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

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U.S. PRESIDENT'S MALARIA INITIATIVE

PRESIDENT'S MALARIA INITIATIVE

MOZAMBIQUE

Malaria Operational Plan FY 2017

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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)
BES	*Boletim Epidemiologico Semanal* (weekly notifiable disease bulletin)
CDC	Centers for Disease Control and Prevention
CISM	*Centro de Investigação em Saude de Manhiça* (Manhiça Health Research Centre)
CMAM	*Central de Medicamentos e Artigos Médicos* (Central Medical Stores)
CSO	Civil Society Organization
DDT	Dichlorodiphenyltrichloroethane
DEPROS	*Departamento de Promoção da Saúde* (Health Promotion Department)
DHIS-2	District Health Information System-2
DHS	Demographic and Health Survey
DPS	*Direcção Províncial de Saúde* (Provincial Health Directorate)
EPI	Expanded Program on Immunization
EUV	End-use verification survey
FELTP	Field Epidemiology and Laboratory Training Program
FY	Fiscal year
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GRM	Government of the Republic of Mozambique
HID	Health Information Department
HMIS	Health Management Information System
iCCM	Integrated Community Case Management
IMASIDA	*Inquérito de Indicadores de Imunização, Malária e HIV/SIDA* (Immunization, Malaria and HIV/AIDS Indicator Survey)
INS	*Instituto Nacional de Saúde* (National Institute of Health)
IPC	Interpersonal communication
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LMIS	Logistics management and information system
MCH	Maternal and child health
MICS	Multiple Indicator Cluster Survey
MNCH	Maternal, neonatal, and child health
MIP	Malaria in pregnancy
MIS	Malaria indicator survey
MoH	Ministry of Health
MOP	Malaria Operational Plan
NFM	New Funding Model
NHS	National Health Service
NMCP	National Malaria Control Program
NMSP	National Malaria Strategic Plan
OR	Operational research
OTSS	Outreach training and support supervision

PCV	Peace Corps volunteer
PEPFAR	President's Emergency Plan for AIDS Relief
PMI	President's Malaria Initiative
QA	Quality assurance
QC	Quality control
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SBCC	Social and behavior change communication
SDP	Service delivery points
SIS-MA	*Sistema de Informação para a Saúde–Monitoria e Avaliação* (local DHIS-2 system)
SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine-pyrimethamine
TES	Therapeutic efficacy studies
UCC	Universal coverage campaign
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

I. EXECUTIVE SUMMARY

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

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

Mozambique was selected as a PMI focus country in FY 2007.

This FY 2017 Malaria Operational Plan 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 2017 funding.

The proposed FY 2017 PMI budget for Mozambique is $29 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 entomological data collection at sentinel sites throughout the country, along with IRS residual efficacy monitoring, year-round entomological monitoring, and annual insecticide resistance testing as part of supported IRS activities.

With FY 2017 funds, PMI will continue entomologic surveillance and insecticide monitoring in IRS areas and support for insecticide resistance testing, residual efficacy testing, and vector bionomics at the national sentinel sites. In addition, PMI will assist in establishment of a field entomology laboratory / insectary in one additional province.

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 from 2007 to 2015 as evidenced by the reported increase from 7% to 48% in children under five years of age sleeping under an ITN the previous night. Access will be further improved by Mozambique's first national ITN campaign in 2016/17.

With FY 2017 funds, PMI will continue to support continuous ITN distribution through antenatal care (ANC) clinics and through a school channel pilot. This pilot distribution will include appropriate social and behavior change communication (SBCC) activities to encourage the students to be agents of change and promote net use in the family. PMI will procure 1.2 million ITNs for the continuous channels. PMI will also support durability monitoring of the 2017 national campaign ITNs.

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 2017, 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.

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. Despite improvements observed in the past few years, coverage of IPTp in Mozambique is still low with 34% of women reporting receipt of at least two doses of SP in 2015, and 22% reporting at least three doses.

With FY 2017 funds PMI will: 1) procure approximately 2.5 million SP treatments; 2) continue to provide central level support for MIP policy and planning, with an increased focus on the provincial and district levels; 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 collection and reporting of key MIP indicators.

Case management:
The national malaria treatment guidelines require parasitological diagnosis of fever before treatment with an antimalarial, which is in line with WHO recommendations. However, access to quality diagnosis and treatment is still low throughout the country. Supply gaps, training and supervision needs, as well as access to facilities, all play a role in this —particularly in the highly endemic 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 2017 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. PMI will also support capacity building for quality assurance of malaria medicines

Health systems strengthening and capacity building:
One of the objectives of the 2012-2016 National Malaria Strategic Plan is to ensure that all districts of the country have capacity to adequately manage and implement malaria control activities. PMI supports a broad array of health system strengthening activities, which cut across intervention areas, such as training of health workers, supply chain management, health information systems strengthening, drug quality monitoring, and NMCP capacity building.

With FY 2017 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. PMI will also continue to provide assistance in building supply chain capacity to manage malaria commodities. To improve epidemiologic capacity, PMI will support two new Field Epidemiology and Laboratory Training Program (FELTP) residents.

Social and behavior change communication (SBCC):
The Mozambican Ministry of Health (MoH) recognizes SBCC as an area in urgent need of direction 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 2017 funding, PMI will work to strengthen the SBCC technical working group to consolidate SBCC materials and approaches, while also continuing to scale up district-level implementation in high burden provinces through a mix of community level interpersonal communication (IPC), health care provider training, and suitable mass media activities.

Surveillance, monitoring and evaluation (SM&E):
Mozambique has strong surveillance, monitoring, and evaluation activities, but data quality and use challenges remain. PMI support aligns with the NMCP 2012-2016 M&E Plan. Sources of data and information include the routine health information system, integrated disease surveillance, activity reports from districts, and periodic household and facility surveys.

With FY 2017 funding, PMI/Mozambique will continue to support the NMCP M&E plan through 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. PMI plans to continue support for end-use verification surveys, ITN monitoring, entomologic monitoring, therapeutic efficacy studies, and training two FETLP residents. PMI will also use FY 2017 funding to support the next Malaria Indicator Survey in Mozambique.

Operational research (OR):
Operational research has been identified as a priority for the MoH. Aligned with MoH priorities, PMI has supported an ITN durability study and is currently supporting an UNITAID co-funded, cost-effectiveness study of different vector control activities.

PMI will use FY 2017 funds to investigate the cost-effectiveness of different SBCC interventions within two districts with persistently high malaria transmission. The goal of this research project is to guide PMI Mozambique and the NMCP on the appropriate balance and composition of SBCC programming to reduce malaria prevalence.

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 under five years of age, 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 rapid diagnostic test [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 higher than the prevalence in urban areas (47% versus 19%, respectively).

Additionally, malaria cases reported through routine health information systems increased from 2013 through 2015. Although reported cases increased by 6%, from 5,820,380 cases in 2014 to 6,418,526 cases in 2015, part of the increase can be attributed the increasing quality of community-based care; over the same time period, the number of cases identified by community health workers (locally referred to as *Agentes Polivalentes elementares*- APEs) increased by 76%. Despite the increase in total cases, the reported number of severe malaria cases reduced by 9%, from 93,885 in 2014 to 85,785 in 2015, and the number of deaths due to malaria decreased by 24%, from 3,245 in 2014 to 2,465 in 2015.

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 the United States Government's (USG) 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 leading operational research.

In calendar year 2012, the NMCP finalized the National Malaria Policy and the 2012-2016 National Malaria Strategic Plan (NMSP). The strategic plan focuses on continuing national-level scale-up of malaria prevention and control and has five objectives:

1. Decentralization of malaria control activities, with 100% of districts in 2016 having malaria management capacity in place.

2. Access to at least one prevention method for 100% of the population by 2016.

3. Confirmatory laboratory testing on 100% of suspected cases of malaria throughout the entire health system, including APEs by 2016.

4. Malaria prevention messaging reaching 100% of the population by 2016.

5. Strengthened monitoring and evaluation system so that by 2016 all districts are capable of reporting key malaria-related indicators.

Mozambique is currently in the process of updating its NMSP, with support from PMI and other partners. The revised NMSP is expected to maintain the aforementioned objectives from the 2012-2016 NMSP, while incorporating the revised vector control strategy and providing guidance as to the use of products not previously included.

5. Updates in the strategy section

- The current NMSP will end in December 2016. The NMCP has started the process of developing a new five-year strategy for the period 2017 - 2021. This process is still in the early stages and it is not yet possible to define what strategic changes will be proposed in the new plan. However, it is expected that the new NMSP will: (i) maintain the same goals and objectives of the current NMSP; (ii) will tailor interventions according to the different epidemiologic settings of the country; and (iii) will incorporate the concepts of the revised vector control strategy, which indicates ITNs as the major vector control intervention and limits the use of IRS as an insecticide resistance tool and to areas with high disease burden.

- Data from the IMASIDA survey shows that Zambézia and Nampula are the two provinces with the highest malaria prevalence, with figures above 60%. These are also the two most populous provinces of the country. For these reasons, and responding to a request from the MoH, PMI will focus its interventions to these two provinces, beginning with FY 2016 funds.

6. Integration, collaboration, and coordination

Integrated health activities

Within the USG, 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 PMI staff 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 USG 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.

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. An example of this complementarity of activities is ITN coverage: PMI supports procurement and continuous distribution of ITNs through ANCs for pregnant

women, while the 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 will be 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 Global Fund generally procures the insecticide used in Zambézia 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 to facilitate collaboration.

Finally, 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 Saude de Manhiça* (CISM) and the other led by the Clinton Health Access Initiative, 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.

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's 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:

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

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

8. Progress on coverage/impact indicators to date

The 2015 IMASIDA was implemented in 2015 and 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).

