets based on the village randomization from 2016. For Mocuba district, because of consistently high refusal rates in the city center, the Mocuba Sede area will not be sprayed in 2017. Maganja da Costa district is replacing the district of Quelimane, which has also had consistently high refusal rates over the last few years, as it is a more urban area. Spray targets for Maganja da Costa are based on population census data. The spray campaign in Zambezia will be conducted between October and November as this is immediately before the historical peak in malaria cases.

In order to increase spray coverage in 2017, communication activities on radio, with community leaders, and house to house will begin at least one month prior to the spray campaign. Mobilizers will then continue to be embedded with spray teams to ensure closer coordination with spray teams on the day of spraying so that houses are ready when spray operators arrive. These mobilizers will receive enhanced training on how to effectively respond to barriers to IRS acceptance in the field. Additional community meetings with traditional and religious leaders and local community radio messaging will also be used to encouraged/promote IRS acceptance. Furthermore, people who agreed to have their houses sprayed will be identified by these leaders and will conduct house-to-house mobilization with their neighbors in order to influence their neighbors and family by explaining the importance of spraying their homes.

PMI will conduct pre-spray environmental assessments in the seven targeted spray districts. For the new operational sites planned, including the new spray district of Maganja da Costa, assessments will also identify acceptable soak pit locations and potential mobile soak pit areas. PMI will ensure safe and correct insecticide application, in compliance with the approved 2015 Supplemental Environmental

Assessment and will lead community mobilization and SBCC sensitization activities to increase community awareness and acceptability of IRS. PMI also plans to continue its partnership with Incala Plastics in Quelimane and to develop a partnership with Royal Plastics in Nampula to expand insecticide bottle recycling opportunities.

In addition, PMI will support the NMCP's 2017 IRS campaign by leading a training of trainers at the national level for IRS managers from all 2017 IRS districts. This training will build on the 2016 boot camp training with a focus on management, environmental compliance, and quality IRS training and implementation. The training will also seek to enhance the supervision skills of IRS managers for all IRS provinces, including Zambezia. Additionally, PMI will provide increased technical support to the NMCP-led IRS program in Nampula Province in the areas of environmental compliance, warehouse and stock management, and SBCC. Lastly, PMI will support the NMCP in waste management, particularly for recycling empty insecticide bottles.

For calendar years 2018 and 2019, PMI will slightly contract support for direct IRS implementation in Zambezia in order to increase support to strengthen acceptance and quality of the MoH IRS program.

Proposed activities with FY 2018 funding: ***($4,935,000)***

- *IRS implementation:* Support IRS operations covering approximately 339,000 structures. PMI-supported activities will include purchasing equipment and supplies, training, supervision, and environmental compliance. All insecticide (long-lasting, non-pyrethroid) needs will be covered by the Global Fund. ($4,400,000)

- *Support to national government IRS program:* Support for national training of trainers through a cascade approach. Increased support for environmental compliance, SBCC, and stock management for the MoH IRS implementation in Nampula, Cabo Delgado, and Tete. ($500,000)

- *IRS environmental assessment:* Routine independent environmental monitoring of IRS activities (implemented every two years). ($35,000)

2. Malaria in pregnancy

NMCP/PMI objectives
Prevention of malaria in pregnant women, through the use of sulfadoxine-pyrimethamine (SP) for IPTp and ITN distribution, has been promoted in Mozambique since 2006. The country has been implementing the WHO updated guidelines on IPTp since 2014, which recommend administering IPTp as early as possible starting in the second trimester (13 weeks) and at each scheduled ANC visit until the time of delivery, as long as there has been an interval of at least one month since the last SP dose. The national guidelines also recommend supplementation with iron and folic acid during pregnancy; the available tablets in Mozambique contain 90 mg of ferrous sulfate and 1 mg of folic acid. Recommended treatment of malaria during pregnancy is with oral quinine in the first trimester and ACTs in the second and third trimesters. Parenteral artesunate is the recommended treatment for severe malaria during pregnancy.

Although the NMCP and its partners lead procurement of SP and ITNs for distribution through ANCs, the MCH department manages the implementation of MCH programs. Both entities have identified focal persons for MIP and these individuals work very closely together. There is also a Reproductive

Health/Maternal-Neonatal-Child Health Working group. The NMCP is represented in this working group and is invited when MIP issues are discussed.

In alignment with GRM objectives, PMI aims to achieve the following objectives:

1. Improve coverage of IPTp to reach all eligible pregnant women at all eligible ANC visits.
2. Ensure point-of-care delivery of quality malaria services in pregnancy through provincial and district support of supervision and training of ANC health workers.

Progress since PMI was launched

Coverage of IPTp in Mozambique is still low, despite the improvements observed in the past few years. According to survey data, the percentage of women who receive at least two doses of SP during pregnancy increased slightly from 16% (2007 MIS) to 19% (2011 DHS), and to 34% in 2015 (IMASIDA). One important barrier to coverage in the Mozambican context is insufficient awareness of the risks associated with malaria in pregnancy (Boene, González, Valá et al., 2013). The MoH is committed to improving the coverage of this indicator and the Model Maternity was one attempt to support these efforts. The Model Maternity approach was an integrated platform for ANC and other maternal health services, which was co-funded by PMI and MCH funds. Although the Model Maternity approach was a very effective intervention in improving MIP related outcomes in targeted areas, its impact in reducing maternal mortality was limited. As a result, this activity was replaced by a new maternal and child survival integrated program, which has a different approach and a narrower geographic area. The primary vehicle for delivering this support has been the Integrated Reproductive Health/Maternal-Neonatal-Child Services Package, which was launched in 2012. PMI has contributed to this effort, along with other USAID funding sources since FY 2009.

The U.S. Government has supported the development of national policies, norms, and guidelines; conducted training on the integrated in-service training package; provided support for the improvement of the quality of care; provided input in the revision of the MCH registers to enable better recording and reporting practices; and coordinated with MCH partners under the leadership of the MoH. Since June 2014, the new IPTp guidelines have been implemented nationwide. As a result of this effort, routine data showed continuing improvement of IPTp2 coverage nationally from 20% in 2011, 36% in 2013, 44% in 2014 to 56% in 2015. In 2016, the IPTp2 coverage dropped to 49%. The decrease in IPTp2 coverage is likely related to the increase in reported stock outs of SP and other commodities and due to a transition in the ANC register which has complicated comparison of current and historical data on IPTp2 coverage. In fact, since October 2016, there have been an increase in the number of reported stockouts for several commodities, not only malaria-related. In almost all cases, these stockouts are related to lack of resources, from the government side, to pay for the transportation of commodities. This situation is related to the severe economic crisis which is affecting Mozambique since the discovery of hidden loans in April 2016. Most donors have significantly reduced their contributions, both to the state budget and to the health sector. Data from the health facilities receiving USAID and PMI support in the context of the Model Maternity Initiative indicate that in the first quarter of 2015, 70,098 pregnant women attended the first ANC visit, and 34% of these women attended the four ANC visits recommended by national guidelines; 53% received at least two doses of IPTp and 29% received at least three doses. The data also show that there was an increase in the proportion of pregnant women receiving an ITN, from 75% in 2014 to 81% in the first quarter of 2015. This transition away from the Model Maternity Initiative led to a reduction in the number of activities implemented by PMI on MIP. Despite these challenges, PMI continued to provide support for the rollout of the new WHO IPTp guidelines and the finalization and introduction of the new MNCH registers.

Progress during the last 12-18 months

During this period, PMI continued to support the implementation of MIP activities both at central and provincial levels. At the central level, the main effort was to establish a separate MIP working group. Previously, MIP issues were addressed at the Reproductive Health/Maternal-Neonatal-Child Health working group. However, in the past 18 months, this working group has not been meeting regularly. As such, the Ministry of Health proposed the creation of the MIP working group. This MIP working group will be a sub-group of the Reproductive Health/Maternal-Neonatal-Child Health working group. It will be co-chaired by the MCH department and NMCP and will include representatives from both programs.

Provincial level activities were focused on Zambézia, Nampula and Sofala provinces. In Nampula and Sofala, as part of an integrated ANC package, PMI provided mentoring to 113 ANC nurses in the application of the updated IPTp guidelines, including the importance of initiating SP as soon as possible in the second trimester, the need to administer SP as direct observed therapy, as well as reinforcing the importance of not administering SP to women who are receiving co-trimoxazole prophylaxis. PMI also supported community health workers to reach 2,122 pregnant women through home visits in Nampula and Sofala. This resulted in the referral of 788 pregnant women to ANC services, including for IPTp.

In Zambézia, PMI supported strengthening of MIP services through quarterly mentoring visits to 21 health facilities, targeting a total of 110 health workers. During these visits, health workers receive support to improve their skills in applying the updated WHO IPTp guidelines, providing counselling on IPTp and use of ITNs and on providing good and prompt malaria case management to pregnant women. As a result of this support, the proportion of pregnant women receiving at least two doses of IPTp in these health facilities in calendar year 2016 was 59%, higher than the Zambézia Province average of 47%.

In order to facilitate the implementation of WHO updated guidelines on IPTp-SP, PMI supported the testing of a toolkit to improve the estimation of gestational age. The toolkit included a technical summary, a PowerPoint presentation, an in-service training module, and a job aid to help ANC providers adhere to the WHO updated guidelines. In August 2016, PMI conducted 2 four-hour sessions to test the use of the toolkit with 33 providers from health facilities in Meconta District, Nampula Province. The data collected are being analyzed and if the tools are found to be effective, they will be submitted to the MoH for approval for initial implementation in Zambézia, Nampula and Sofala.

PMI also continued to provide support for the procurement of SP by purchasing 2 million tablets. However, data from the last EUV report showed continued reports of stockouts at the health facility level. In fact, 25% of the 69 health facilities and 2 of the 17 warehouses visited during the first quarter of FY 2017, reported stockouts of SP on day of the visit.

Table 10. Status of IPTp policy in Mozambique

Status of training on updated IPTp policy		Number and proportion of HCW trained on new policy in the last year if training on new policy is not yet completed	Are the revised guidelines available at the facility level?	ANC register updated to capture 3 doses of IPTp-SP	HMIS/ DHIS updated to capture 3 doses of IPTp-SP
Completed/Not Completed	Date (If completed, when, if not completed, when expected)				
Completed	2016	Training on new policy was completed in 2015. PMI is providing refresher training.	Yes	Yes	No*

*Although the registers capture 3 doses of IPT-p, DHIS-2 only reports 2 or more doses and 4 or more doses

Commodity gap analysis

Table 11. SP Gap Analysis for Malaria in Pregnancy

Calendar Year	2017	2018	2019
Total country population	27,128,530	27,843,933	28,571,310
Population at risk for malaria	27,128,530	27,843,933	28,571,310
SP Needs			
Total number of pregnant women attending ANC	1,586,127	1,627,954	1,671,383
Total SP Need (in treatments)	**3,790,844**	**3,890,810**	**3,994,605**
Partner Contributions			
SP carried over from previous year	1,937,017	1,812,840	1,422,030
SP from MoH	1,000,000	1,000,000	1,000,000
SP from Other Donors (UNICEF)	2,000,000	0	0
SP planned with PMI funding	666,667	2,500,000	3,000,000
Total SP Available	**5,603,683**	**5,312,840**	**5,422,030**
Total SP Surplus (Gap)	**1,812,840**	**1,422,030**	**1,427,424**

Assumptions:

- ANC needs were based on the number of pregnant women who attended ANC in 2016, adjusted for population growth.
- The estimated treatments needed are calculated with consideration of the current ANC visit attendance rates (1st visit: 95%; 2nd visit: 75%; 3rd visit: 42%; and 4th visit: 27%). The estimated total SP needs are calculated in treatments (3 tablets comprise each treatment).
- MoH contributions for 2018 and 2019 have not yet been confirmed.

Plans and justification
In order to support the continuous supply of SP, PMI will procure 3 million treatments with FY 2018 funds. The procurement of SP has historically been supported by the GRM, with UNICEF and PMI providing limited support when needed. For calendar years 2018 and 2019, there are no planned shipments of SP to be procured by UNICEF and the MoH contributions have not yet been confirmed. Hence, the SP procured by PMI will be crucial to ensure adequate stock levels in the supply chain. PMI will continue to monitor MIP stock levels through EUVs and provide support for stock forecasting and supply system strengthening to reduce stockouts at district and facility levels.