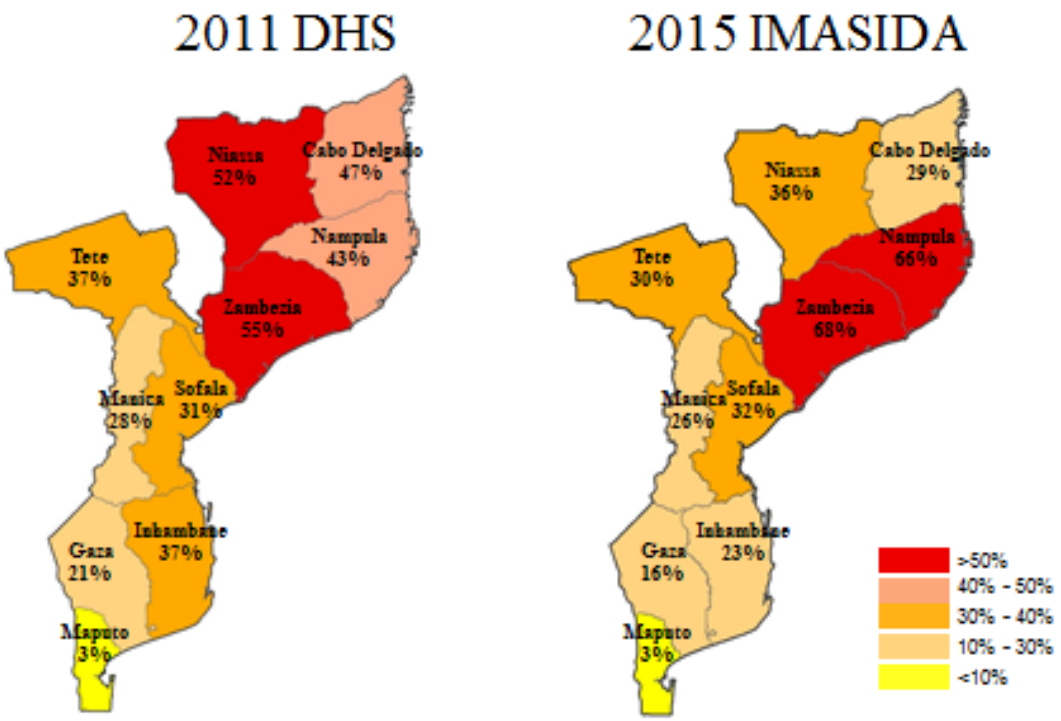
Table 1: Evolution of Key Malaria Indicators in Mozambique from 2007 to 2015

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 protected by IRS	52*	NA	NA	18	NA
% 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	4**	NA	NA	18	36
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	16	43	33	20	34

*The percent coverage in targeted districts was 52%.
** This is the percent that received an ACT within 24 hours

Figure 1 compares parasite prevalence in each province as measured by RDTs during the 2011 DHS and 2015 IMASIDA. 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



9. Other relevant evidence on progress

The results of a survey to evaluate the MoH's mass distribution campaign for ITNs in Sofala Province in calendar year 2010 demonstrated high levels of coverage of household sleeping spaces and access to ITNs (80% and 85%, respectively), which were maintained for a year after the campaign. A significant reduction in parasitemia (32%) among children under the age of five was also documented after one year. However, data from a second survey supported by PMI, conducted in Nampula Province in calendar years 2013 and 2014, indicated that one month after the campaign only 80% and 54% of households in Nacala-a-Velha and Mecubúri districts, respectively, received at least one ITN, and only 58% and 34% of households received enough ITNs to cover everyone in the household. Additionally, parasitemia in children under five years of age actually increased from 2013 to 2014, from 52% and 67% to 61% and 87% in Nacala-a-Velha and Mecuburi districts, respectively. Despite this increase, those who frequently used ITNs had lower parasitemia prevalence than those who did not in both districts.

III. OPERATIONAL PLAN

PMI support to Mozambique is in line with the Government of the Republic of Mozambique's (GRM's) 2012-2016 NMSP and is expected to be aligned with the forthcoming 2017-2021 NMSP. PMI funding is considered in conjunction with the other primary donor, Global Fund, as well as the NMCP and other partners, so that all resources can be allocated in an efficient and complementary manner, according to disease burden and the added value of each organization. A review of current PMI activities during the development of this operational plan found gaps in the supply chain and information systems, particularly between district and facility levels. Moreover, despite the extremely high malaria burden and population in the north of the country, there was no coordinated support to these provinces to improve overall performance of malaria service delivery.

Based on this perspective, PMI will continue to support national level commodities and coordination, and will provide additional implementation support to those provinces with the highest malaria transmission. 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 improve implementation of malaria-related activities through the facilitation of supervision, distribution of commodities, and surveillance, monitoring, and evaluation (SM&E). 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 has requested that PMI continue to focus its technical activities intensively in these two provinces. 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.

PMI-supported activities 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 distributed countrywide through the government supply chain. However, other interventions will be geographically targeted to the areas of most need. Service delivery activities to strengthen malaria in pregnancy (MIP) interventions and case management, and supportive activities such as SBCC, strengthening supply chain management, and SM&E, will be focused primarily in the high burden target provinces. In addition, targeted IRS will be used to complement national universal coverage ITN campaigns.

Using FY 2017 funds, and in line with MoH priorities to decentralize programming to the provincial level, PMI will focus a significant portion of its activities in Nampula and Zambézia, providing consolidated support to the highest burden areas in the country. In provinces where the USG has existing partners, efforts will be made to use existing mechanisms. Additionally, PMI will focus resources on improving the delivery and quality of care in previously underserved areas with high transmission. This support will focus on provincial and district-level planning and coordination and health facility service delivery improvement.

1. Vector monitoring and control

NMCP/PMI objectives

One of the objectives of the 2012-2016 NMSP is to ensure that 100% of the population of Mozambique has access to at least one method of malaria prevention. The Malaria Acceleration Plan 2014–2016, which is a multi-year operational plan, and Mozambique's Global Fund NFM concept note call for a scale-up of ITN distribution and a more evidence based approach for IRS. The main focus of this plan is a national, universal coverage campaign (UCC) to be carried out in 2016-2017. As a result, districts that were formerly targeted to receive only IRS will now be covered by ITNs. Universal coverage of ITNs is now included in the revised integrated vector control strategy, which awaits final approval by the MoH. The new malaria vector control strategy prioritizes universal access to ITNs complemented with IRS implemented to manage pyrethroid insecticide resistance and to reduce malaria burden in areas with high transmission. It is important to note that the national UCC planned for 2016 – 2017 will be the first national level campaign in Mozambique. The previous UCCs were planned to cover only a limited number of districts, as the country had a large IRS program. For example, in 2013, 60 of the 152 districts of the country received IRS.

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

1. Support the implementation of the updated integrated vector control 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 an integrated, evidence-based approach to IRS that results in a more cost-effective and efficient targeted strategy for the entire country; and
5. Strengthen the MoH-led entomology, IRS, and ITN programs.

These objectives are in line with the recently revised integrated vector control strategy, and are expected to remain relevant in the new 2017-2021 NMSP, which is under development.

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 central and provincial levels. PMI support for entomological monitoring and insecticide resistance management is through direct implementation by PMI's IRS partner in support of the NMCP's national efforts. PMI has supported entomological data collection as part of supported IRS activities, 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.

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. In addition it performs monitoring of insecticide resistance and its mechanisms. 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. Similarly, PMI supported the establishment of an entomology laboratory in Pemba, Cabo Delgado Province, which serves as a regional center for entomological monitoring and surveillance in the Northern provinces.

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 conduct entomological monitoring in Zambézia, the province where PMI-supported IRS was implemented in 2015. 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 IRS areas and one site in a comparable non-intervention district (Maganja da Costa). Entomological collections included pyrethrum spray collection, human landing catches, and CDC light trap collections. All methods captured *An. gambiae* s.l. and *An. funestus* s.l., although the majority of mosquitoes collected were *An. funestus*. In all areas from July to December 2015, 84% of the mosquitoes collected by pyrethrum spray catches, 81% of the mosquitoes collected by landing catches, and 96% of the mosquitoes collected by light traps were *Anopheles funestus* s.l. In particular, high numbers of *An. funestus* s.l. were collected in July.

A total of 734 *Anopheles* mosquitoes were collected from July to December from human landing collections, 78% of which were collected in the non-IRS area, followed by 18% in Milange, an IRS area. Molecular analysis of the mosquitoes from the *An. funestus* complex identified 96% as *An. funestus* s.s., 76% of which were collected indoors. From the *An. gambiae* complex, 73% were identified as *An. arabiensis* and the rest were *An. gambiae* s.s.- 65% of *An. arabiensis* and 61% of the *An. gambiae* were collected outdoors.

During the four months pre-IRS (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. Two months post-spray (November – December 2015), the average indoor resting density decreased to 0.05 and 0.5 mosquitoes/collection in the IRS and non-IRS areas respectively with the main decrease being in the numbers of *An. funestus* collected in IRS sites.

Insecticide resistance testing was carried out in January 2016 in Mocuba, Milange, and Morrumbala on *An. gambiae* s.l. In all sites, the *An. gambiae* s.l. tested were resistant to the pyrethroids deltamethrin and lambdacyhalothrin (Table 2). Full susceptibility was observed to dichlorodiphenyltrichloroethane (DDT), bendiocarb, fenitrothion, and pirmiphos-methyl in Mocuba, Morrumbala, and Milange.

Table 2: Insecticide Resistance Testing on *An. gambiae* s.l. in IRS Districts – 2016

	Delta methrin	Lambda cyhalothrin	DDT	Bendiocarb	Fenitrothion	Pirimiphos-Methyl
Mocuba	52 (100)	40 (100)	98 (100)	98 (100)	98 (100)	100 (100)
Morrumbala	34 (100)	33 (100)	100 (100)	100 (100)	100 (100)	100 (100)
Milange	71 (100)	45 (100)	100 (100)	100 (100)	100 (100)	100 (100)

% 24-hour mortality (number tested); >98% = susceptible, 90-97% = possible resistance, <90% = resistance

In order to build NMCP entomological capacity, PMI supported the NMCP to collect entomological data from recently established entomological sentinel sites in 10 provinces (11 including Zambézia).

Data were collected to monitor entomology and insecticide resistance indicators and the quality and coverage of malaria vector control interventions. PMI-supported sentinel sites began collecting data in 2014 and continued through 2015. These data are used by NMCP, with PMI support, to inform IRS programming, but data management has been an important challenge. In order to address this challenge, PMI has supported training of NMCP and INS staff on a new Disease Data Management System.

The sentinel sites currently collect larvae and pupae and conduct susceptibility testing and density monitoring. Susceptibility monitoring was conducted in 21 sites (including the 4 in Zambézia) in 2016 and these data are forthcoming. Data on insecticide susceptibility from all sites are collected annually. The most recent available susceptibility data were collected from 21 sentinel sites from February to March 2015. Susceptibility testing of *Anopheles gambiae* s.l. determined that there is resistance to lambdacyhalothrin in districts in Cabo Delgado, Zambézia, Tete, Maputo Province and Maputo City. Deltamethrin resistance was detected in Zambézia, Manica and Tete. Bendiocarb resistance or suspected resistance was detected in Maputo Province and Manica. DDT resistance was detected in Manica.

Table 3: **Results of susceptibility testing of *Anopheles gambiae* s.l., 2015**

Province	Sentinel Site	Lambdacyhalothrin (0.05%)		Deltamethrin (0.05%)		Bendiocarb (0.01%)		DDT (4%)		Pirimiphos Methyl		Fenitrothion (1%)	
		n	% Mort.	n	% Mort.	n	% Mort.	n	% Mort.	n	% Mort.	n	% Mort.
Cabo Delgado	Metuge	100	84	100	99	100	100	100	100	-	-	-	-
	Montepuez	100	88	100	96	100	100	100	100	-	-	-	-
Nampula	C. Nampula	100	100	100	99	100	100	100	100	100	100	-	-
	Meconta	100	100	100	100	100	100	100	100	-	-	-	-
Zambézia	Mocuba	300	92*	300	74*	100	100	100	100	-	-	100	100
	Morrum bala	100	69	300	91*	100	100	100	100	-	-	100	100
	Milange	-	-	100	100	-	-	-	-	-	-	100	100
Manica	Gondola	80	96	80	96	80	95	160	94	-	-	-	-
	Chimoio	105	92	105	86	105	98	105	88	120	100	-	-
Tete	C. Tete	100	74	100	86	200	99	100	99	-	-	-	-
Sofala	Beira	200	97*	100	99	100	100	100	98	-	-	100	100
	Dondo	100	98	200	97*	100	100	100	99	-	-	100	100
Inhambane	Cidade de Inhambane	100	100	100	100	100	100	100	100	-	-	-	-
Gaza	Chokwe	-	-	100	100	-	-	100	100	50	100	-	-
	Xai-Xai	100	100	100	100	100	100	50	100	100	98	-	-
Maputo Provincia	Boane	100	100	100	93	100	65	100	100	100	100	-	-
	Magude	123	89	100	93	100	81	100	97	100	100	-	-
	Magude**	-	-	100	99	198	100	221	100	97	100	-	-
	Moamba	100	100	100	100	114	100	100	99	100	100	-	-
Cidade de Maputo	DU. Ka Maxaquene	120	77	100	90	125	99	125	98	125	98		
Total		9272											

*tests done on F1; >98% = susceptible, 90-97% = possible resistance, <90% = resistance

Susceptibility testing of *Anopheles funestus* s.l. determined that there is resistance to lambdacyhalothrin in Maputo Province and to deltamethrin in Niassa and Tete.

Table 4: **Results of susceptibility testing of *Anopheles funestus* s.l., 2015**

Province	Sentinel Site	Lambdacyhalothrin (0.05%)		Deltamethrin (0.05%)		Bendiocarb (0.01%)		DDT (4%)		Pirimiphos-methyl (1%)	
		n	% Mort	n	% Mort	n	% Mort	n	% Mort	n	% Mort
Niassa	Lichinga	-	-	100	58	-	-	100	100	-	-
Tete	Moatize	-	-	100	85	100	100	100	100	-	-
Maputo	Magude	100	88	100	94	-	-	108	99	100	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 supported the hiring of two technicians for the Maputo provincial entomology laboratory/insectary at Matola. In addition to direct support for entomological data collection, PMI has organized a series of meetings with the NMCP and other partners in order to develop a plan to standardize entomological collection procedures and protocols across partners to facilitate data use by the NMCP. Furthermore, PMI supported the hiring of a senior entomologist seconded to the NMCP to assist in the development of the operational plan for the new integrated vector control strategy and in the implementation and coordination of the NMCP's IRS activities.

Plans and justification

With FY 2017 funds, PMI plans to continue entomologic surveillance and insecticide monitoring in Zambezia. In addition, PMI will assist in enhancing Nampula Province's capability to conduct entomologic monitoring for its IRS and ITN program with the establishment of a field entomology laboratory / insectary. This will include training to provincial and district personnel in basic entomological techniques to conduct routine longitudinal entomologic monitoring.

PMI will also continue to support implementation of the NMCP's National Entomology Monitoring and Evaluation plan (2012 – 2016), which includes insecticide resistance testing, residual efficacy testing for IRS and ITNs, and vector bionomics at the current established national sentinel sites. PMI support will include continued support of the senior entomologist seconded to the NMCP to strengthen capacity for integrated vector control activities. The central laboratory at the INS, with PMI funding, 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 in the near future. Entomological technical assistance is planned to support the strengthening of this in-country capacity. PMI will also support the NMCP with development of the new Global Fund concept note, which will include entomological monitoring activities that are complementary to PMI support. With growing partner contributions to national entomological data collection, PMI will concentrate its entomological FY 2017 support in the center and north of the country.

Proposed activities with FY 2017 funding: ($779,000)

- *Entomological monitoring in Zambézia and Nampula Province and capacity building:* Support entomological monitoring activities in PMI IRS districts in Zambézia and Nampula Provinces and continued laboratory support at the central level for mosquito processing and analysis. ($500,000)
- *Support to national and provincial government for entomologic monitoring*: Support for the national government entomological program entomological collection at established sentinel sites, sample processing and 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 old 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 old via the expanded program on immunizations (EPI) and school based distribution but these two channels have not yet been introduced. NMCP asked PMI to focus on making sure that the ANC distribution system is functioning well before expanding to a second routine distribution channel. The NMCP declined to introduce routine distribution via EPI for logistic reasons.

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 IRS and ITNs. The results suggest allocating more resources to ITNs rather than IRS, and helped secure funding from Global Fund to cover the entire country with ITNs by the end of 2017. There was also a significant change in the bed net 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 ANCs and their distribution to provincial warehouses throughout Mozambique. Although routine distribution of ITNs to pregnant women at ANC visits has been national policy since 2006, the system still has weaknesses, particularly due to the lack of standard operating procedures for storage and distribution, unclear reporting guidelines or lack of approved stock forms to monitor availability of ITNs. 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 5, PMI and UNICEF also support distribution from the warehouses down to the district and facility level in targeted areas. The MoH implements this activity in areas without donor support.

Table 5. Provincial level support by partners for distribution of ITNs

Province	From Provincial Warehouses to Districts	From Districts to Health Facilities
Niassa	-	-
Cabo Delgado	PMI	-
Nampula	PMI	PMI
Zambézia	PMI	PMI
Tete	UNICEF	UNICEF
Manica	-	-
Sofala	-	-
Inhambane	-	-
Gaza	UNICEF	UNICEF
Maputo	-	-

The implementation of mass UCCs started in 2010. Table 6 shows the number of districts covered from 2011 to 2015, among the existing 151 districts in the country. The districts covered in a given year were spread across the country.

Table 6. Number of districts covered with UCC per year, 2011 to 2015

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

Note: The total number of districts in the country is 151. Some districts were covered twice.

The NMCP is now considering the introduction of a school-based distribution system because Netcalc calculations demonstrated that school-based distribution is the most efficient keep-up 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.

In 2009, Mozambique adopted the policy of universal coverage, defined as one ITN for every two persons in ITN targeted districts. The implementation of mass UCCs started in 2010 in 11 (out of a total of 151) districts. The UCCs were carried out in 45 districts in 2011, 21 districts in 2012, 23 districts in 2013, 64 districts in 2014, and 41 districts in 2015.

PMI funded a survey on the effectiveness and impact of a universal ITN distribution campaign in Nampula in 2013 and 2014. The results of this survey showed that one month after the campaign indicated that only 80% and 54% of households in Nacala-a-Velha and Mecubúri, respectively, received at least one ITN, and only 58% and 34% of households received enough ITNs to cover everyone in the household. These results pointed to the need for stronger, more detailed planning for future mass campaigns to ensure higher coverage. The survey also showed no significant impact of the

campaign on community parasitemia, though it did show significantly lower odds of parasitemia among individuals who used ITNs frequently.

Results of PMI's 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. ITNs were tagged during the campaign and a random sample of ITNs was followed for three years. 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 (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 used as part of a pooled analysis of durability across eight PMI countries.

Data from the 2015 IMASIDA show 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 show 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 the past year, PMI procured approximately 1.5 million ITNs to meet the requirement for the ANC channel. According to routine health management information system (HMIS) data, of the 1,476,350 pregnant women attending their first ANC visit in calendar year 2015, 1,252,731 (85%) received an ITN.