PMI will continue to foster the collaboration between the NMCP and the MCH department by providing support to the MIP working group at the central level. This includes technical support to update supervision and training materials related to MIP, particularly in the context of the integrated supervision of health workers at ANCs. PMI will also support refresher training of central level staff and will facilitate and assist with planning for supervisory visits of central level staff to provinces.

In alignment with the new provincial focus approach, PMI will continue to focus on increasing coverage of MIP activities to all districts of Zambézia and Nampula provinces, and in improving the quality of service delivery. This support will be implemented in an integrated manner with case management, SBCC, and SM&E activities by the PMI Mozambique bilateral partner. With FY 2017 funds, PMI aims to cover all districts of Zambézia and Nampula, the two provinces with the highest malaria burden in the country. Lessons learned from implementation in these provinces will be analyzed and will inform the development of the FY 2018 work plan. With FY 2018 funds, PMI will consolidate these efforts and start expansion to Tete and Cabo Delgado, the other PMI target provinces. In order to increase IPTp and ITN coverage rates in these target provinces, PMI will work with the provincial, district, health facility and community structures in order to improve ANC attendance rates and with commodity partners to improve the availability of malaria commodities at service delivery points. PMI will also support mentoring, supervision, and training to ANC staff to provide a comprehensive package of malaria interventions (case management, IPTp and ITNs) to pregnant women. In addition, there will be an increased focus on the quality collection and timely reporting of key MIP indicators.

*Proposed activities with FY 2018 funding: (**$840,000**)*

- *Procure SP:* PMI will procure 3 million treatments of SP. ($540,000)

- *Support national MIP planning and implementation:* Central level technical assistance to support planning and coordination of MIP activities, particularly its continued integration into standard ANC packages. ($100,000)

- *ANC training and supervision:* Provincial-level support for training and supervision of ANC staff in MIP. Decentralized support for integrated in-service training and supervision of ANC health workers on MIP in all districts of two of the four targeted provinces (Zambézia and Nampula) and support for expanding activities to the remaining two provinces (Tete and Cabo Delgado). This activity will be coordinated with other provincially focused activities. ($200,000)

3. Case management

a. Diagnosis and treatment

NMCP/PMI objectives

According to Mozambique's national treatment guidelines, all patients suspected of having malaria must have a confirmatory diagnostic test before receiving treatment with an ACT. RDTs are the preferred test for primary diagnosis of malaria. Microscopy is used for only 12% of malaria cases, and is typically performed in combination with an RDT and reserved for suspected treatment failures, severe febrile illness, and cases referred from lower levels of care. The NMCP and PMI prioritize the scaling up of quality-assured diagnostic testing through procurement of RDT, microscopes, laboratory supplies, and reagents; supporting training and supportive supervision; and scaling up quality assurance (QA)/ quality control (QC) systems for malaria diagnostics.

In line with the GRM objectives, PMI aims to achieve the following objectives:

1. Improve malaria case management, both at health facility and community level, through mentoring, supervision and training.
2. Improve forecasting, allocation, distribution, stock management, and use of case management commodities (i.e., ACTs and RDTs) in the country.
3. Improve QA/QC for both microscopy and RDTs.

Table 12. Status of Case Management Policy in Mozambique

Status of Case Management Policy in Mozambique according to National Malaria Treatment Guidelines 2017	
What is the first-line treatment for uncomplicated *P. falciparum* malaria?	Artemether-Lumefantrine
What is the second-line treatment for uncomplicated *P.falciparum* malaria?	Artesunate-Amodiaquine
What is the first-line treatment for severe malaria?	Injectable Artesunate
In pregnancy, what is the first-line treatment for uncomplicated *P. falciparum* malaria in the first trimester?	Oral quinine
In pregnancy, what is the first-line treatment for uncomplicated *P. falciparum* malaria in the second and third trimesters?	Artemether-Lumefantrine
In pregnancy, what is the first-line treatment for severe malaria?	Injectable Artesunate
Is pre-referral treatment of severe disease recommended at peripheral health facilities? If so, with what drug(s)?	Yes, it is recommended. Injectable Artesunate is the recommended drug.
Is pre-referral treatment of severe disease recommended for community health workers? If so, with what drug(s)?	Yes, it is recommended in children <6 years old. Rectal Artesunate is the recommended drug.
If pre-referral rectal artesunate is recommended, for what age group? (note: current international guidelines do not recommend administrating to those ≥ 6 years)	Rectal Artesunate is only recommended for children <6 years old.

The NHS covers approximately 60% of the population. In 2011, Mozambique launched a revitalization of the APE program with the intent that this cadre of trained health workers would extend the reach of the NHS and provide health-related care to the remaining 40% of the population. According to the draft 2017-2021 National Community Health Worker Strategic Plan, APEs provide 80% and 20% of rural

communities' preventive and curative care, respectively, for illnesses such as upper respiratory tract infections, diarrheal diseases, and malaria under an iCCM platform. The APEs serve as the first-line of defense against malaria for people living in rural Mozambique and are trained to diagnose malaria with RDTs and provide ACTs to those with positive test results. The APE program is an important component of Mozambique's malaria case management plan and, for some residents, is the only option for appropriate malaria diagnosis and treatment. Although 85% of malaria cases are seen in the public sector, understanding and promoting the quality of services in the private sector is a component of the updated NMSP case management objective. Challenges include lack of integrated reporting from the private sector and legislation to require outlets to follow national case management norms.

Progress since PMI was launched

In the calendar year 2012 and in support of the NMCP objectives, the National Reference Laboratory for Blood Parasites was refurbished, Quality Assurance (QA) testing practices were developed, and supervision guidelines for malaria diagnosis were completed. In addition, central and regional level training of microscopy trainers was performed, followed by the subsequent training of 95% of the existing laboratory staff in the country by these trainers. PMI has supported the procurement of laboratory consumables used for Quality Control (QC) activities and training of staff. PMI has also been strengthening the capacity of the reference laboratory staff on malaria microscopy by providing high level training on preparation of slides, slide reading, parasite density and standard operating procedures. In 2015, PMI also provided support to collect 3,500 specimens to prepare permanent slide sets for training and proficiency testing. These slide sets went through a rigorous validation process by WHO experts and they are being used as a resource for the routine QA panels.

PMI has historically procured at least one third of the nation's annual RDT and ACT needs to support the provision of appropriate case management. Significant progress has been achieved in ensuring the availability of RDTs and ACTs, both at facility and community levels. At the beginning of the rollout of RDTs, clinicians preferred the use of microscopy and the uptake of RDTs was slow. A study carried out in 2014 also showed poor performance of clinicians with regards to RDT use, with 78% of patients included in the study being asked about the presence of fever and only 13% of clinicians following the proper procedures for administering and reading RDTs. To help address these issues, PMI supported training and supervision of provincial and district staff on the use of a RDT QA checklist. Additionally, the consumption of RDTs has increased significantly in past two years.

PMI has also been supporting the Malaria Case Management Working Group, which was revitalized in 2006 through a collaborative effort of various U.S. Government implementing partners and other donors. This working group provides technical advice to the NMCP in terms of updating case management policies and guidelines, reviewing job aids, identifying training needs for both central level and provincial level staff, and planning supervision visits to the provinces. This working group also serves as the main liaison between the NMCP and the APE program.

Since 2015, PMI has been concentrating the majority of its case management efforts at the provincial level and below, focusing on Zambézia, Nampula, Cabo Delgado and Tete provinces. In these provinces, PMI has supported mentoring, supervision and training of clinicians and laboratory staff. The trainings included use of a RDT QA checklist, designed to improve the quality of the diagnosis by RDT. PMI is also providing logistic and technical support for the malaria case management committees established in 31 health facilities of the four target provinces. These multidisciplinary committees meet monthly at the facility level, especially the referral hospitals, to review case management data and discuss malaria case management trends.

Progress during the last 12-18 months

PMI has provided technical and financial support to update the malaria treatment guidelines and to develop training modules on malaria case management, malaria performance standards for quality improvement, supervision checklists, and a national training plan. In addition to on-the-job training and mentoring, the plan will aim to roll out national training in the calendar year 2017 and subsequent refresher trainings (frequency to be determined).

PMI and the Global Fund together continue to purchase all RDTs and ACT treatments needed in Mozambique each year. However, the country continues to experience challenges in ensuring a continued availability of RDTs and ACTs, due to delays in the arrival of Global Fund shipments. Data from the EUV carried out between October and December of 2016, in 86 facilities across the country, showed that 63 (91%) of the 69 health facilities and 16 (94%) of the 17 warehouses visited had at least one of the four presentations of AL. The data also showed that nine percent of the health facilities had stockouts of all four AL presentations on the day of the visit, while only 20% had all presentations available. Similarly, one warehouse had stockouts of all four AL presentations on the day of the visit, while only three had all presentations available. Regarding RDTs, 9 (13%) of the health facilities and 2 of the 17 warehouses had stockouts on the day of the visit.

At the provincial and district level, PMI continued to provide support to mentoring, supervision and training of health staff in the four targeted provinces of Zambézia, Nampula, Cabo Delgado and Tete. Across these four provinces, there are 62 total districts, of which 58 are PMI targeted districts. Within the 58 PMI focus districts, there are approximately 700 health facilities and 4,000 health workers. During FY 2016, PMI provided support to train 287 health workers on malaria case management. PMI also supported seven rounds of outreach training and supportive supervision (OTSS) visiting a total of 182 health facilities across 56 districts. During these OTSS visits, low performing facilities were identified to receive intense mentoring visits. As a result, 139 clinical and laboratory providers received mentoring visits in the 15 lowest performing health facilities. In Nampula, in collaboration with UNICEF, PMI provided support to train 21 trainers and 95 MCH nurses in integrated management of childhood illness (IMCI). In addition, PMI provided support to adapt a tool used during the quarterly IMCI mentoring visits and supported these visits in 32 health facilities in Nampula to strengthen the quality of child consultations, including the evaluation and management of fever and adherence to malaria treatment guidelines.

Across the 58 targeted districts of the 4 provinces, there are approximately 140 laboratories. To strengthen laboratory capacity, PMI supported the training of 70 laboratory technicians in malaria microscopy and laboratory management, 25 of whom were selected as laboratory supervisors and attended an advanced training. In addition, PMI supported RDT onsite training and mentoring for health care workers during OTSS visits, training a total of 700 health care workers in the 4 target provinces. PMI also supported the NMCP in conducting two rounds of diagnostic proficiency panels testing across laboratories in the four provinces. Of the 70 facilities which received panels each round, only 30 facilities returned results for both rounds, showing a need to strengthen the transportation and management system if this intervention is to be successful.

The APE program has been progressively scaled up since calendar year 2011. By December 2016, there were 3,380 APEs working across the 11 provinces of Mozambique, including 442 in Zambézia and 665 in Nampula. PMI continued to support the APE program by providing RDTs and ACTs and by supporting the kitting system through which these commodities are distributed to APEs. PMI also

provided support to conduct supportive supervision of APEs in three districts of Zambezia. USAID, through UNICEF, continues to support the expansion of the APE program with non-PMI funds. Although the country decided to implement rectal artesunate, first among APEs with plans to later expand its use to village health centers, the actual implementation has not yet begun due to delays with the procurement of rectal artesunate. PMI and UNICEF support of APEs will include supervision and monitoring around rectal artesunate when it is rolled out. In 2017, and with USAID MCH funding, UNICEF will continue to support subsidies for APEs, printing of APE training manuals, and mentoring and supervision of APEs across the country. APEs are currently paid exclusively by donors. Efforts have been made to encourage payment by the government, but there have been barriers with local requirements for government employees. Incentive and retention strategies continue to be explored.

Finally, PMI continued to support malaria case management committees established in 31 referral health facilities of the four target provinces. These committees meet monthly and they include management, clinical and laboratory staff. The main objective of the committees is to review case management practices at the health facility. They also analyze malaria data (in-patient malaria cases and malaria deaths) and conduct malaria death audits. PMI provides technical assistance and logistic support to ensure that these meetings are happening on a regular basis. PMI is also facilitating coordination of partners at provincial level.