PMI continued to support a semi-parallel distribution system for ITNs, from port-of-entry to the provincial level, nationwide, as shown in Table 5. In addition, PMI supported the distribution from port-of-entry directly to the districts in Cabo Delgado and Nampula Provinces, while UNICEF continued to support similar activities in the provinces of Zambézia, Gaza, and Tete. However, 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 in 39% of 33 warehouses visited and in 20% of the 153 health facilities visited. The major challenge is the delayed arrival of ITNs to the country. In calendar year 2015, the country experienced a seven-month delay in arrival from the initial planned delivery date (from March to November). A similar delay was observed in calendar year 2014. To overcome this challenge, the country increased the number of ITNs to be procured, in order to create a pipeline and smooth out the supply chain. There were also efforts to try to shorten the lead time for the arrival of ITNs in country. As a result of these efforts, the ITNs for this current year arrived in country in March 2016, as initially planned.

PMI continued to provide technical assistance for the Global Fund-supported mass campaigns. All mass campaigns planned for 2015 were completed on time with more than 3.7 million ITNs distributed in 41 districts across the country. PMI is providing technical support for the designing and planning of the first national ITN campaign. The country decided to take a staged approach, starting with only one

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

province in 2016, in order to learn from the process. The plan is to launch the campaign in Nampula Province in October 2016. The campaign is expected to run for approximately 12 months covering all districts of the country by the end of 2017. The Global Fund has already procured the ITNs for Nampula Province and these ITNs are due to arrive in country in July, 2016. The Global Fund board has also approved the funding for the rest of the country and the procurement process has started. The plan is to have all ITNs in country by February 2017.

PMI also supported a joint visit of the NMCP and the School Health Department of the Ministry of Health to Tanzania to observe a school distribution in order to inform decision-making around inclusion of school-based distribution in the national strategy to keep up ITN coverage in between campaigns.

Finally, PMI also continued to support durability monitoring of bed ITNs and post-campaign evaluations in three provinces. Baseline data collection was completed in calendar year 2015. The second round of data collection is planned for June and August of 2016 and the third, and final, round of data collection is planned for June and August of 2017.

Commodity gap analysis

Table 7. ITN Gap Analysis

Calendar Year	2016	2017	2018
Total population	26,423,623	27,128,530	27,843,933
Total targeted population	26,423,623	27,128,530	27,843,933
Continuous Distribution Needs			
Channel #1: ANC	1,544,913	1,586,127	1,628,440
Channel #2: School-based	0	0	10,000
Estimated Total Need for Continuous	*1,544,913*	*1,586,127*	*1,638,440*
Mass Distribution Needs			
2016/2017 mass distribution campaign	3,489,047	11,510,953	0
Estimated Total Need for Campaigns	*3,489,047*	*11,510,953*	*0*
Total ITN Need: Routine and Campaign	**5,033,960**	**13,097,080**	**1,638,440**
Partner Contributions			
ITNs carried over from previous year	826,700	1,436,287	350,160
ITNs from Global Fund	3,489,047	11,510,953	500,000
ITNs planned with PMI funding	2,154,500	500,000	1,200,000
Total ITNs Available	**6,470,247**	**13,447,240**	**2,050,160**
Total ITN Surplus (Gap)	**1,436,287**	**350,160**	**411,720**

Assumptions:

- ANC needs were based on the number of pregnant women who attendant ANC in 2015 adjusted for population growth.
- School-based needs were based on the number of ITNs needed to pilot this intervention in one district.
- The campaign ITNs will distributed during the national UCC, which will start in September 2016 in Nampula. All 11 provinces will receive ITNs from the UCC from 2016-2017.

Plans and justification

With FY 2017 funds, PMI will continue to support continuous ITN distribution through ANC clinics and through a school channel pilot. PMI will procure 1.2 million ITNs for the continuous channels. 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. It will also now support distribution from provincial warehouses to the district level in Nampula, Zambézia and Cabo Delgado provinces; and from the district level to health facility level in Nampula and Zambézia provinces.

The national UCC will finish by the end of 2017. Continuous ITN distribution through ANC clinics will not be sufficient to maintain high ITN coverage. In order to develop additional continuous distribution channels, PMI will pilot a school-based ITN distribution in 1-2 districts. The pilot will complement the existing ANC channel as part of the keep up strategy post-campaigns. The pilot will target elementary level age groups to receive ITNs annually. This pilot distribution will include appropriate social and behavior change communication (SBCC) activities to encourage the students to be agents of change and promote ITN use in the family. PMI will cover the costs related to TA and to the procurement of the 10,000 ITNs. If additional ITNs are required NMCP will utilize existing Global Fund-procured ITNs. If the pilot is successful, the long-term strategic vision for Mozambique is to implement routine school-based distribution, alongside routine ANC distribution and campaigns, similar to what is implemented in other settings. Based on the findings from the pilot, PMI would focus further scale up support in Zambézia and Nampula provinces.

A new ITN durability monitoring of the 2017 national campaign ITNs will be funded by PMI, pending the confirmation that the brand of ITN and the site(s) selected for monitoring will serve to expand the body of knowledge about ITN durability in Mozambique. Assessing the durability of the most widely used malaria control intervention in Mozambique is important to inform future national distributions.

Proposed activities with FY 2017 funding: ($5,756,000)

- *Procurement of ITNs*: PMI will procure 1,200,000 ITNs for continuous distribution through ANC services and a school distribution pilot ($3,456,000)
- *Distribution of ITNs:* PMI will provide funds to distribute 1,200,000 ITNs from the port-of-entry to provincial level warehouses (national), from provincial warehouses to district-level warehouses (Nampula, Zambézia and Cabo Delgado) and from district warehouse to health facilities (Nampula and Zambézia) ($2,100,000)
- *ITN distribution technical assistance*: TA will be provided for the school-based pilot distribution of 10,000 ITNs in one district and for planning ITN continuous distribution ($100,000)
- *Durability monitoring*: PMI will implement durability monitoring, in selected districts of Nampula and Zambézia, for ITNs distributed during the national UCC ($100,000)

c. Indoor residual spraying

Progress since PMI was launched

Currently, there are four groups supporting 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 sprays the remaining target districts in the provinces outside of Zambézia.

Goodbye Malaria implements IRS in Magude District as part of the Bill and Melinda Gates Foundation-funded malaria elimination work in the south of the country. PMI has supported IRS in as few as four and as many as eight districts in Zambézia since FY 2007, consistently achieving high coverage levels of above 85%. The Global Fund provides 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 these years. The Global Fund has procured all insecticide for the MoH, Goodbye Malaria, and PMI for use in 2016.

Table 8: PMI-supported IRS activities 2013-2018

Calendar Year	Number of Districts Sprayed	Insecticide Used	Number of Structures Sprayed	Coverage Rate	Population Protected
2013	4	Pyrethroid	414,232	89.2%	2,181,896
2014	5	Pyrethroid	445,118	93.1%	2,327,815
2015	6^	3 districts pyrethroid; 3 districts organophosphate	337,433	88.1%*	1,631,058
2016**	6.5#	organophosphate	400,139	-	1,910,109
2017**	TBD	organophosphate	440,000	-	2,156,000
2018**	TBD	long-lasting, non-pyrethroid insecticide	440,000	-	TBD

^ Note that Milange and Morrumbala were each split into two districts in late 2014 by the GRM.
* This number may be lower, as shown by discrepancies noted in the post-data spray quality assessment
** Represents targets based on the 2016 IRS work plan, and/or projected targets based on national strategic plan and/or discussions with the NMCP.
# An additional half district will be sprayed as part of the UNITAID-supported vector control cost-effectiveness study in Mopeia

Progress during the last 12-18 months

The IRS operations in 2015 targeted six districts in Zambézia Province without universal ITN coverage: Milange, Morrumbala, Molumbo, Derre, Mocuba, and Quelimane. The calendar year 2015 spray campaign, carried out from October 19 through December 18, used the pyrethroids K-Othrine & Pali in three districts, and the organophosphate Actellic CS in three districts. A total of 1,772 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 468,439 targeted structures (based on structures reported in 2014) in the six districts, only 383,139 structures were found by spray operators, indicating large discrepancies in the number of

structures found in 2015 compared to 2014. Of these found structures, a total of 337,433 were sprayed, representing 88% coverage of eligible structures. The total number of persons protected was 1,631,058, including 105,400 pregnant women and 287,813 children less than five years of age.

Standard WHO cone bioassays were used to evaluate the quality of the 2015 spray operation. The bioassay tests were conducted 24 hours after spraying and monthly thereafter in Mocuba, Milange, Morrumbala and Quelimane. Initial wall bioassay tests showed high mortality rates (100%) of susceptible mosquitoes (*Anopheles arabiensis*) exposed to organophosphate-treated walls in Mocuba and Morrumbala and deltamethrin-sprayed walls in Milange. In Quelimane, bioassay tests showed mortality less than 80% on deltamethrin-treated walls, which indicated substandard spray quality. Therefore, a re-spray of the houses in question was conducted. Four months after spraying, bioassay mortality of susceptible mosquitoes exposed to organophosphate-treated walls remained high in Mocuba and Morrumbala (90% mortality and 84% mortality respectively). However, five months post-IRS mortality dropped to 72% in both districts. In Milange, in March 2016, five months after spray, 88% mortality of susceptible mosquitoes exposed to deltamethrin was observed, dropping to 78% in April 2016.

In addition to the standard use of WHO cone bioassays, a Post Spray Data Quality Audit was conducted after the 2015 IRS campaign. This audit noted important deficiencies in the spray campaign and found an overall coverage level of 62%. The reported proportion of the population covered during the 2015 campaign (88%) does not fall within the 95% confidence interval for the audit coverage (56%- 66%), which is indicative of a lower than reported spray coverage.