Table 13. PMI-funded TESs

Completed TESs		
Year	**Site name**	**Treatment arm(s)**
2011	Montepuez (Cabo Delgado); Dondo (Sofala); Tete city (Tete); Chokwe (Gaza); and Manhiça (Maputo Province)	AL – therapeutic efficacy of 96% ASAQ - therapeutic efficacy of 99.6%
2015*	Montepuez (Cabo Delgado); Moatize (Tete); Dondo (Sofala); and Chokwe (Gaza)	AL - therapeutic efficacy varied from 96.4% to 100%
Ongoing TESs		
Year	**Site name**	**Treatment arm(s)**
2017	Montepuez (Cabo Delgado); Ribaue (Nampula); Moatize (Tete); Mopeia (Zambézia); and Massinga (Inhambane)	AL AS-AQ
Planned TESs FY 2018		
Year	**Site name**	**Treatment arm(s)**
2019	TBD	TBD

*The k13 testing showed no presence of mutations associated with artemisinin resistance. The k13 testing was conducted by CISM in collaboration with a laboratory in Barcelona.

Table 13 presents the TES PCR-corrected results from 2011[4] and 2015[5], which indicate continued efficacy of AL and ASAQ. PMI FY 2016 funds are contributing to a TES (also with k13 testing) in the calendar year 2017, with a slightly modified selection of study sites, as shown in the table. The next TES

[4] https://malariajournal.biomedcentral.com/articles/10.1186/1475-2875-13-309
[5] http://www.sciencedirect.com/science/article/pii/S0001706X17301353?via%3Dihub. This study included resistance testing conducted by the ISGlobal laboratory in Barcelona.

will be supported by WHO in the calendar year 2019. Resistance testing in 2019 will be conducted in Mozambique, provided that a local laboratory has demonstrated sufficient capacity to do so.

Commodity gap analysis

Table 14: RDT Gap Analysis

Calendar Year	2017	2018	2019
RDT Needs			
Total country population	27,128,530	27,843,933	28,571,310
Population at risk for malaria	27,128,530	27,843,933	28,571,310
PMI-targeted at-risk population*	27,128,530	27,843,933	28,571,310
Total number of projected fever cases**	51,544,207	52,903,473	54,285,489
Percent of fever cases tested with an RDT***	80%	85%	88%
Total RDT Needs**	**22,081,538**	**24,080,338**	**25,581,494**
Partner Contributions (to PMI target population if not entire area at risk)*			
RDTs carried over from previous year	20,072,670	14,445,282	11,364,943
RDTs from Government	0	0	0
RDTs from Global Fund^	8,454,150	15,000,000	15,000,000
RDTs planned with PMI funding	8,000,000	6,000,000	7,500,000
Total RDTs Available	**36,526,820**	**35,445,282**	**33,864,943**
Total RDT Surplus (Gap)	**14,445,282**	**11,364,943**	**8,283,449**

Assumptions:
*Total population is at risk of malaria (estimates obtained from forecasting provided by the GRM).
**Projected fever cases estimated at an average of 1.9 fevers per person per year.
***Denotes percentage of fevers expected to be tested with an RDT (vs. microscopy or no test received), increasing with RDT scale-up driven by the expansion of the APE program and by the plan from NMCP to scale-up RDT use both at community and at health facility level.
****Average care seeking for fever is 63%; 85% of these fevers are seen in the public sector.
^The Global Fund contributions for 2018 and 2019 have not yet been confirmed.

Table 15: ACT Gap Analysis

Calendar Year	2017	2018	2019
ACT Needs			
Total country population	27,128,530	27,843,933	28,571,310
Population at risk for malaria	27,128,530	27,843,933	28,571,310
PMI-targeted at-risk population*	27,128,530	27,843,933	28,571,310
Total projected number of malaria cases**	11,482,400	11,799,366	12,534,932
Total ACT Needs* **	**12,542,314**	**13,027,463**	**13,839,588**
Partner Contributions (to PMI target population if not entire area at risk)*			
ACTs carried over from previous year	5,743,219	7,785,788	6,758,325
ACTs from Government	0	0	0
ACTs from Global Fund^	6,004,208	10,000,000	10,000,000
ACTs from UNICEF	2,670,000	0	0
ACTs planned with PMI funding	5,910,675	2,000,000	5,000,000
Total ACTs Available	**20,328,102**	**19,785,788**	**21,758,325**
Total ACT Surplus (Gap)	**7,785,788**	**6,758,325**	**7,918,737**

Assumptions:
*Total population is at risk of malaria (estimates obtained from forecasting provided by the GRM).
**Considers the RDT need in Table 14 and an RDT positivity rate of 52% in 2017, and 49% in 2018 and 2019.
***An additional 10% accounts for the possibility of false positives.
^The Global Fund contributions for 2018 and 2019 have not yet been confirmed.

In 2016, there were 80,829 severe malaria cases recorded. The recommended first-line treatment for severe malaria is injectable artesunate. In the peripheral health facilities, injectable artesunate is also recommended as pre-referral treatment, with rectal artesunate recommended at the community level in children under six years of age. The GRM and Global Fund currently make procurements for severe malaria, while PMI plans to prioritize procurements towards filling the national gap for uncomplicated malaria.

Plans and justification
PMI and the Global Fund will continue to supply the vast majority of the case management commodities, including all the RDTs and ACTs to meet the needs of the country. These commodities will be distributed to all levels of the health system, including to district health facilities and APEs. It is important to note that the current Global Fund grant ends in July 2017 and there is not yet final funding from the Global Fund for the commodities planned for the calendar year 2018. PMI is working closely with the MoH and with the Global Fund on the elaboration of the new grant and to monitor the availability of RDTs and ACTs in country, particularly in the context of RDT scale-up. If needed, PMI will adjust the amount of RDTs and ACTs to be procured in order to ensure adequate supply.

PMI will continue to provide technical support at central level to update guidelines and policies related to case management. PMI will support the refresher training of central level staff and will facilitate and assist with planning for supervisory visits of central level staff to provinces. PMI will also provide

support to strengthen the coordination and collaboration between the NMCP, the MCH department and the APE program, in order to improve the implementation of malaria case management activities in the country.

PMI will also continue its decentralized support through training and supervision of malaria case management activities at the provincial, district and health facility levels. This support will be implemented in an integrated manner with MIP, SBCC, and SM&E activities by the PMI Mozambique bilateral partner. With FY 2017 funds, PMI aims to cover all districts of Zambézia and Nampula, the two provinces with the highest malaria burden in the country. Lessons learned from implementation in these provinces will be analyzed and will inform the development of the FY 2018 work plan. With FY 2018 funds, PMI will consolidate these efforts and start expansion to Tete and Cabo Delgado, the other PMI focus provinces. Scale-up throughout all four provinces will be complete by the end of FY 2018. The support will focus on improving supervisory capacity at the provincial level, while also strengthening the capacity of districts to supervise facilities and manage quality issues more effectively. In addition, periodic refresher trainings on microscopy and RDT use will take place for laboratorians and supervisors in these provinces. This will also include mentoring and supervision of a selected number of community health workers. PMI support will focus on supervision and on the job training of existing APEs, with the training of new APEs being covered by other U.S. Government funds and by other donors. The support to supervision will be based on the national guidelines and tools for the routine supervision of trained APEs.

PMI will continue to support the implementation of QA/QC activities in all districts of Zambézia and Nampula provinces and will increase the number of health facilities in each district. PMI will also start the expansion of these activities to Tete and Cabo Delgado. PMI will strengthen the provincial level capacity to implement and monitor QA activities for both malaria microscopy and RDTs.

*Proposed activities with FY 2018 funding: (**$8,200,000**)*

- *Procurement of RDTs:* PMI will procure 7.5 million single-species RDTs, which will be pooled and distributed nationally. *($2,400,000*)

- *Procurement of ACTs:* PMI will procure 5 million treatments of the national first-line antimalarial (artemether-lumefantrine), which will be pooled and distributed nationally. (*$5,000,000*)

- *Central level case management support and training:* PMI will provide central level support for appropriate case management and laboratory diagnostics. (*$100,000*)

- *Provincial, district, and health center case management training and supervision:* PMI will provide support to the provincial, district and facility levels for the improvement of service delivery of key febrile case management interventions. Support will be coordinated with other provincially focused activities to improve supervision, monitoring and performance improvement of case management services in target provinces. (*$500,000*)

- *Provincial, district, and health center laboratory training and supervision:* PMI will provide support to the provincial, district and facility levels for laboratory quality assurance in target provinces. (*$200,000*)

b. Pharmaceutical management

NMCP/PMI objectives

Both the MoH and its partners have recognized the need to strengthen the MoH's supply chain system in order to support service delivery. CMAM is the national entity with primary responsibility within the MoH for all central-level supply chain functions, including procurement of all pharmaceuticals and related health supplies. In collaboration with the NMCP, CMAM continues to manage forecasting needs and supervises the procurement, storage, and distribution of all malaria commodities, except ITNs, from the central level to the provincial warehouses.

Malaria medicines and RDTs are delivered through two parallel CMAM logistical systems, one known as the kit system and a second known as the Via Clássica. The kit system was developed in response to the bulky ACT packaging, which made it difficult to fit in the essential medicine kit. Currently, PMI provides support to the kit system, which runs together with the essential medicines kit. These malaria kits are distributed to both health facilities and APEs through a push system. The second logistics system, the Via Clássica, distributes medicines (including ACTs and SP) and RDTs on a quarterly basis. The products are delivered to warehouses in Maputo, Beira and Nacala, which in turn supply the three existing central hospitals and ten provincial warehouses. Each of the ten provincial warehouses supply the district warehouses, rural hospitals, general hospitals, and provincial hospitals. Malaria drugs, including AL, are managed within this system, which requires health facilities to report consumption data and place orders for commodities.

Despite these two systems, stockouts are still common with facilities often waiting for the next kit to arrive with replenishments rather than placing orders through the Via Clássica. Moreover, there is little use of consumption or stock level data at the provincial or district levels, meaning supervisors and managers cannot help facilities manage their stocks. One consequence of this breakdown is that facilities will often use APE kits (stored at the facility) to fill gaps in their own supplies, thus causing stockouts at the community level.

In alignment with the GRM, PMI aims to achieve the following objectives:

1. Develop more effective public sector medical supplies/commodity procurement capacity.
2. Improve public sector warehousing and distribution at all levels.
3. Improve the use of medicines and develop more effective pharmaceutical services.
4. Strengthen the MoH/Pharmacy Department's strategic planning and management capacity.
5. Strengthen overall regulatory capacity.

Progress since PMI was launched

The U.S. Government has made significant contributions toward supply chain strengthening and improvement of pharmaceutical management in efforts to support access to good quality commodities. The U.S. Government has been the major partner providing technical assistance to CMAM. Most of the support has been provided through PEPFAR. PMI supported the introduction and rollout of ACTs and RDTs on a national level and the development of a supply chain master plan. PMI funds have also complemented PEPFAR resources to strengthen central-level warehousing by refurbishing the main central warehouse, Zimpeto, located in the outskirts of Maputo, and the Beira regional warehouse in Sofala Province. Together with another Maputo-based warehousing complex, Adil, these warehouses are linked to the Beira warehouse to form a centrally managed, national system with accurate information on stock status for all essential commodities. The Nampula regional warehouse will also be linked to this system in the coming months.

Through significant efforts on the part of CMAM, the NMCP, and U.S. Government donors, a computerized logistics management and information system (LMIS) is now operational nationally in all provincial capitals and all 151 districts. This computer-based, real-time LMIS is an Access-based program that is relatively easy to use. Warehouse staff in all provinces have been trained in the use of this system. The plan is to continue the rollout of the LMIS to all districts with U.S. Government and Global Fund support.

In order to improve the management of the supply chain, PMI has been decentralizing its support to the districts. Additional logistic advisors were placed in target provinces. Currently, there are 7 logistic advisors who provide support to 10 of the 11 provinces as follows: one regional advisor for Nampula and Niassa; one regional advisor for Sofala and Manica; and one provincial advisor for Cabo Delgado and one for Zambézia. In addition, there are three advisors based in Maputo who provide support to Maputo, Gaza, Inhambane and Tete provinces. These advisors work closely with the provincial and district authorities to improve supply chain management and improve routine health facility reporting of consumption data. Their support focuses on strengthening supervision and training of health staff and implementation of quarterly meetings.

Progress during the last 12-18 months

During the past year, PMI continued to provide support to CMAM through provision of technical assistance, support for commodity quantification and forecasting, procurement of commodities, and support to the ACT and RDT kitting system. PMI also continued to support supervision of health facilities through the implementation of the EUV tool. During visits to health facilities, the EUV survey teams provide on the job training in the use of standard operating procedures for commodity management. This is contributing to improvements in the LMIS by improving data flow and data quality.

The EUV survey carried out during the last quarter of calendar year 2016 included 86 facilities in 22 districts, covering 9 provinces of the country. The 86 facilities included 17 warehouses and 69 Service Delivery Points (SDPs), and showed that only 9% of all the facilities visited had stockouts of all four AL presentations on the day of the visit while 20% had all presentations available. All the warehouses visited had at least one of the four presentations, indicating high availability at the provincial level. Despite the problems with Mozambique's pharmaceutical management and supply chain system, data through the middle of the calendar year 2016 from the EUV indicated that ACTs and RDTs were reaching the health facilities in all 11 provinces of the country. These last quarter EUV results indicate a decline in commodity availability at the facility level. The GRM has recently faced additional challenges due to the economic environment, reducing the resources and capacity to deliver health commodities from the provincial warehouses to districts and health facilities. PEPFAR, PMI, and other U.S. Governement programs are exploring solutions with the MoH to ensure commodities are getting past the provincial level.

PMI provided support to revitalize the Medicines Technical Working Group (*Grupo Técnico de Medicamentos*). This group is chaired by CMAM and it is composed of various U.S. Government implementing partners, MoH officials, and other donors. The group covers several technical areas, including malaria, and it meets quarterly to review the quantification tables, monitor the shipments of commodities, and track commodity consumption data to support the management and oversight of health commodities via regular supply plan updates. In the calendar year 2015, the ACT and malaria RDT district reporting rates have improved ranging from 84% to 99% for ACTs, and from 84% to 97%

for RDTs. In the calendar year 2014, the reporting rate for both ACT and RDT was 93%. However, a continued effort is needed to ensure that all health facilities within a given district are reporting consistently.

Other activities supported by PMI included the repacking and distributing of ACT/RDT kits; district and provincial quarterly meetings to review and improve supply chain and logistics data and performance; and training and supervision on logistics standard operating procedures and data quality to the district and SDP staff. Much of the quarterly meeting and training activities were carried out by the provincial coordinators who worked closely with the MoH provincial warehouse to strengthen the capacity of logistics management of health commodities in the province. Such activities were also in response to specific provincial needs and training strategies and focused on inventory control, warehousing and storage, distribution, and supply chain monitoring and evaluation.

Plans and justification
PMI's FY 2018 investment will cover a combination of technical assistance and operational support, helping to implement lasting reforms key to ensuring availability of malaria commodities at service delivery points, particularly given the economic crisis and its impact on the health sector in Mozambique. Over the years, PEPFAR has contributed to strengthening the supply chain, and PMI and other non-PEPFAR programs have gradually increased their share of technical assistance to CMAM. Most of the U.S. Government support to the supply chain has been at central level, but more recently this was decentralized to the provincial level. Therefore, PMI's focus is to provide more intense support at district level, focusing on PMI target provinces. PMI will continue to provide technical assistance to CMAM in order to support the continued improvements in key areas such as warehousing, supervision, and LMIS. PMI will also provide technical assistance to CMAM to improve its capacity to better liaise and strengthen communication and information exchange with the NMCP, continue to strengthen human resources capacity within CMAM, and improve warehousing management and logistics capabilities.

PMI will support the expansion of the LMIS, focusing on Zambézia and Nampula provinces, and will continue to support the ACT/RDT kitting system. PMI will also continue to support the implementation of the EUV survey (see SM&E section) and the placement of regional and provincial-level technical advisors. This will support information collection, aggregation, and timely delivery to CMAM to better inform all warehousing and procurement activities. Although these activities will be implemented across the country, a special focus will be dedicated to Zambézia and Nampula, where PMI will consider placing technical advisors at sub-provincial level to adequately cover all districts.

With non-PMI funds, USAID has been providing support to assure the quality and safety of priority medicines by strengthening the QA/QC capabilities of Mozambique's medicines regulatory authority, the MoH Pharmaceutical Department. This work has been ongoing since 2012 and it includes malaria medicines in a limited scale. With FY 2017 funds, PMI will contribute to expand these activities in order to support regular QA activities for malaria medicines, but no FY 2018 funds are currently planned for this activity.

*Proposed activities with FY 2018 funding: **($900,000)***

- *Supply chain strengthening:* PMI will continue to support capacity building of CMAM to better plan for, deliver, and track malaria commodities, in addition to strengthening storage and distribution capability at central and provincial levels. Additionally, PMI will provide provincial and district level support to improve warehouse management, supervision of the LMIS and

transportation of medicines to strengthen peripheral-level capacity in selected provinces. *($900,000*)

4. Health system strengthening and capacity building

PMI supports a wide array of health system strengthening (HSS) activities which cut across intervention areas, such as supportive supervision of health workers, LMIS and HMIS strengthening and NMCP capacity building.

NMCP/PMI objectives

One of the objectives of the 2017-2022 NMSP is to strengthen the program management skills at central, provincial and district levels in order to effectively achieve the other NMSP strategic objectives. Five main strategies were defined to achieve this goal: (i) establish the NMCP organigram and ensure program staff at all levels have the required capabilities to perform their roles; (ii) ensure effectiveness of program management; (iii) establish appropriate internal mechanisms for effective communications and coordination within the NMCP, partners, the private sector and the Malaria Technical Advisory Committee; (iv) establish effective and accountable partners to secure adequate resources and their appropriate use; and (v) ensure effective coordination and communications on procurement and supply chain management.

In keeping with the goals set forth in the NMSP, PMI aims to:

1. Support human resource capacity strengthening through in-service training and supportive supervision in areas such as case management, HMIS, MIP, and SBCC;
2. Support the design and implementation of key policy documents related to malaria control, including the dissemination of the new NMSP, the revision of the Integrated Vector Control Strategy and Operational Plan, and the planning of community-based activities, particularly the expansion of the APE program;
3. Support the strengthening of the management of malaria commodities in order to ensure that they are available when and where needed; and
4. Strengthen the collaboration of malaria partners at the central, provincial, and district level.

Progress since PMI was launched

Since FY 2007, PMI has supported capacity-building for malaria control across levels. PMI has provided technical and implementation support to the NMCP on a range of issues including development of strategic and operational plans, preparation of Global Fund applications, and other key policy documents and technical guidance. PMI has also provided considerable support to strengthen the entomology program (see *Entomology* section), vector control (see *ITN* and *IRS* sections), case management (see *Diagnosis and treatment* section), the supply chain system (see *Pharmaceutical Management* section), the SBCC program (see *SBCC* section), and the SM&E system (see *SM&E* section).

For vector monitoring and control strengthening, PMI has seconded an entomologist at the NMCP to coordinate national vector control activities. In Zambézia Province, PMI has strengthened the capacity of the provincial health directorate to implement IRS activities and conduct entomologic monitoring through the establishment of a regional entomology laboratory and insectary. PMI also supported training in entomology with the objective of increasing capacity of INS and NMCP staff members to perform the CDC bottle assay technique, to detect mechanisms of insecticide resistance and to analyze, interpret and use entomological data. In addition, PMI supported the refurbishment and equipping of the

entomology laboratory and of an insectary at INS. PMI has also supported the training of trainers for quality IRS implementation and has provided technical support for national UCC ITN campaign.

For epidemiological capacity strengthening, PMI has supported several training activities, including Field Epidemiology & Laboratory Training Program (FELTP). PMI has supported 1-2 FELTP residents in each cohort. Some of the projects completed by FELTP residents, with PMI support, include an evaluation of the ITN campaign in two districts of Nampula in 2013 and 2014 and an ongoing evaluation of the APE malaria case management commodity supply and utilization.

For SM&E capacity strengthening, PMI supported the participation of two NMCP staff at a Monitoring and Evaluation of Malaria Workshop in Ghana that provided participants with knowledge of SM&E fundamentals and hands-on experience in designing SM&E plans for malaria programs.

For SBCC, PMI has supported Peace Corps volunteers (PCVs) to implement malaria-related programming during their service. There are approximately 175 PCVs in Mozambique working in the education and health sectors. All PCVs are trained on malaria three times within their period of service and have supported the uptake of positive malaria prevention and treatment behaviors within their communities. PMI has also supported a third year PCV based in Maputo to coordinate the malaria activities of PCVs, including a PCV malaria task force. Key activities have included support for World Malaria Day activities and support for community-level mapping of IRS districts.

PMI has implemented various activities to strengthen laboratory capacity. Three regional "training of trainers" for malaria microscopy were first held in calendar year 2011 to establish a cadre of highly qualified master trainers. These trainings were led by CDC reference laboratorians. Several technicians were chosen from among these master trainers to lead the national refresher training on malaria microscopic diagnosis. PMI also supported the refurbishment and equipment of National Reference Laboratory. Moreover, PMI supported a needs assessment for the establishment of a QC system for diagnostics in Mozambique; a draft guideline for this system is awaiting approval. To complement this, two of the technicians working in the National Reference Laboratory traveled to CDC/Atlanta for a six-week training in molecular biology and other diagnostic techniques that are seen as key activities of a diagnostic reference laboratory.

Given the lack of professionally trained health workers, the U.S. Government is contributing, along with other partners, to the revitalization of the APE system. This system consists of community health workers who have been selected by their communities to undergo intensive four-month training on the prevention and treatment of common diseases, including malaria, diarrhea and pneumonia. APEs also provide services related to family planning, management of post-partum hemorrhage, prevention of umbilical infections in neonates, distribution of vitamin A and adherence to antiretroviral and TB treatments. Support for the APE revitalization comes from many partners, including UNICEF, USAID, World Bank, Irish Embassy, Malaria Consortium, Save the Children, and World Vision. The rollout of the APE trainings was divided into several rounds. PMI has been supporting the APE program by providing RDTs and ACTs and by supporting the kitting system through which these commodities are distributed. PMI has also provided supportive supervision to APEs in targeted districts.

Progress during the last 12-18 months

PMI continued to support HSS activities in order to increase MoH capacity to implement malaria related programs in the areas of entomology and vector control, case management, supply chain, SBCC, and SM&E.

In the past 12-18 months, PMI supported the NMCP in developing policy, establishing norms, planning and coordinating all malaria control activities in the country. This included active participation in technical working group internal assessments to inform the review of the previous NMSP and the development of the 2017-2022 NMSP. PMI has also supported periodic assessments of the impact of malaria control, mobilization of domestic and external funds for malaria control activities, promotion of malaria awareness and advocacy, and operational research. In the past six months, PMI has worked closely with the NMCP to support drafting of the NMSP and of the new continuation application for funding from the Global Fund.

PMI continued to strengthen the capacity of the provincial health directorate to implement IRS activities and conduct entomologic monitoring in Zambézia Province. PMI has also actively engaged in efforts to develop NMCP capacity to implement entomological monitoring activities nationwide and provided financial support for national entomological data collection. It also supported the training of all provincial and district personnel on IRS for the national program and provided support throughout the country on environmental compliance.

PMI contributed to improvements in the quality of malaria diagnosis through diagnostics refresher training, advanced training for lab supervisors, and on-site, rapid diagnostic test training for health workers. This included training of 37 staff on basic Malaria Diagnostic Refresher Training (MDRT) and 25 staff on advanced MDRT. To improve overall supervision and case management, PMI supported training of clinical and laboratory supervisors who conducted supervision at health facilities in five provinces.

PMI has also supported SM&E activities such as data management and analysis of routine malaria data to identify trends. It also supported routine data strengthening at the district and facility level through supportive supervision visits and monthly data analysis meetings.