The NMCP conducted IRS in 15 districts across the country in 2015. PMI seconded a consultant to the NMCP to provide support in the implementation and coordination of their IRS activities, and has begun to coordinate weekly IRS technical working group meetings with the NMCP and Goodbye Malaria in order to harmonize IRS operations and planning and supervision tools.

Plans and justification

Because of challenges faced during the 2015 IRS campaign, which resulted in lower than anticipated spray coverage, a number of changes will be instituted during the 2016 campaign, including more scrutiny during the spray operator recruitment process, as well as greater emphasis on mobilization and supervision. In particular, there will be focused training for team leaders, the number of spray operators per team will be reduced, and mobilizers providing SBCC messages will be from the communities to be sprayed. In addition, structure-mapping exercises are being coordinated with Peace Corps and the USAID GeoCenter. This mapping, combined with a rapid census in select villages of spray districts, will be used to provide a more accurate number of structures per district and facilitate strengthened microplanning.

PMI is also working closely with the NMCP to ensure that lessons learned from the 2015 campaign will also inform the national program. To further strengthen the national spray program, PMI will provide a centralized training of the trainers from all districts to improve the quality of spray planning and of the cascade training of spray operators.

Mozambique has been selected as a first round country in the UNITAID funded NGenIRS (Next Generation IRS) 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 price reduction will enable Mozambique to expand coverage of long-lasting IRS from baseline levels, and participation in the NGenIRS Project confirms Mozambique's commitment to do so. Mozambique

will be eligible to buy subsidized long-lasting organophosphate starting in 2016. For 2016, PMI will spray the same six districts sprayed in 2015 with long-lasting organophosphate purchased by the Global Fund. In addition, PMI will spray half of Mopeia District as part of a study within the larger UNITAID market-shaping project (see Operational Research section for further details). The peak in the national and Zambezia malaria cases in Mozambique is between January and April in the time period during and immediately after the rainy season, although transmission occurs throughout the year. Both *An. gambiae* and *An. funestus* are present in Zambezia and the July peak is primarily due to *An. funestus*. While it would be ideal to cover the months of highest density for both species, there are many logistical challenges to starting the campaign later than October because the campaign would run into the start of the rains. For this reason, the Zambezia spray will be conducted October-November as this is immediately before the peak in malaria cases.

By the start of the 2017 spray season in October, all districts in Zambézia are expected to be covered with ITNs from the UCC. Therefore, in 2017 and 2018 PMI will conduct IRS with a non-pyrethroid insecticide in targeted districts based on criteria laid out in the revised NMCP vector control strategy, including status of insecticide resistance, malaria burden, and population density. PMI will maintain its current focus of IRS efforts on Zambézia Province based on the province's malaria burden, but will increase the targeted number of structures sprayed from approximately 400,000 in 2016 to 440,000 in 2017 and 2018. Specifically, the PMI IRS campaign in 2017 will provide protection for approximately 2,156,000 people in Zambezia.

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. This will include continued support for the centralized training of trainers and targeted support for training and supervision of the NMCP-led spray in Nampula. PMI will also provide support for the supervision of the MoH-led national campaign to help improve the quality of spray operations, as well as limited support to environmental compliance-related activities.

Proposed activities with FY 2017 funding: ($6,300,000)

- *IRS implementation:* Support IRS operations covering approximately 440,000 structures. PMI-supported activities will include purchasing equipment and supplies, training, supervision, and environmental compliance. ($6,000,000)
- *Support to national government IRS program:* Support for training of trainers through a cascade approach, supervision of IRS activities, and environmental compliance activities. ($300,000)

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, as long as there has been an interval of approximately 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 a Reproductive Health/Maternal-Neonatal-Child Health Working group. The NMCP is represented in this working group and it is invited when MIP issues are discussed. The priority for the MoH MCH program is the implementation of an Integrated Reproductive Health/Maternal-Neonatal-Child Services Package. A key objective of both the NMCP and the MCH Department is to ensure that 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy.

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

1. Ensure point-of-care delivery of malaria services in pregnancy through provincial and district support of supervision and training of ANC health workers.
2. Support simplification of the delivery and reporting of SP uptake by pregnant women through ensuring widespread adoption of the WHO guidelines and training in their implementation.

Given that the current NMSP will end in December 2016, and a new strategy is being developed, these objectives may be adjusted to reflect the priorities of the new strategic plan.

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. 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 USG 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 MCH partners under the leadership of the MoH. Since June 2014, the new guidelines have been implemented nationwide. As a result of this effort, routine data shows continuing improvement of IPTp2 coverage nationally from 20% in 2011, 36% in 2013, and 44% in 2014, to 56% in 2015. 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. The Model Maternity approach is an integrated platform for ANC and other maternal health services, which was co-funded by PMI and MCH funds. Although the Model Maternity approach has been recognized as a very effective intervention in improving MIP related outcomes, including IPTp coverage, its impact in reducing maternal mortality is

still under debate. The results of this debate will determine whether this intervention will be scaled up or not.

The reasons for the low coverage of IPTp are complex, but are thought to result primarily from lack of supervision at ANC facilities, lack of clearly articulated guidelines on the administration of IPTp, and poor performance of the supply chain. The poor performance of the supply chain is evidenced by the data from EUV reports. The data from the past two years have consistently shown that there are continuing reports of stockouts at the health facility level while no stockouts are reported at the warehouse level. This suggests that management issues, rather than availability of the drug in the district, may cause the IPTp stockouts at health facilities. Finally, it has been observed during monitoring visits that some women that receive both IPTp and ITNs are not recorded, making the coverage of these interventions artificially low and emphasizing the need for better monitoring and reporting of MIP indicators at the health facility level. Efforts to address the quality of data are described in the SM&E section. Over the past several years, the MCH department at the MoH has undergone an internal reorganization, and changes in personnel have resulted in increased collaboration with the NMCP.

Progress during the last 12-18 months

The major focus of the past 18 months was to ensure a smooth transition of implementing mechanisms in this technical area. This transition led to a reduction in the number of activities implemented by PMI. Despite the transition, PMI continued to support the implementation of the new WHO IPTp guidelines and the finalization and introduction of the new MNCH registers. PMI continued to provide support to 125 health facilities in the context of the Model Maternity Initiative. Through this work, approximately 51,000 pregnant women had four antenatal care visits by skilled providers in these USG-assisted health facilities. The proportion of pregnant women receiving at least two doses of IPTp in these health facilities in calendar year 2015 was 62%, higher than the national average of 56%.

In relation to the new MNCH registers, PMI supported the training of 65 provincial and district-level trainers (nurses, physicians, and statisticians), as well as financial and logistical support for the subsequent district-level trainings. Twelve district-level trainings, facilitated by four provincial/district trainers each, were supported, for a total of 147 MCH nurses trained in the revised RMNCH registers. There were delays in the startup of the MCSP project that limited the number of nurses trained during the referred period. In FY 2016, 425 MCH nurses will be trained in MIP guidelines and practices. These revised MNCH registers are already being used in the three southern provinces of Maputo, Gaza and Inhambane, and in Maputo city. The implementation of the new registers in the rest of the country will happen later in the calendar year 2016.

To support the supply of SP, approximately 2.7 million treatments of SP were purchased in 2014 with USG funds. This amount was supplemented with 2 million treatments procured by the GRM and 1.5 million treatments through UNICEF. As such, in October 2015 there were 26 months of stock available and no further purchases were made with FY 2015 funds. According to the projections, in September 2016 the country will have 20 months of stock. However, the data from the last EUV report (Q1 2016) showed the occurrence of stockouts in 43% of the 16 health facilities visited, nation-wide. No stockouts were reported at the warehouse level, suggesting that management issues, rather than availability of the drug in the district may cause the stockouts at health facility, as mentioned above.

Table 9. Status of IPTp policy in Mozambique

WHO policy updated to reflect 2012 guidance	2014
Status of training on updated IPTp policy	Completed
Number of health care workers trained on new policy in the last year	147
Are the revised guidelines available at the facility level?	Yes
ANC registers updated to capture three doses of IPTp-SP?	Yes
HMIS/ DHIS updated to capture three doses of IPTp-SP?	Yes

Commodity gap analysis

Table 10. SP Gap Analysis for Malaria in Pregnancy

Calendar Year	2016	2017	2018
Total population	26,423,623	27,128,530	27,843,933
SP Needs			
Total number of pregnant women attending ANC	1,544,913	1,586,127	1,628,440
Total SP Annual Need (in treatments)	**3,754,139**	**3,949,456**	**4,152,522**
Partner Contributions			
SP carried over from previous year	4,322,484	1,568,345	2,618,889
SP from MOH	1,000,000	1,000,000	1,000,000
SP from Global Fund			
SP from other donors (UNICEF)		2,000,000	
SP planned with PMI funding		2,000,000	2,500,000
Total SP Available	**5,322,484**	**6,568,345**	**6,118,889**
Total SP Annual Surplus (Gap)	**1,568,345**	**2,618,889**	**1,966,367**
Pipeline Need (8 months)	2,502,759	2,632,970	2,768,348

Footnotes: The national SP needs are calculated based on the following assumptions:

- The number of pregnant women was estimated based on the number of women who attended ANC in 2015 according to HMIS data, increased by population growth rate (NMCP annual report)
- The estimated treatments needed are calculated with the consideration of the current ANC visit attendance rates (1st visit: 85%; 2nd visit: 75%; 3rd visit: 42%; and 4th: 27%). The estimated total SP needs are calculated in treatments (3 tablets comprise each treatment).
- The supply system team has determined that an additional 8 months of SP supply are needed to provide adequate quantities for the various levels of the pipeline (central, provincial, district, and health facility). If the "Total SP Annual Surplus" is greater than the "Pipeline Need", any excess would indicate a true surplus. If the "Total SP Annual Surplus" is less than the "Pipeline Need", SP has not achieved full supply.