At the central level, PMI supported the MoH to strengthen its APE program and increase the supervision support for APE malaria case management. In addition, PMI assisted the NMCP with forecasting of malaria treatments, commodities, and planning of ITN distribution campaigns.

PMI continues to provide technical and financial support for two FELTP residents. The FELTP residents are working on projects utilizing data from the ITN campaign evaluation, from a qualitative exploration of IRS acceptability and from an evaluation of malaria mortality in hospitals. PMI support for PCV malaria-related projects have continued, but implementation has been affected by not having a third year PCV based in Maputo to coordinate activities during FY 2016. Peace Corps management has identified strong volunteers to fill the role in coming years.

PMI also continues to support strengthening of SBCC programming through its SBCC implementation partners and through active participation in the SBCC technical working group. It has also strengthened the capacity of the NMCP and the national health promotion department through activities such as an SBCC SM&E workshop.

Plans and justification

Based on malaria prevalence in Mozambique, particularly in Nampula and Zambézia provinces, there is a need to further strengthen health system functioning, including expansion of the implementation of malaria preventive activities, case management, and SM&E and improvement in the quality of implementation. This includes the need for human resource capacity-strengthening through pre- and in-service training and through supportive supervision at the provincial and district level. In order to address these needs, PMI will work to support the capacity of provincial and district-level staff in target

provinces to better plan, manage, and analyze their activities with a goal of improving service quality at health facilities and at the community level.

To improve vector control interventions, PMI will continue support of the training of trainers for quality IRS implementation and will support improvements in the quality of MoH IRS environmental management, stock management and SBCC for IRS acceptance in priority provinces.

In order to strengthen clinical and laboratory capacity, PMI will continue financing of supportive supervision of clinical and laboratory staff and supervisors and APEs in priority provinces. PMI will also continue to provide assistance in building CMAM's capacity to manage malaria commodities at central, provincial and district levels and to improve public sector forecasting, warehousing and distribution of commodities at all levels.

To address epidemiologic capacity, PMI will support two new FELTP residents who will work with the malaria program to address programmatic needs, including implementation of assessment of malaria systems and evaluations to address key NMCP operational questions. PMI will also continue support for FELTP students' implementation of trainings to strengthen provincial and district staff capacity to understand, analyze, visualize, and use programmatic data.

PMI will also support quality data for decision-making at a national, provincial, district, and health facility level by providing technical assistance to strengthen MoH capacity. This includes embedding of staff to ensure sufficient human resources capacity for entomological, data management and case management programming. This will also include continued support for the functioning of NMCP technical working groups such as the SBCC, IRS, and entomology working groups.

Lastly, PMI will continue to support the implementation of PCVs' malaria-related activities through support for one third year PCV in Maputo and one third year PCV in a PMI priority province, support to the malaria advisory committee and continued provision of PMI-supported small project assistance grants for PCV projects.

Proposed activities with FY 2018 funding: ***($545,000)***

- *Provincial level capacity building:* Support in target provinces (Zambezia, Nampula, Cabo Delgado, Tete) to improve the planning and coordination of malaria control activities and partners. Support will focus on capacity building for provincial and district level MoH managers for data assessment, analysis and use in program decision making. ($250,000)

- *Field Epidemiology & Laboratory Training Program (FELTP):* Support for two malaria-focused Field Epidemiology & Laboratory Training Program fellows. ($125,000)

- *Strengthen technical capacity and program management of NMCP:* Support to the central level NMCP for capacity strengthening and program management, including seconding of case management technical advisor, provincial supervision and international meeting participation ($150,000)

- *Support to community activities:* Support to community-level malaria activity coordination and implementation by U.S. Peace Corps volunteers. ($20,000)

Table 16: Health Systems Strengthening Activities

HSS Building Block	Technical Area	Description of Activity
Health Services	Case management	Strengthen diagnostic capacity of existing laboratory and healthcare staff through refresher trainings, on-the job training, and supportive supervision.
	Malaria in Pregnancy	Support on-the-job training and supportive supervision of provincial, district and health facility staff to improve management of uncomplicated and severe malaria and implementation of IPTp.
Health Workforce	Entomology	Assist NMCP in addressing key personnel gap by seconding senior entomologist at national level and supporting entomologists in priority provinces.
	Case management	Strengthen the APE program and expand of the number of APE trained in order to increase access to quality malaria case management.
	HSS	Assist NMCP in addressing key personnel gap by seconding senior case management specialist at national level.
	SM&E	Support two FELTP fellows to strengthen capacity in epidemiology and program evaluation. Assist NMCP in addressing key personnel gap by seconding data manager at national level.
Health Information	SM&E	Strengthen capacity for entomological and insecticide resistance monitoring. Improve quality and completeness of malaria data reporting through the HMIS (DHIS-2 platform) at health facility, district, and provincial levels, and use of data for decision making at all levels. Support 2018 MIS planning, implementation, analysis and data use
	Operational Research	Provide technical assistance and financial support for in-country malaria operational research.
Essential Medical Products, Vaccines, and Technologies	Pharmaceutical management	Strengthen capacity of the NMCP in forecasting, procurement, quality control, storage and distribution of malaria commodities, such as ITNs, ACTs and RDTs. Support TES planning, implementation, analysis and data use.
Health Finance	GF Management Support	Continued capacity building of the MoH's Global Fund management unit to ensure timely and accurate submissions and, thus, efficient use of Global Fund funds.
Leadership and Governance	HSS	Strengthen national coordination and guideline development through participation in Malaria Technical Working Groups. Build capacity for planning and coordination of malaria control activities at provincial level.

5. Social and behavior change communication

NMCP/PMI objectives

The NMSP includes the objective to implement an effective SBCC approach to ensure that at least 70% of people seek appropriate and timely healthcare and at least 80% of the population uses an appropriate malaria prevention method. In order to help meet this objective, PMI supports a range of SBCC activities aimed at promoting correct and consistent use of ITNs, increasing acceptance of IRS, improving care-seeking and provision, and increasing adherence to treatment and prevention therapies, all of which are key to achieving and maintaining the NMCP's goals for malaria control. The MoH has created a malaria SBCC technical working group to coordinate all malaria communications activities. This group includes representatives from the NMCP, PMI, the *Departamento de Promoção da Saúde* (DEPROS- Health Promotion Department), the WHO, and implementing partners. This working group is chaired by the NMCP and meets approximately once a month.

In alignment with the NMSP, PMI aims to achieve the following objectives:

1. Strengthen the capacity of MoH to effectively develop, implement, and coordinate malaria SBCC strategies and approaches.
2. Build the capacity of local organizations to implement interpersonal communication (IPC) and mass media activities to reduce malaria prevalence and improve malaria care-seeking.
3. Develop in-country capacity, within the NMCP and its partners, to effectively monitor and evaluate the quality of SBCC activities and their impact on desired behavioral outcomes.

Progress since PMI was launched

PMI is the primary donor supporting malaria SBCC activities in Mozambique. This support has been through stand-alone SBCC programs and through incorporation of SBCC into MIP, ITN, case management, and IRS programming.

Since 2007, PMI has supported the SBCC work of a consortium of religious groups. This local organization provides malaria messages to communities during religious sermons as well as through door-to-door, interpersonal malaria SBCC activities implemented by trained community volunteers.

PMI has also provided central level capacity building for SBCC to the NMCP and to DEPROS in order to develop the overall malaria communication strategy as well as implement and coordinate malaria SBCC activities in Mozambique. PMI supported a desk review to gather and analyze regional and country data regarding perceptions, acceptability and use of malaria prevention, and diagnosis and treatment interventions from both health care provider and client perspectives. As a result of this review, two priorities were identified: (i) the need for more coordination and visibility of malaria SBCC interventions, and (ii) the need for technical strengthening of the NMCP communication division and of DEPROS. In response to these findings, PMI has continued to provide technical assistance to the malaria SBCC technical working group, has given strategic guidance to strengthen the coordination capacity of the NMCP and DEPROS, and has supported regular working group meetings. With PMI support, the NMCP has also finalized its branding strategy, which consists of a slogan ("Malaria Out! Protected and Strong Families") and a logo representing a family. This brand has been included in national mass media campaigns in order to raise programmatic visibility and awareness. To further raise the visibility of malaria programming, PMI and its partners have also supported activities such as World Malaria Day celebrations since 2007.

In addition to these SBCC-specific activities, PMI has included content to improve provider-patient IPC in the trainings and job aids that they provide to improve clinician and APE malaria case management

and MIP activities, and has supported SBCC-related training and mobilization efforts for quality implementation and acceptance of IRS and ITNs.

PMI has also provided SBCC support through integrated platforms which receive funding from multiple health programs. These platforms have a significant reach within PMI's targeted provinces and utilize various proven SBCC channels, including door-to-door mobilization, community radio, theater groups, and training of health workers, among other channels to influence malaria-related behaviors at the community and health facility level using standardized messages. Several media activities were also implemented, including the development and dissemination of radio spots in Portuguese and in the local language of each province.

There has been important progress in some SBCC areas, including the development of a national malaria SBCC strategy in the calendar year 2013, the existence of a strong SBCC technical working group for the UCC of ITNs, and improved coordination of malaria partners. Despite this progress, there is still limited technical capacity for SBCC at the NMCP and coordination between the malaria program and DEPROS is limited.

Progress during the last 12-18 months

In FY 2015 and FY 2016, PMI continued its support to SBCC activities at the policy and operational levels. At the policy level, PMI supported the operationalization of the NMCP communication and advocacy strategy. In order to do this, PMI and its partners have supported the revitalization of the NMCP SBCC technical working group. The group resumed meeting at least on a monthly basis in late 2015 and this schedule has been sustained. In mid-2016, the group reviewed the progress of the NMCP and its partners in meeting the goals and objectives of the SBCC and NMCP strategies. Key weaknesses were identified, particularly related to the old strategic plan and associated SM&E framework. For example, the SM&E framework and national surveys did not include outcome or impact-related indicators and the denominators for indicators were difficult to define.

Guided by these programmatic review findings, PMI actively engaged in the development of the SBCC objective in the 2017-2022 NMSP to ensure that it was clear and implementable. PMI also supported the implementation of an SBCC SM&E workshop in February 2017 with participation from national and target province NMCP staff and the SBCC technical working group. During the workshop, the SBCC SM&E indicators for the new NMSP were refined to allow for stronger monitoring of SBCC implementation and a shift in orientation from only collecting data on SBCC output to looking at SBCC outcomes and impact.

In the last 12-18 months, PMI and the SBCC technical working group worked with provincial health authorities to successfully plan and implement World Malaria Day 2016 activities in all provinces, including a large event in Nampula that was attended by the Minister of Health, the Governor of Nampula, and the U.S. Ambassador to Mozambique. PMI also supported the planning for World Malaria Day 2017 activities, including a large event in Maputo City which was attended by the Minister of Health, the Governor of Maputo City and the U.S. Ambassador to Mozambique.

In addition to the strengthened working group, PMI, in collaboration with the working group, has also facilitated SBCC planning for the 2016-2017 ITN national UCC. Global Fund historically has provided limited support to community-based activities, but their investment has increased in the context of this campaign. PMI support has been to ensure the technical quality and appropriate dissemination of UCC communication. As part of this effort, PMI and its SBCC partners have led implementation of many of the campaign-related activities, including development and pre-testing of the campaign pamphlets,

journalist fact sheets, radio spots, and a song. These mass media materials and dissemination have been critical for supporting UCC registration and ITN use.

At the operational level, PMI continued to support the dissemination of malaria messages through stand-alone and integrated provincial-level platforms. Two PMI-supported SBCC partners resumed PMI-supported SBCC work in November 2015. Both groups participate in and support the central-level and policy SBCC progress described above and implement SBCC activities at the provincial, district, and community level.

PMI supported SBCC implementation in targeted districts in Zambézia, Nampula, Sofala, Inhambane, and Gaza provinces. A training of trainers was conducted for 71 religious leaders in early 2016. By March 2017, these leaders had trained 500 faith leaders in their districts on malaria and how to effectively incorporate malaria messages into their sermons, resulting in 45,110 community members reached with malaria messages during sermons and lectures in their place of worship. In the first 15 months of implementation, volunteers conducted 63,976 first visits to homes to teach about malaria behaviors and broadcasted radio messages 117 times.