Plans and justification

In order to support the supply of SP, PMI will procure approximately 2.5 million treatments with FY 2017 funds. The procurement of SP has been supported by the GRM, with UNICEF and PMI providing limited support when needed. For calendar year 2018, there are no planned shipments of SP to be

procured by UNICEF; 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 through the planned 2016 health facility assessment.

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 support the review of the existing evidence related to barriers to IPTp, including the aforementioned mixed methods study by Boane and colleagues on perceptions of MIP in a Mozambican setting in order to further refine specific interventions to improve IPTp uptake. 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 focus on increasing coverage of MIP activities to all districts of Zambézia and Nampula provinces, and in improving the quality of service delivery. 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 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 collection and reporting of key MIP indicators.

Proposed activities with FY 2017 funding: ($1,150,000)

- *Procure SP:* PMI will procure approximately 2.5 million treatments of SP. ($450,000)
- *Support national MIP planning and implementation:* Central level technical assistance for updated guidelines and strengthened coordination between NMCP and MCH department for training and supervision. ($200,000)
- *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 targeted provinces (Zambézia and Nampula). ($500,000)

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. Due to difficulties involved in implementing and ensuring the presence of high-quality microscopy, RDTs are the preferred test for primary diagnosis of malaria outside of provincial level referral hospitals and were rolled out nationally in 2011. Microscopy should be 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 microscopes, laboratory supplies, reagents, and RDTs;

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. Expand and strengthen supervision and training of malaria case management at the provincial level and below through the implementation of provincial focal points for malaria case management
2. Improve the forecasting, allocation, distribution, stock management, and use of case management commodities (i.e., ACTs and RDTs) in the country
3. Implement a QA/QC program for both microscopy and RDTs

Mozambique's national guidelines for malaria treatment were last updated in 2011. Artemether-lumefantrine (AL) remains the first-line treatment for uncomplicated malaria, and artesunate-amodiaquine is the recommended alternative antimalarial. Quinine is the recommended treatment for pregnant women during their first trimester, and AL in the second and third trimesters. Parenteral artesunate is the recommended treatment for severe malaria, including during pregnancy. Rectal artesunate is recommended for pre-referral treatment of severe malaria, both at facility and community levels, and is being rolled out in a phased approached. In this first phase, the use of rectal artesunate is limited to APEs.

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. Currently, 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. 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.

In 2013, the GRM decided to decentralize its approach to health care and prevention, a plan now being implemented. While previously many of the health-related responsibilities, including oversight and training of health care workers, behavioral communication, and distribution of commodities were managed at the central level, they now fall under the purview of the provincial governments. Despite this shift, the goal of the NMCP remains to ensure the entire population of the country has access to proper malaria diagnostics and treatment.

Progress since PMI was launched

In calendar year 2012 and in support of the NMCP objectives, the National Reference Laboratory for Blood Parasites was refurbished, 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 QC activities and training of staff. PMI supported the training of eight reference laboratory staff on malaria microscopy, including preparation of slides, slide reading, parasite density and standard operating procedures. The training was

carried out at CISM, which has a laboratory with International Organization for Standardization certification for malaria.

PMI has historically procured at least one third of the nation's annual RDT needs to support the provision of appropriate case management. Significant progress has been achieved in ensuring the availability of RDTs, both at facility and community levels. However, clinicians seem to prefer the use of microscopy and the uptake of RDTs has been slow, leading to overstock of RDTs at central and provincial warehouses. 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. There have also been reports of stockouts of RDTs at the peripheral (health facility) level, which indicates that there are still challenges in the management of the supply chain system.

PMI has also been supporting the Malaria Case Management Working Group, which was established several years ago through a collaborative effort of various USG 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 2007, significant progress has been made to simplify and streamline national standards of care for malaria treatment. In 2011, national case management guidelines were finalized in line with WHO treatment guidelines for uncomplicated and severe malaria. Clinicians at all levels of the health system have been trained on the implementation of these guidelines in all 11 provinces. Support for these programs has historically been provided at the central level, but with the policy shift towards decentralization, there is now a larger emphasis on building capacity at the provincial, district, and health facility levels.

The most recent completed therapeutic efficacy study (TES) of ACTs was carried out in 2011 and showed a 28-day polymerase chain reaction corrected efficacy for AL of 96% and for artesunate-amodiaquine of 99%[3].

Progress during the last 12-18 months

PMI and the Global Fund together continue to purchase all RDTs and ACT treatments needed in Mozambique each year. However, ensuring a timely arrival of the Global Fund supported shipment remains an important challenge. In the past year, PMI had to increase the initial planned amount of ACTs, from 2.9 million to 4.9 million, in order to cover for gaps created by the delayed arrival of Global Fund supported shipments.

PMI continued to work with partners to support warehousing and drug management at the central and provincial levels. Stockout data from the EUV carried out between January and March of 2016 in all 11 provinces shows important improvements in the availability of malaria commodities. The data shows that in the 186 facilities visited only five percent had stock outs of all four AL presentations, on the day

[3] Nhama, A., Q. Bassat, S. Enosse, A. Nhacolo, R. Mutemba, E. Carvalho, E. Naueia, E. Sevene, C. Guinovart, M. Warsame, S. Sanz, A. Mussa, G. Matsinhe, P. Alonso, A. Tiago and E. Macete (2014). "In vivo efficacy of artemether-lumefantrine and artesunate-amodiaquine for the treatment of uncomplicated falciparum malaria in children: a multisite, open-label, two-cohort, clinical trial in Mozambique." Malar J **13**: 309.

of the visit, while 35% had all presentations available. All the 33 warehouses visited had at least one of the four presentations. In relation to RDTs, 22 (12%) of the 186 facilities had stockouts on the day of the visit.

PMI has continued to focus the majority of its case management efforts at the provincial level and below, focusing on Nampula, Zambézia, Tete, and Cabo Delgado provinces. In the past 12 months, 37 laboratory staff were trained in basic malaria diagnostic refresher trainings. Twenty-five of these staff were selected as laboratory supervisors, and received the advanced malaria diagnostic refresher training. To improve clinical management of malaria, 36 clinical supervisors were trained in all four provinces. In addition, a joint outreach training and support supervision (OTSS) supervisor training for 52 clinical and laboratory supervisors was conducted. All these trainings included the use of a RDT quality assurance checklist.

At least one round of the OTSS was conducted in each of the four target provinces. A total of 79 health facilities were visited, across 52 districts, as follows: 16 health facilities in 10 districts of Zambézia; 21 health facilities in 10 districts of Tete; 22 health facilities in 21 districts of Nampula; and 20 health facilities in 11 districts of Cabo Delgado. During these visits, 220 health workers received on-site RDT training. Data from the OTSS rounds is showing improvements in case management. For example, in the last round of the OTSS, it was observed that all patients with a positive malaria result received an ACT; 89% of the patients who received an ACT had a positive malaria result recorded; and, only 16% patients with a negative malaria result were treated with an ACT.

With PMI support, the National Reference Laboratory collected 3,500 specimens to prepare permanent slide sets for training and proficiency testing. All slide sets will go through a rigorous validation process by WHO experts. The slide bank will also be a resource for the routine QA panels. Other QA/QC activities supported by PMI include the training of provincial and district staff on the use of the RDT quality assurance checklist.

PMI also continued to provide logistic and technical support for the malaria case management committees established in four health facilities in previous years and supported the establishment of an additional six health facility committees. These multidisciplinary committees meet monthly at the facility level, especially the referral hospitals, to review case management data and discuss malaria case management trends (new malaria cases, severe malaria deaths, case management practices and adherence to guidelines, and any data management issues).

The APE program has been progressively scaled up since calendar year 2011. By June 2016, there were 3,109 APEs working across the 11 provinces of Mozambique. There is recognition from both the MoH and donors that this number is still insufficient and efforts are in place to increase the number of APEs. However, these efforts are hampered by funding constraints and by the limited capacity of the health sector to support the APEs. USAID, through UNICEF, is supporting the expansion of the APE program, with non-PMI funds. In 2016, and with USAID funding, UNICEF will continue to support subsidies for APEs, printing of APE training manuals, and will support training of an additional 200 APEs in Zambézia Province. UNICEF will also support the development of the 2016 - 2020 strategic plan for the APE program. PMI has supported the APE program by providing RDTs and ACTs and by supporting the kitting system through which these commodities are distributed to APEs. PMI has also provided support to supervision of APEs in targeted districts. This includes support for APEs' MIP-related activities.

In 2015, WHO sponsored a TES in the provinces of Cabo Delgado, Sofala, Tete, and Gaza but the results are not yet available. Genotyping to evaluate for the k13 mutation associated with artemisinin resistance will be performed by a WHO collaborating center.

Commodity gap analysis

Table 11: RDT Gap Analysis

Calendar Year	2016	2017	2018
RDT Needs			
Total country population	26,423,623	27,128,530	27,843,933
Population at risk for malaria*	26,423,623	27,128,530	27,843,933
Total number of projected fever cases**	50,204,844	51,544,207	52,903,473
Percent of fever cases tested with an RDT	**80%**	**80%**	**80%**
Total Annual RDT Needs* **	**17,925,152**	**19,507,421**	**21,155,041**
Partner Contributions (to PMI target population if not entire area at risk)*			
RDTs carried over from previous year	18,775,682	21,025,611	13,020,978
RDTs from Government	0	0	0
RDTs from Global Fund	12,175,081	5,502,788	3,000,000
RDTs planned with PMI funding	8,000,000	6,000,000^	6,000,000
Total RDTs Available	**38,950,763**	**32,528,399**	**22,020,978**
Total RDT Surplus (Gap)	**21,025,611**	**13,020,978**	**865,937**

Assumptions

- Estimates for the entire population of the country; obtained from forecasting provided by the GRM.

* Total population is at risk of malaria.