In addition to working with religious leaders, PMI has supported implementation of malaria SBCC through IPC and mass media. This has included training of 197 activists from 10 community-based organizations to implement community dialogues to improve malaria-related gender norms, care-seeking and use of prevention tools. These activists implemented the dialogues with 31,114 participants in the last 15 months. PMI also increased malaria visibility, knowledge and norms through training 74 journalists to develop malaria programming, which resulted in 149 malaria-related media materials broadcast in three months. PMI has also begun development of an evidence-informed SBCC campaign to address gender-related barriers to appropriate malaria behaviors.

PMI also implemented community mobilization activities in Zambézia Province to increase acceptance of the PMI-supported IRS program. The community sensitization activities were based on messages approved by the NMCP and included the involvement of local leaders in all steps of the campaign and the training of these leaders to mobilize their communities. These efforts included radio spots, meetings with community leaders, and mobilization visits by community educators.

Plans and justification

With FY 2018 funding, PMI will work with the SBCC technical working group to update the national SBCC strategy. The group will also consolidate SBCC materials and approaches, while continuing to scale up community-level activities to deliver these messages. PMI will continue to provide support centrally to coordinate these activities and develop a robust and comprehensive malaria SBCC package for use throughout the country. Among other ways, success for capacity-strengthening activities will be determined by the level of functioning of the SBCC technical working group (e.g., frequency of meeting, completion of SBCC annual plan) and through the development and implementation of a revised SBCC strategy to support the NMSP. Progress in these activities will be monitored through regular partner reporting.

The SBCC package will be available to all malaria partners in the country and will contain standardized messages and images that link to the national malaria “brand”. Messages will be developed for all key interventions, including IRS acceptance, ITN use, IPTp use, prompt care-seeking, adherence to RDT results and to ACT messages, and early ANC attendance. These messages will be evidence-based and Mozambique-relevant and their implementation will use the appropriate balance of mass media and IPC. The aim of these efforts is to empower targeted populations to seek and use effective services to prevent and treat malaria. This package will indicate the most effective and feasible channels for each target

behavior and audience. It will ensure that health care providers and community and religious leaders are also employed to act as channels for malaria messages. It will also include relevant SM&E indicators to document implementation and determine effectiveness.

PMI will focus its SBCC implementation in its priority provinces through a mix of community level IPC, provider training, and suitable mass media activities. This support will be implemented in an integrated manner with MIP, case management, and SM&E activities by the PMI Mozambique bilateral partner. With FY 2017 funds, PMI aims to cover all districts of Zambézia and Nampula, the two provinces with the highest malaria burden in the country. Lessons learned from implementation will be analyzed and will inform the development of the FY 2018 work plan. With FY 2018 funds, PMI will consolidate these efforts and start expansion to Tete and Cabo Delgado, the other PMI target provinces. PMI will reach populations, particularly those in rural communities, with high quality standardized messages to promote behaviors such as ITN usage, ANC attendance, and prompt treatment seeking behavior using proven communication channels. This will include clinic-, religious center-, school- and home-based IPC activities and radio programming. This programming will be aligned with and informed by the FY 2017 SBCC OR study described in the *OR* section.

Lastly, PMI will also continue to strengthen the quality of its SBCC activities to increase acceptance of the PMI-supported IRS program and acceptance of IRS in the MoH-implemented campaigns in priority provinces. These efforts will include radio spots, meetings with community leaders, and mobilization visits by community educators (see *IRS* section). PMI will also strengthen the quality of SBCC messaging, training, supportive supervision, and job aids for facility-based and community-based health care providers (see *Case Management* section).

Proposed activities with FY 2018 funding: ***($650,000)***

- *Central level coordination of SBCC activities:* Support to the SBCC technical working group to develop core malaria SBCC materials. This activity will develop a national package of standardized malaria SBCC materials for use throughout Mozambique. ($150,000)

- *Provincial coordination and implementation of SBCC activities:* Adaptation and implementation of the national level SBCC materials in target provinces. This includes radio programming, incorporation of malaria awareness in school programming and capacity-building of community structures for malaria SBCC. ($500,000)

6. Surveillance, monitoring, and evaluation

NMCP/PMI objectives

The NMCP is in the process of finalizing a new National Malaria Strategic Plan as the previous one expired in December 2016. The SM&E plan is also being updated to reflect the priorities of the new 2017-2021 NMSP. PMI, along with other partners, is supporting this process.

The objectives of the previous SM&E plan were to:

1. Guide the periodic tracking and documentation of the implementation of the NMSP so as to ensure accountability and address problems that emerge in a timely manner.
2. Guide collection, processing, and use of malaria data for decision-making at all levels.

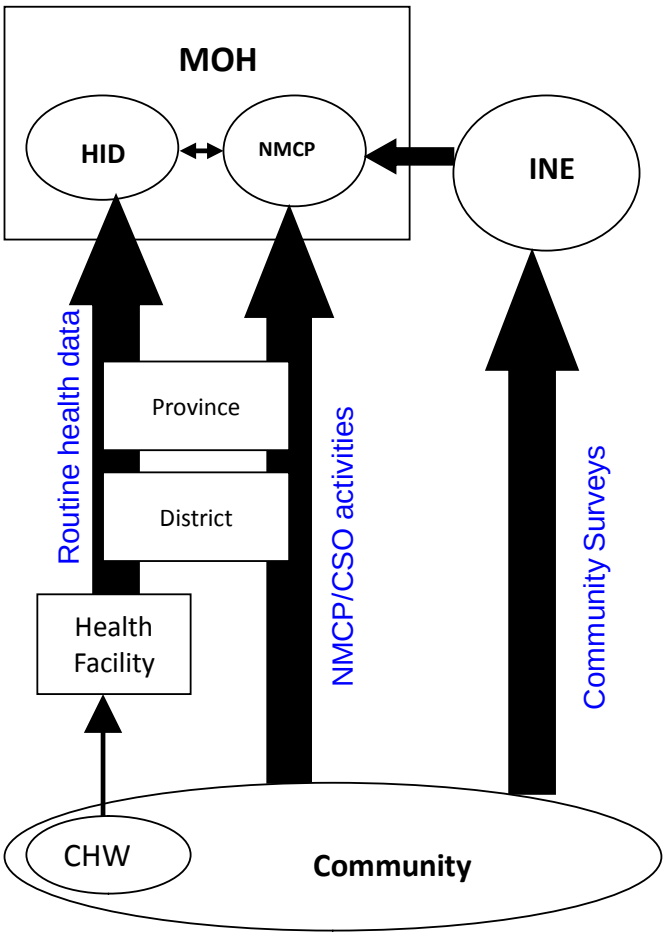
3. Provide a framework for measuring the outcomes and impact of scale-up of interventions against targets.
4. Provide a framework for providing feedback to data providers and disseminating malaria information to all stakeholders.
5. Provide an action plan for strengthening malaria SM&E capacity.

Sources of data and information include the routine health information system, integrated disease surveillance system, activity reports from the districts and implementing partners, periodic household and facility surveys, and operational research studies.

PMI coordinates and collaborates with the NMCP and several partners in providing technical assistance and resources for SM&E activities.

All SM&E data in the MoH fall under the Directorate of Planning and Corporation. Malaria-specific data are utilized by PMI and its partners in the NMCP SM&E technical working group. This group is comprised of several NMCP staff and other MoH departments (such as the Health Information Department- HID) as well as the NMCP's partners. The NMCP SM&E unit leads the coordination of this technical working group, which meets monthly and more regularly when issues arise. National surveys are implemented in coordination with the National Statistics Institute (also referred to as INE for *Instituto Nacional de Estatísticas*) and INS.

Figure 4: Data flow within Mozambique



HID= Health Information Department; NMCP= National Malaria Control Program; INE= National Statistics Institute; CSO= Civil Society Organization CHW= Community health worker (locally referred to as APEs)

The data flow diagram comes from the 2012-2016 NMCP SM&E plan. The diagram shows that routine data flows up from APEs to health facilities. These data are then aggregated at the district and provincial levels before reaching the MoH where data are shared between the HID and NMCP. The NMCP and Civil Society Organization (CSO) activities include any monitoring and evaluations carried out by those institutions (laboratory department data, ITN and IRS data). These data flow from the community-based activities up to the NMCP. This diagram will be updated in the coming months and it is expected that the new diagram will include a feedback loop, among other improvements.

Progress since PMI was launched

Routine Health Information System

The HMIS has historically been run through an electronic system called the *Modulo Básico*. All basic in- and out-patient data from health facilities were reported through the *Modulo Básico* system. The key indicators that rely on HMIS as a data source are:

- Total in-patient malaria deaths

- In-patient malaria cases
- Total outpatient malaria cases (confirmed and clinical)
- Malaria test positivity rate
- Proportion of suspected cases tested for malaria

The HMIS data have been collected on paper-based tools at health facilities and sent monthly to the district level where they were collated, entered into an electronic database, and then transferred through USB flash drives to the provincial information unit. The aggregated data was emailed to the central level HID in the Directorate of Planning and Cooperation.

The *Modulo Básico* system did not provide sufficient quality data for the MoH and has been replaced by a DHIS-2-based system called *Sistema de Informação para a Saúde–Monitoria e Avaliação* (SIS-MA). An interim parallel malaria database that was created to collect data from outpatient registers, pharmacies, and laboratories was used in the provinces where the SIS-MA malaria module was not yet fully operational. The HMIS has now officially been transitioned from *Modulo Básico* to the SIS-MA (DHIS-2) platform in 2016. There were, however, delays in the implementation of these activities and the transition was largely implemented without direct PMI support. Completeness of the data reported through the SIS-MA remains a challenge, and thus, the reports generated at the central level still depended on three different sources through 2016: *Modulo Básico*, parallel malaria system, and SIS-MA.

In 2014, PMI supported training of three NMCP SM&E staff on the SIS-MA platform. At the end of the training, the staff had created a malaria-specific module to be included in the SIS-MA by digitizing the existing data reporting forms. These same forms with a digital interface had the added advantage of obviating the need for additional training on data reporting forms at the health facility level, and decreased the need for additional training at the district and provincial level.

PMI support has focused on using routine data, from the *Modulo Básico,* parallel malaria system, and SIS-MA, to produce the annual report. For example, the 2015 NMCP Annual Report included an analysis to inform the relationship of changes in reporting completeness and overall health care-seeking changes with the increase in malaria burden in some provinces. In addition, PMI supported the recruitment of a data manager who was seconded to the NMCP. This data manager played a key role in supporting the rollout of the SIS-MA through on the job training and supervision of MoH staff. The PMI-funded data manager is also an integral member of the NMCP SM&E working group and provides technical support to the NMCP for data access and use.

PMI has supported data audits, data quality improvement, and data use in four districts in the Sofala Province and three districts in the Manica Province. In Zambézia Province, PMI supported supervision and capacity building at health facilities to improve the data collection and reporting practices from the facility to the central level in eight districts. Reporting completeness in these districts was found to be 94%. The testing rate across the health facilities was 99%.

Boletim Epidemiologico Semanal

In addition to the monthly SIS-MA reporting, all public health facilities are expected to report the number of confirmed malaria cases on a weekly basis through the *Boletim Epidemiologico Semanal* (BES- bulletin for notifiable diseases). The BES report is generated at district level. This data was part of the *Modulo Básico* and has now been fully transitioned to the SIS-MA. Malaria is one of ten notifiable diseases. However, confirmed and clinical cases are not disaggregated in the system, limiting

the utility of the data. Inpatient and outpatient registers from health facilities are the data source for both the BES and HMIS. In 2011, a process to revise the BES standard operating procedures manual began and the NMCP, as part of the technical working group, collaborated with the epidemiology department to revise the BES tools to allow for the distinction between confirmed and clinical cases.

Surveys

National Level Surveys - The first malaria indicator survey (MIS) was carried out in 2007 and a Multiple Indicator Cluster Survey (MICS) occurred in 2008. PMI supported a Demographic and Health Survey (DHS) that was undertaken in 2011. The data collection for a combined Immunization, MIS and AIDS Indicator Survey (IMASIDA) was carried out between June and September 2015. A key indicator report has been finalized, which includes all malaria related data. Available data have been shared with the NMCP, and PMI is supporting the NMCP in utilizing these data to guide development of the new strategic plan. Coverage results from the 2015 IMASIDA data have been described in the *progress on coverage* section. Figure 1 shows the progress in reducing malaria prevalence among children under five from 2011 to 2015 by province.

End-Use Verification Surveys (EUVs) - PMI-supported EUV surveys have taken place since 2011. Province and site selection has been done in collaboration with the NMCP. One urban health unit (health center or hospital), one rural health center, and one APE within each district have been included in each round of collection. In addition, at the request of the NMCP, these surveys were broadened to include a range of malaria activities. The additions included laboratory, pharmacy, and case management components, where samples of medical records from previous months are pulled and data is extracted to calculate various indicators on case management.

NMCP Mid-Term Review

The Mozambique Mid-Term Review (MTR) of the 2012-2016 NMSP was completed in July 2014. The MTR assessed the progress made, identified the key challenges, and made recommendations to improve performance in order to ensure impact in the remaining period of the NMSP 2012-2016.
The MTR had four major conclusions:

1. Great strides have been made and, if efforts are continued, the country will succeed in achieving malaria control.
2. There has been remarkable achievement on the impact and outcome indicators.
3. The current program goals are attainable given the current level of performance.
4. Although important progress has been made on morbidity and mortality, more could have been achieved with greater decentralization.

In turn, recommendations focused on increased decentralization of control activities, intensification of cross-border activities, increasing accountability at all levels, greater emphasis on monitoring of program implementation, improvement of data quality and completeness, and increasing the domestic budget. The MTR identified challenges with SME capacity, data quality, supervision and coordination, highlighting the need for enhanced personnel, training and supervision. An additional program review was implemented in July 2016 to inform development of the new Malaria Strategic Plan.

Impact Evaluation

An impact evaluation was undertaken in Mozambique in 2014 and the report was released in August 2015. According to the report, progress was seen with nearly all indicators: net ownership among children under five years of age increased from 37% to 57% between 2007 and 2011, whereas use

increased from 7% to 36% during the same time period. The percentage of women who received at least two doses of SP increased from 16% in 2007 to 19% in 2011, while the percentage of children under five with fever during the previous weeks that were treated with an antimalarial increased from 15% in 2007 to 30% in 2011. Overall, parasitemia in children 6-59 months of age decreased from 52% in 2007 to 36% in 2011, while all-cause mortality in children under five years of age decreased from 152 to 97 during the same time period.

Progress during the last 12-18 months

Routine Health Information System

As of June 2016, the SIS-MA was fully operational in all 11 provinces of the country. However, completeness and timeliness of the data reported through the SIS-MA remains a challenge. Data are entered into the SIS-MA at district level and is web-based. Given the limited access to internet in many districts of the country, this poses challenges to district staff. There are ongoing discussions to try to find a solution for this challenge.

PMI support has focused on data quality. PMI has provided training, mentoring and support to implement data quality audits (DQAs). PMI provided support to train 119 health workers in data collection and reporting in Zambézia, Nampula and Sofala. PMI also supported provincial quarterly program review meetings in Zambézia. The objectives of these meetings included reviewing provincial and district progress in key malaria indicators, outlining actions to improve the management and distribution of malaria commodities, and sharing program successes and best practices. Priority actions that were identified as a result of these discussions include the need to review data collection processes and to increase the use of case audits to identify key areas of focus for mentoring and supportive supervision visits. In addition, PMI supported quarterly mentoring visits to 21 targeted health centers, reaching a total of 110 health workers. These mentoring visits focused on malaria data registry and reporting. PMI continued to provide support for the implementation of DQAs in Sofala and Manica. The results of the first round of DQA showed poor quality of data as in all health facilities visited the margin of error was higher than 20%, for all indicators considered.

PMI has also provided support to produce annual reports using routine data. PMI is supporting the development of a provincial malaria bulletin in Zambézia and has started discussions to support the edition of a national malaria bulletin.

PMI continued to support a data manager who was seconded to the NMCP. This data manager continued to play a key role in supporting the rollout of the SIS-MA through on the job training and supervision of MoH staff. This data manager is also coordinating the retroactive data entering into SIS-MA in order to ensure that all 2016 data is reflected in the system. The PMI-funded data manager is also an integral member of the NMCP SM&E working group and provides technical support to the NMCP for data access and use.

Surveys

End-use Verification Surveys: The EUV survey continued to be implemented quarterly in Mozambique over the past 12 months. The last report from the EUV is for October to December 2016. The data from that survey show continuing challenges on the regular availability of RDTs and ACTs at health facilities, as described in the case management section. Case management indicators showed malaria accounting for 24% of cases seen, with 100% receiving a test (93% RDT and 7% microscopy). Children under five years of age accounted for 55% of cases and all were treated with an ACT.

Table 17. Surveillance, Monitoring, and Evaluation Data Sources

Data Source	Activities	Year								
		2011	2012	2013	2014	2015	2016	2017	2018	2019
Household surveys	Demographic Health Survey (DHS)	X								
	Malaria Indicator Survey (MIS)					X			(X)	
	Health facility survey							(X)*		
	EUV survey	X	X	X	X	X	X	X	(X)	(X)
Malaria Surveillance and Routine System Support	Support to malaria surveillance system	X*	X*	X*	X*	X*	X*	X*	(X*)	(X*)
	Support to HMIS	X	X	X	X	X	X	X	(X)	(X)
Therapeutic efficacy monitoring	In vivo efficacy testing	X				X*		(X)		(X*)
Entomology	Entomological surveillance and resistance monitoring	X	X	X	X	X	X	X	(X)	(X)
Net durability monitoring	ITN monitoring	X				X	X	X	(X)	
Other Data Sources	Malaria Impact Evaluation			X						

( ) denotes planned activity
*Not PMI-funded

Plans and justification

With FY 2018 funds, PMI/Mozambique will continue to strengthen the routine malaria information system at the health facility, district, and provincial levels through SIS-MA. PMI will also continue to support malaria data collection through household surveys, health facility surveys, and information from partners. PMI SM&E activities will include comprehensive support for provincial and district-level training and supervision of health facility, district, and provincial personnel on the collection, processing, analysis, presentation, interpretation, and use of routine malaria data in all districts of Zambézia and Nampula. This support will be implemented in an integrated manner with MIP, case management, and SM&E activities by the PMI Mozambique bilateral partner. With FY 2018 funds, PMI will consolidate these efforts and start expansion to Tete and Cabo Delgado, the other PMI target provinces. PMI will also start the expansion of these activities to two additional provinces, Tete and Cabo Delgado. Considerable effort will focus on improving the quality and completeness of malaria data through enhanced supervision and feedback. In addition, PMI will support data use for program decision-making at the NMCP, provincial- and district-level and provincial-level support for data supervision, processing, analysis, and dissemination.

PMI will continue to fund EUV surveys quarterly to monitor malaria commodity stocks and case management practices at district warehouses, and at the facility/APE level. PMI will continue to support: 1) entomological surveillance (see entomology section; 2) ITN durability monitoring (see ITN section); 3) TES every other year (see case management section); and 4) two FELTP residents (see HSS section).

Proposed activities with FY 2018 funding: ***($610,000)***

- *Strengthen provincial HMIS*: Working with provincial counterparts to improve data use and programmatic decision-making by conducting regular meetings to discuss and analyze data, preparing regular reports and providing feedback to the lower levels. ($100,000)

- *Strengthen district HMIS:* Working with district counterparts on strengthening the existing information systems to improve data quality and completeness by conducting regular data reviews, data analysis and preparation of monthly reports. ($150,000)

- *Strengthen health facility HMIS:* Working with health facility to improve data collection, data quality and timely reporting, through training and supervision of health staff. The support may also include printing of data collection and reporting tools. ($250,000)

- *EUV Surveys:* Support the implementation of the quarterly EUV surveys in a sample of health facilities and medical stores. ($100,000)

- *CDC SM&E Technical Assistance:* Support one CDC TDY to provide technical support for SM&E activities. ($10,000)

7. **Operational research**

NMCP/PMI objectives

Operational research (OR) remains a priority for the MoH. Specific guidelines for OR were developed at the national level and priority questions to be targeted for OR for each priority disease have been identified. The 2017-2021 NMSP includes a strategy to establish a system to ensure implementation and operation research are conducted and that results are rapidly used to inform programmatic activities.

In line with the MoH objectives, PMI aims to achieve the following objectives:

1. Support the refinement of an OR agenda for the NMCP;
2. Support implementation of OR activities that focus on the NMCP's identified priority areas;
3. Ensure that PMI-supported OR findings are rapidly disseminated and used to inform programmatic-decision-making.

Progress since PMI was launched

A high-level MoH meeting was held in February 2014 to build a list of key research questions that need to be addressed to help the NMCP better implement their activities, and to create a roadmap with established roles and responsibilities of key partners. To this end, a draft priority OR list has been generated and shared with malaria partners. These priorities include evaluation of the impact of IRS and ITN campaigns, studies on determinants of ITN use, evaluations of community IPC interventions on prevention practices, testing of the efficacy and residual efficacy of new classes of insecticides, and evaluation of the barriers to appropriate malaria case management. The NMCP plans to update and

identify priorities within this OR list in 2017 through PMI support. During this meeting the NMCP and partners will identify institutions that are well-positioned to implement the priority studies and to discuss institutional roles and responsibilities. PMI also supported an ITN durability study in 2015, whose results have been described in the ITN section.

Progress during the last 12-18 months

Over the past year PMI began implementation of a cost-effectiveness study of different vector control activities in one district of Zambézia with co-funding by the NgenIRS project. The main evaluation objective is to determine the cost-effectiveness of different vector control interventions in a malaria endemic region of Mozambique. This includes a prospective evaluation of IRS with the organophosphate, Actellic CS, within a context of high coverage of ITNs. Cost-effectiveness will be determined by calculating the cost per case of malaria averted at community level and the cost per disability-adjusted life years saved. It is expected to show the added benefit and cost associated with spraying a long-lasting, non-pyrethroid insecticide in areas with ITNs to inform implementation of the national IVM strategy. NgenIRS is covering the costs of active case surveillance and cross-sectional studies as well as some entomological monitoring costs. PMI is covering the operational costs of implementation of the IRS, as well as costs associated with routine health facility data strengthening and health economic analysis.

PMI has also begun preliminary planning of the cost-effectiveness evaluation of different SBCC strategies. It is anticipated that this activity will determine the cost-effectiveness of different SBCC interventions within two districts with persistently high malaria transmission in Zambézia or Nampula. It is well-established that SBCC is most effective when mass media activities are complemented by IPC activities, but there is insufficient evidence on the appropriate balance of these activities and their associated cost-effectiveness. Given the importance of maximizing reach of SBCC interventions without compromising programmatic effectiveness, this evaluation will compare the cost-effectiveness of different SBCC interventions. The study arms will have varying levels of mass media and IPC interventions to determine the cost-effectiveness of each. The goal of this project is to guide PMI Mozambique and the NMCP on the appropriate balance and composition of SBCC programming. These research studies are closely aligned with NMCP priorities, particularly in the context of the new NMSP.

Table 18. PMI-funded Operational Research Studies

Completed OR Studies			
Title	**Start date**	**End date**	**Budget**
ITN Durability Monitoring	2008	2011	$250,000
Ongoing OR Studies	**Start date**	**End date**	**Budget**
Title			
Vector Control Cost Effectiveness Study (COST)	07/2016	12/2018	$700,000
Planned OR Studies FY 2017			
Title	**Start date (est.)**	**End date (est.)**	**Budget**
SBCC Cost Effectiveness Study	02/2018	02/2019	$250,000

Plans and justification

There are no additional OR studies planned using FY 2018 as the two NMCP and PMI Mozambique priority studies, evaluations of the cost-effectiveness of different vector control strategies and of different SBCC interventions, are both fully funded. Implementation of the vector control cost

effectiveness (COST) study will continue through December 2018. This study includes monthly active case surveillance with a cohort of children from sprayed and non-sprayed areas, passive case surveillance through routine data abstraction, micro-costing of IRS implementation and of malaria care-seeking through cross sectional annual studies, and monthly entomological surveillance. Preliminary findings from the first year of IRS implementation are expected to be disseminated in late 2017. The study includes investigators from the NMCP, provincial health authorities and PMI in order to ensure rapid use of study findings. Implementation of the SBCC study is expected to begin in early 2018, pending approval by the PMI OR committee, and will last approximately one year. SBCC strategy implementation and the cost-effectiveness study will be implemented by different partners in order to ensure the rigor and trustworthiness of study findings.