** Projected fever cases estimated at an average of 1.9 fevers per person per year.

*** Average care seeking for fever is 63% (IMASIDA); with 85% public sector.
Diagnostic testing rates of 60% (2016), 65% (2017), and 70% (2018) and RDT use 80%.
Additional 1.2% of fever cases tested in public sector will be managed at the community level (iCCM) by APEs.

^The 2017 PMI procurement was reduced to 6,000,000 based on the available pipeline from 2016

Table 12: ACT Gap Analysis

Calendar Year	2016	2017	2018
ACT Needs			
Total country population	26,423,623	27,128,530	27,843,933
Population at risk for malaria*	26,423,623	27,128,530	27,843,933
Total projected number of malaria cases**	12,224,688	12,512,104	12,725,843
Total Annual ACT Needs* **	**13,434,501**	**13,750,878**	**13,968,389**
Partner Contributions			
ACTs carried over from previous year	*6,822,513*	*9,972,145*	*7,572,844*
ACTs from Government	0	0	0
ACTs from Global Fund	11,747,403	2,914,132	4,000,000
ACTs from other donors (UNICEF)	0	1,002,000	0
ACTs planned with PMI funding	4,836,730^	7,435,445^	4,390,000
Total ACTs Available	**23,406,646**	**21,323,722**	**15,962,844**
Total ACT Surplus (Gap)	**9,972,145**	**7,572,844**	**1,994,455**
Pipeline Need (10 months)	11,195,417	11,459,065	11,640,324

Assumptions:

- Population estimates for the entire country; obtained from forecasting provided by the GRM.

* Total population is at risk of malaria.

** Projected fever cases are estimated at an average of 1.9 fevers per person per year.

*** Average care seeking for fever is 63% (IMASIDA); with 85% public sector.
Diagnostic testing rates of 60% (2016), 65% (2017), and 70% and RDT use 80%.
Test positivity rate would decrease from 55% in 2016 to 52% in 2017 and 49% in 2018.
Of those not tested, 10% will be presumptively treated with an ACT.
Non-compliance rates to negative test: 10%, 9%, and 8%.
Additional cases that test positive by RDT will be treated with ACTs through iCCM by APEs.

^The 2016 and 2017 PMI procurement was increased to 6,000,000 to meet available pipeline need

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. The GRM and the Global Fund will fund severe malaria treatment commodities (parenteral and rectal artesunate). It is also important to note that the current Global Fund grants ends in July 2017 and there is not yet funding from the Global Fund for the commodities planned for calendar year 2018. PMI will work closely with the MoH and with the Global Fund in the elaboration of the new grant and to monitor the availability of RDTs and ACTs in country. 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. Based on the IMASIDA results, PMI, in close collaboration with the NMCP, decided to further focus its support in the two high burden provinces in the north of the country, Zambézia and Nampula. This shift will start with FY 2016 funding and PMI support will be extended to cover all districts in these two provinces. 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 in all districts. Prior support for the four provinces was in 1-2 facilities in select districts of the provinces and did not include support for community-health workers.

PMI will continue to support the implementation of QA/QC by expanding these activities to all districts of Zambézia and Nampula provinces and the number of health facilities in each district will also be increased. PMI will also strengthen the provincial level capacity to implement and monitor QA activities for both malaria microscopy and RDTs.

A therapeutic efficacy study (TES) is not included in this MOP as PMI is planning to support a TES in calendar year 2017, using FY 2016 funds. The TES will be carried out in the same sites where the WHO-sponsored TES was conducted in 2015. This TES will include k13 resistance testing.

Proposed activities with FY 2017 funding: ($7,760,000)

- *Procure* RDTs: PMI will procure approximately 6 million single species RDTs. ($1,920,000)
- *Procure ACTs:* PMI will procure approximately 4 million ACTs (AL) for the treatment of uncomplicated malaria. ($4,390,000)
- *Central level support of case management and training:* Provision of technical assistance to NMCP at central level and support training of central level staff in case management. ($200,000)

- *Provincial, district, and health center level support of case management and training:* Continued support to training and supervision of provincial, district, health facility, and community level staff in Zambézia and Nampula. ($1,000,000)
- *Laboratory QA provincial level:* Support the implementation of QA/QC activities in all districts of Zambézia and Nampula. ($250,000)

b. Pharmaceutical management

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 supports this 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 having to wait 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 USG has made significant contributions toward supply chain strengthening and improvement of pharmaceutical management in efforts to support access to good quality commodities. The USG has been the major partner providing technical assistance to CMAM. Most of the support has been provided

through PEPFAR. PMI funds have 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.

PMI supported the introduction and roll out of ACTs and RDTs on a national level and the development of a supply chain master plan. Despite the problems with Mozambique's pharmaceutical management and supply chain system, data from the EUV indicates that ACTs and RDTs are reaching the health facilities in all 11 provinces of the country, despite the challenges mentioned in the diagnosis and treatment section.

Through significant efforts on the part of CMAM, the NMCP, and USG donors, a computerized logistics management and information system (LMIS) is now operational nationally in all provincial capitals and in 68 out of 151 districts. This computer-based, real-time LMIS is an Access-based program and relatively easy to use. Warehouse staff in all provinces have been trained in the use of this system. The plan is to continue the roll out of the LMIS system to all districts with USG 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 seven 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, 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 first quarter of calendar year 2016 included 186 facilities in 48 districts, covering all 11 provinces of the country. The 186 facilities included 33 warehouses and 153 Service Delivery Points (SDPs), and showed that only 5% of all the facilities visited had stock outs of all four AL presentations on the day of the visit while 35% had all presentations available. All the warehouses visited had at least one of the four presentations, indicating high availability at the provincial level. These results show that AL is generally available in the SDPs but there is still work to be done to ensure that all 4 presentations are available. Consequently, intensive work was done with the health facilities and warehouses to prevent SDP stockouts, primarily to ensure that requisitions and distributions are done accurately and on time.

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 USG 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 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 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 AL/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

With the reduction of PEPFAR contributions to strengthening the supply chain, PMI and other non-PEPFAR programs, will have to increase their share of technical assistance to CMAM. 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 SIMAM LMIS, focusing in 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 *Monitoring & Evaluation* 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.

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

- *Supply chain strengthening:* Continue to support capacity building of CMAM at central and provincial levels to better plan for, deliver, and track malaria commodities. 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. Strengthen storage and distribution capability at central and provincial levels. ($900,000)

- *Strengthen regulatory authority on drug surveillance:* Strengthen the national Pharmaceutical Department's capacity for drug quality control including the procurement of necessary equipment and supplies. Support will include deployment and use of minilabs for field testing of drugs. ($100,000)

4. Health system strengthening and capacity building

NMCP/PMI objectives

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

One of the objectives of the 2012-2016 NMSP is to ensure that all districts of the country have capacity to adequately manage and implement malaria control activities. Six main strategies were defined to achieve this goal: (i) review the organizational structure of the NMCP and equip it with appropriate human resources; (ii) strengthen the infrastructure capacity and ensure adequate equipment for malaria control activities; (iii) improve management and leadership at all levels of the program; (iv) improve collaboration and coordination among partners; (v) improve malaria epidemic preparedness and response; and, (vi) strengthen cross-border collaboration activities in order to support malaria elimination efforts in the Southern African Development Community region.

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

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

Progress since PMI was launched

PMI has built capacity for malaria control at a number of 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).

PMI supported the development of the Malaria Acceleration Plan, the Global Fund Round 9 Phase 2 proposal, and the Global Fund NFM concept note. The Malaria Acceleration Plan is a multiyear operational plan of the malaria control strategy, covering the period of 2014 to 2016, which gives guidance for the timing of the implementation for specific activities, with the parties responsible for implementation, and on funding availability.

For vector monitoring and control strengthening, PMI has seconded an entomologist at the NMCP to coordinate vector control. In Zambézia Province, PMI has strengthened the capacity of the provincial health directorate (*Direcção Províncial de Saúde-* DPS) to implement IRS activities and conduct entomologic monitoring through the establishment of a regional entomology laboratory and insectary. The regional entomology capacity to do entomologic monitoring/surveillance has also been supported by PMI through the establishment of an entomology lab in Pemba, Cabo Delgado. 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 equipment of the National Reference Laboratory, the entomology laboratory, and an insectary at INS.

For epidemiological capacity strengthening, PMI has supported several training activities, including the FELTP program. 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, an assessment of malaria prescription practices in each province in 2011, and an investigation of a reported increase in severe malaria among children at Maputo Central Hospital.

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

PMI has implemented various activities to strengthen laboratory capacity. Three regional "training of trainers" for malaria microscopy were held in calendar year 2011 to establish a cadre of highly qualified master trainers. CDC reference laboratorians led these trainings. Several technicians were chosen from among these master trainers to lead the national refresher training on malaria microscopic diagnosis. 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 USG 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 support to supervision to APEs in targeted districts.

Progress during the last 12-18 months

PMI continued to support health system strengthening 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.

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 mid-term review and development of the new strategic plan. PMI has also supported periodic assessment of impact of malaria control, mobilization of domestic and external funds (such as the Global Fund) for malaria control activities, promotion of malaria awareness and advocacy, and operational research.

PMI continued to strengthen the capacity of the DPS to implement IRS activities and conduct entomologic monitoring in Zambézia Province and to develop NMCP capacity to implement entomological monitoring activities nationwide.

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. These trainings led to a 13% increase in participant's ability in parasite identification. To improve overall supervision and case management, PMI supported training of clinical and laboratory supervisors who conducted supervision at 79 health facilities in four provinces.

Through its implementing partner, PMI has also supported SM&E activities such as analysis of routine malaria data to identify trends, as well as support for entomological capacity building.

PMI is also strengthening the capacity of the DPS to implement IRS activities and conduct entomologic monitoring in Zambézia province and to develop NMCP capacity to implement entomological monitoring activities nationwide.