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

8. Staffing and administration

Two health professionals serve as Resident Advisors (RAs) to oversee PMI in Mozambique, one representing CDC and one representing USAID. In addition, two Foreign Service Nationals (FSNs) work as part of the PMI team. All PMI staff members are part of a single interagency team led by the USAID Mission Director or his/her designee in country. The PMI team shares responsibility for development and implementation of PMI strategies and work plans, coordination with national authorities, managing collaborating agencies and supervising day-to-day activities. Candidates for RA positions (whether initial hires or replacements) will be evaluated and/or interviewed jointly by USAID and CDC, and both agencies will be involved in hiring decisions, with the final decision made by the individual agency.

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

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

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

The number of locally-hired staff and necessary qualifications to successfully support PMI activities either in Ministries or in USAID will be approved by the USAID Mission Director. Because of the need to adhere to specific country policies and USAID accounting regulations, any transfer of PMI funds directly to Ministries or host governments will need to be approved by the USAID Mission Director and Controller, in addition to the U.S. Global Malaria Coordinator.

Proposed activities with FY 2018 funding: ***($1,235,462)***

- *USAID Staffing and Administration:* Support for two Foreign Service National malaria advisors, an administrative assistant and other Mission-related costs (including the CDC staff ICASS charges related to office space). ($660,462)

- *CDC Staffing and Administration:* Support for the CDC Resident Advisor and his/her administrative costs ($575,000)

Table 1: Budget Breakdown by Mechanism

President's Malaria Initiative – MOZAMBIQUE
Planned Malaria Obligations for FY 2018

Mechanism	Geographic Area	Activity	Budget ($)	%
TBD – Vector Control IDIQ	Zambézia and Nampula	Entomological monitoring in Zambézia and Nampula	400,000	23%
	National	Support to national and provincial government for entomologic monitoring	250,000	
	Zambezia	IRS implementation	4,400,000	
	National	Support to national government IRS program	500,000	
VectorWorks	Zambezia	School-based pilot	100,000	0%
TBD – Environmental Compliance	Zambezia	IRS environmental assessment	35,000	0%
PSM	National	Procurement of ITNs	3,969,538	59%
	National	Distribution of ITNs	1,336,000	
	National	Procure SP	540,000	
	National	Procurement of RDTs	2,400,000	
	National	Procurement of ACTs	5,000,000	
	National	Supply chain strengthening	900,000	
	National	End-use verification	100,000	
TBD – Malaria Bilateral	National	Central level ANC support	100,000	10%
	Zambézia, Nampula, Tete, and Cabo Delgado	ANC training and supervision	200,000	
	National	Central level case management support and training	100,000	
	Zambézia, Nampula, Tete, and Cabo Delgado	Provincial, district, and health center case management training and supervision	500,000	
	Zambézia, Nampula, Tete, and Cabo Delgado	Provincial, district, and health center laboratory training and supervision	200,000	
	Zambézia, Nampula, Tete, and Cabo Delgado	Provincial level capacity building	250,000	
	National	Strengthen technical capacity and program management NMCP	150,000	
	Zambézia, Nampula, Tete, and Cabo Delgado	Provincial level implementation of SBCC activities	500,000	

	Zambézia, Nampula, Tete, and Cabo Delgado	Strengthen provincial, district and health facility HMIS	500,000	
CDC IAA	National	CDC technical assistance on entomology activities	29,000	3%
	National	FELTP support	125,000	
	National	CDC SM&E technical assistance	10,000	
	National	Staffing and administration	575,000	
USAID	National	Staffing and administration	660,462	3%
SIHO	National	Central level coordination of SBCC activities	150,000	1%
Peace Corps	National	Support to community activities	20,000	0%
			24,000,000	**100%**

Table 2: Budget Breakdown by Activity

President's Malaria Initiative – MOZAMBIQUE
Planned Malaria Obligations for FY 2018

Proposed Activity	Mechanism	Budget		Geographic Area	Description
		Total $	Commodity $		
PREVENTIVE ACTIVITIES					
VECTOR MONITORING AND CONTROL					
Entomologic monitoring and insecticide resistance management					
Entomological monitoring in Zambézia and Nampula	TBD – Vector Control IDIQ	400,000		Zambézia and Nampula	Support entomological monitoring activities in Zambézia and Nampula Provinces. Support includes insectary and animal house requirements, as well as training for provincial staff
Support to national and provincial government for entomologic monitoring	TBD – Vector Control IDIQ	250,000		National	Support for the national government entomological program for the established sentinel sites, consistent with the national integrated vector management strategy and continued laboratory support at the central level for mosquito processing and analysis.
CDC technical assistance on entomology activities	CDC IAA	29,000		National	Two TDY visits from CDC entomology branch to build MoH entomological monitoring capacity.
Subtotal Ento monitoring		679,000	0		
Insecticide-treated Nets					

Procurement of ITNs	PSM	3,969,538	3,969,538	National	Procurement of approximately 1,600,000 ITNs for continuous distribution through routine ANC services and a school-based pilot
Distribution of ITNs	PSM	1,336,000		National	Distribution costs for 1,600,000 ITNs from the port-of-entry to provincial level warehouses (national), from provincial warehouses to district level warehouses (Nampula, Zambézia, Tete, and Cabo Delgado) and from district level warehouses to facility (Nampula, Zambezia); also support for school-based pilot distribution
School-based pilot	VectorWorks	100,000		Zambezia	Support technical assistance, an end-line survey, and dissemination of results of a school-based ITN distribution pilot
Subtotal ITNs		5,405,538	3,969,538		
Indoor Residual Spraying					
IRS implementation	TBD – Vector Control IDIQ	4,400,000		Zambézia	Implementation costs for IRS activities to cover approximately 339,000 structures. PMI-supported activities will include purchasing equipment and supplies, training, supervision, and environmental compliance. All insecticide (long-lasting, non-pyrethroid) needs will be covered by Global Fund.
Support to national government IRS program	TBD – Vector Control IDIQ	500,000		National	Support for national training of trainers. Increased support for environmental compliance, SBCC, and stock management for the MoH's IRS implementation in Nampula, Cabo Delgado, and Tete.

IRS environmental assessment	TBD – Environmental Compliance	35,000		Zambézia	Routine environmental assessment to monitor IRS activities; (implemented every 2 years)
Subtotal IRS		4,935,000	0		
SUBTOTAL VECTOR MONITORING AND CONTROL		11,019,538	3,969,538		
Malaria in Pregnancy					
Procure SP	PSM	540,000	540,000	National	PMI will procure 3 million treatments of SP.
Central level ANC support	TBD – Malaria Bilateral	100,000		National	Support to the central level planning and coordination of MIP activities, particularly its continued integration into standard ANC packages
ANC training and supervision	TBD – Malaria Bilateral	200,000		Zambézia, Nampula, Tete and Cabo Delgado	Provincial-level support for training and supervision of ANC staff in MIP. Decentralized support for integrated in-service training and supervision of ANC health workers on MIP in all districts of two of the four targeted provinces (Zambézia and Nampula) and starting expanding activities to the remaining two provinces (Tete and Cabo Delgado). To be coordinated with other provincially focused activities to improve supervision, monitoring and performance improvement of MIP services in target provinces.
Subtotal Malaria in Pregnancy		840,000			
SUBTOTAL PREVENTIVE		11,859,538	3,969,538		

CASE MANAGEMENT					
Diagnosis and Treatment					
Procurement of RDTs	PSM	2,400,000	2,400,000	National	Procurement of 7.5 million single-species RDTs. Commodities to be pooled and distributed nationally.
Procurement of ACTs	PSM	5,000,000	5,000,000	National	Procurement of 5 million treatments of the national first-line antimalarial (artemether-lumefantrine). Commodities to be pooled and distributed nationally.
Central level case managemen support and training	TBD – Malaria Bilateral	100,000		National	Central level support for appropriate case management and laboratory diagnostics
Provincial, district, and health center case management training and supervision	TBD – Malaria Bilateral	500,000		Zambézia, Nampula, Tete and Cabo Delgado	Provincial, district and facility level support for the improvement of service delivery of key febrile case management interventions. To be coordinated with other provincially focused activities to improve supervision, monitoring and performance improvement of case management services in target provinces.
Provincial, district, and health center laboratory training and supervision	TBD – Malaria Bilateral	200,000		Zambézia, Nampula, Tete and Cabo Delgado	Provincial, district and facility support for laboratory quality assurance in target provinces
Subtotal Diagnosis and Treatment		8,200,000	7,400,000		
Pharmaceutical Management					

Supply chain strengthening	PSM	900,000		National	Support for CMAM to improve logistical planning and implementation through better use of data and building skills of key personnel at both the national and provincial levels. Provincial and district level support to improve warehouse management, supervision of the LMIS and transportation of medicines.
Subtotal Pharmaceutical Management		900,000	0		
SUBTOTAL CASE MANAGEMENT		9,100,000	7,400,000		
HEALTH SYSTEM STRENGTHENING / CAPACITY BUILDING					
Provincial level capacity building	TBD – Malaria Bilateral	250,000		Zambézia, Nampula, Tete and Cabo Delgado	Support in target provinces to improve the planning and coordination of malaria control activities and partners. The support will focus on capacity building for provincial and district level MoH managers for data assessment, analysis and use in program decision making.
FELTP support	CDC IAA	125,000		National	Support for two FELTP residents
Strengthen technical capacity and program management NMCP	TBD – Malaria Bilateral	150,000		National	Support to the central level NMCP for capacity strengthening and program management, including seconding of case management technical advisor, provincial supervision and international meeting participation
Support to community activities	Peace Corps	20,000		National	Support to community-level malaria activity coordination and implementation by US Peace Corps volunteers.

SUBTOTAL HSS & CAPACITY BUILDING		545,000	0		
SOCIAL AND BEHAVIOR CHANGE COMMUNICATION					
Central level coordination of SBCC activities	SIHO	150,000		National	Support to the NMCP Communications Working Group SBCC technical working group to develop core malaria SBCC materials. This activity will develop a national package of standardized malaria SBCC materials for use throughout Mozambique.
Provincial level implementation of SBCC activities	TBD – Malaria Bilateral	500,000		Zambézia, Nampula, Tete and Cabo Delgado	Adaptation and implementation of the national level SBCC materials in target provinces. This includes radio programming, incorporation of malaria awareness in school programming and capacity-building of community structures for malaria SBCC.
SUBTOTAL SBCC		650,000	0		
SURVEILLANCE, MONITORING, AND EVALUATION					
Strengthen provincial, district and health facility HMIS	TBD – Malaria Bilateral	500,000		Zambézia, Nampula, Tete and Cabo Delgado	Working with provincial, district and facility MoH counterparts, this support will build off existing information systems to improve the quality and completeness of facility data as well as its collection and use by district and provincial level authorities to improve programmatic decision-making.
End-use verification	PSM	100,000		National	Implementation of EUV and development of EUV reports from supply chain data collected throughout the country

CDC SM&E technical assistance	CDC IAA	10,000		National	One TDY visit by CDC SM&E advisors to help the MoH better analyze and use programmatic data collected through its routine systems.
SUBTOTAL SM&E		610,000	0		
OPERATIONAL RESEARCH					
SUBTOTAL OR		0	0		
IN-COUNTRY STAFFING AND ADMINISTRATION					
USAID		660,462			Support for two Foreign Service National malaria advisors, an administrative assistant and other Mission-related costs.
CDC		575,000			Support for the CDC Resident Advisor and his / her administrative costs
SUBTOTAL IN-COUNTRY STAFFING		1,235,462	0		
GRAND TOTAL		**24,000,000**	**11,369,538**		