At the central level, PMI supported the MoH to strengthen its APE program and expand of the number of APEs trained. 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 one FELTP resident and will provide support to two residents in the cohort beginning in June 2016. The current FELTP resident is working on his thesis utilizing data from the ITN campaign evaluation. The results of this study were presented during a joint-FELTP/PMI meeting in March 2015.

PMI also continues to support strengthening of SBCC programming through its SBCC implementation partners and through Peace Corps Volunteers (PCVs) based in 59 health facilities throughout the country.

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 the implementation of malaria preventive activities, case management, and SM&E. This includes need for human resources capacity-strengthening through pre- and in-service training and through supportive supervision at provincial and district level. This support must reach facilities in rural areas, where malaria burden is highest.

In order to address these needs, PMI will work to support the capacity of provincial and district-level staff in Zambézia and Nampula to better plan, manage, and analyze their activities with a goal of improving service quality at health facilities and at the community level. PMI will also continue to provide assistance in building CMAM's capacity with focus on management of malaria commodities at central, provincial and district levels to improve public sector warehousing and distribution of commodities at all levels.

To improve epidemiologic capacity, PMI will support two new FELTP residents to strengthen their capacity in malaria-related SM&E. PMI will also provide support for a short course for central-level and provincial NMCP and DPS staff to strengthen understanding and ability for data analysis, visualization, and use.

To improve clinical and laboratory capacity, PMI will continue support for a joint OTSS for clinical and laboratory staff and supervisors, in Nampula and Zambézia provinces.

PMI will also support data for decision-making at a national, provincial, district, and health facility level, by providing technical assistance to strengthen NMCP capacity through embedding of staff to ensure sufficient human resources capacity for program implementation. This includes entomological, data management and case management support, as previously described.

Proposed activities with FY 2017 funding: ($875,000)

- *Provincial level capacity building:* Support in two target provinces (Nampula and Zambézia) to improve the planning and coordination of malaria control activities, focus on capacity building for provincial and district-level managers for data assessment, analysis and use in program decision-making. ($500,000)
- *Field Epidemiology & Laboratory Training Program (FELTP):* Support for two Field Epidemiology & Laboratory Training Program fellows and for a malaria short course. ($80,000)
- *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, training, international meeting supervision. ($295,000)

Table 13: Health Systems Strengthening Activities

HSS Building Block	Technical Area	Description of Activity
Health Services	Case management and Malaria in Pregnancy	Strengthen diagnostic capacity of existing laboratory and healthcare staff through refresher trainings, on-the job training, and supportive supervision. Support on-the-job training and supportive supervision of provincial/district/health facility staff to improve management of uncomplicated and severe malaria and implementation of IPTp
Health Workforce	Case management	Strengthen the APE program and expand of the number of APE trained in order to increase access to malaria case management .
	SM&E	Support two FELTP fellows to strengthen capacity in epidemiology and program evaluation
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.
	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.
Health Finance	GF Management Support	Continuing 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	Health Systems Strengthening	Strengthen national coordination and guideline development through participation on Malaria Technical Working Group. Build capacity for planning and coordination of malaria control activities at provincial level.

5. Social and behavior change communication

NMCP/PMI objectives

The NMCP has had the objective to cover 100% of the population with key messages related to malaria prevention, diagnosis, and treatment by calendar year 2016. PMI supports a range of SBCC activities aimed at promoting correct and consistent use of ITNs, increasing acceptance of IRS, improving care-seeking and increasing adherence to treatment and prevention therapies, all of which are key to achieving and maintaining the NMCP's goals for malaria control. To coordinate all malaria communications activities, the MoH has created a malaria SBCC technical working group. This group includes representatives from the NMCP, the Communications Department of the MoH, PMI, the WHO, and implementing partners. This working group is chaired by the NMCP and meets once a month.

In alignment with the GRM, 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 train religious leaders in SBCC and community mobilization to reduce malaria prevalence.
3. Develop in-country capacity, within the NMCP and PMI implementing 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 door-to-door, interpersonal malaria SBCC activities through community volunteers.

PMI has also provided central level capacity building for SBCC to the NMCP and to the *Departamento de Promoção da Saúde* (DEPROS- Health Promotion Department) 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 meetings. With PMI support, the NMCP finalized its branding strategy, which consists of a slogan ("Malaria Out! Protected and Strong Families") with a logo representing a family.

In addition to these SBCC-specific activities, PMI has included SBCC messaging in the trainings and job aids that they provide to improve clinician and APE malaria case management, and MIP activities, as well as during training and mobilization efforts for quality implementation and acceptance of IRS and

ITNs. PMI and its partners have supported malaria-related SBCC activities and activities such as World Malaria Day events since 2007.

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 approved messages. With support from these platforms, 93 new Committee Health Councils were created and 163 group education sessions were carried out at the community-level, reaching a total of 356,367 people in 2014. Several media activities were also implemented, including the development and dissemination of radio spots in Portuguese and in the local language of each province. A total of six episodes of TV programs were broadcasted on the main television stations addressing issues related to ITN promotion and IPTp.

To strengthen its community-based SBCC activities, PMI also launched an integrated malaria and diarrhea prevention campaign in Nicoadala, in partnership with local authorities and other partners. The major objective of the campaign was to create awareness and provide an opportunity for the community to participate in the design and implementation of malaria interventions. The campaign involved several activities including a public march headed by the Nicoadala District Administrator, health fairs, distribution of ITNs, road-shows, radio programs and spots, door-to-door outreach, practical demonstrations of the correct use of ITNs, and video sessions followed by community dialogues. The messages focused mainly on promotion and use of ITNs, IPTp, and the need to promptly seek health care in cases of suspected malaria.

There has been important progress in some SBCC areas, including the development of a national malaria SBCC strategy in 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, malaria SBCC and appropriate malaria-related behaviors continue to be notable weaknesses in Mozambique. There remains limited technical capacity for SBCC at the NMCP and the coordination between the malaria program and DEPROS is weak.

Progress during the last 12-18 months

During the past year, 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 on an at-least monthly basis in late 2015 and this schedule has been sustained. The group recently reviewed the progress of the NMCP and its partners in meeting the goals and objectives of the SBCC and NMCP strategies. Key weaknesses have been identified and this process will inform the NMCP's development of its new strategic plan. One of PMI's SBCC partners has also begun development of a central repository of all malaria-related SBCC materials developed and/or in use in Mozambique to facilitate information sharing and harmonization of SBCC activities.

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 and support the central-level and policy SBCC progress described above and have begun implementation of SBCC activities at the provincial level.

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 activities in all provinces, including a large event in Nampula that was attended by the Minister of Health, the Governor of Nampula, and the US 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. As part of this effort, PMI and its SBCC partners have also led implementation of many of the campaign-related activities, including development and pre-testing of the campaign pamphlets, journalist fact sheets, radio spots, and song.

PMI has also conducted a mapping of SBCC interventions in Tete and Nampula and trained seven community-based organizations, including 36 community facilitators, on malaria diagnosis, prevention and treatment.

During the past fiscal year, PMI supported SBCC implementation in targeted districts in Zambézia, Nampula, Sofala, Inhambane, and Gaza provinces. A training of trainers was conducted for 71 religious leader trainers. As of May 2016, these leaders have commenced training of other religious leaders in their communities on malaria and how to effectively incorporate malaria messages into their sermons.

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.

Lastly, PMI continued to support one third-year Malaria PCV in Maputo to coordinate malaria-related activities implemented by the nearly 200 PCVs nationwide. This third year volunteer managed a malaria advisory committee comprised of 18 volunteers in provinces throughout the country. All PCVs were trained on malaria three times within their period of service and have been supported the uptake of positive malaria prevention and treatment behaviors within their communities, including ITN use, IRS acceptance, and early ANC attendance. For example, PCVs trained 2,023 community mobilizers in their communities on malaria SBCC. PMI-funded small project assistance grants have allowed PCVs to promote malaria messages through 12 training of trainers and workshops, health fairs, development of music videos, murals and blogs. Finally, PMI, through Peace Corps, formed a partnership with a local mobile phone company, Vodacom. Vodacom provides ITNs to be distributed in the villages where they work and also provides a platform for dissemination of malaria messages through mobile phones. PCVs have participated in 14 ITN distribution events with Vodacom-provided ITNs since November 2014.

Global Fund historically has provided limited support to community-based activities, but their investment is increasing in the context of the large-scale UCC of ITNs in 2016-17.

Plans and justification

With FY 2017 funding, PMI will work to strengthen the SBCC technical working group to consolidate SBCC materials and approaches, while also 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 TWG (e.g. frequency of meeting, implementation of World Malaria Day events) and through the development

and implementation of a revised SBCC strategy to support the new malaria strategic plan. Progress in these activities will be monitored through regular partner reporting

The SBCC package will be available to all malaria partners in the country to use and will contain standardized messages 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 contextually informed and the implementation will use the appropriate balance of mass media and interpersonal communication (IPC). The aim of these efforts will be to empower targeted populations to seek and use effective services to prevent and treat malaria effectively. This package will take advantage of all feasible channels and ensure that health care providers are also employed to act as channels for malaria messages.

PMI will focus its SBCC implementation in the two key provinces of Zambézia and Nampula through a mix of community level IPC, health care provider training, and suitable mass media activities. 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. 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 SBCC OR study described in the *OR* section.

PMI will continue its support for its faith-based SBCC partner to work in targeted districts in Zambézia, Nampula, Sofala, Inhambane, and Gaza provinces. This network of religious leaders and volunteers will provide religious center- and community-based malaria messaging.

PMI will continue to strengthen the quality of its SBCC activities to increase acceptance of the PMI-supported IRS program and has added an SBCC coordinator to manage these activities. 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.

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

Proposed activities with FY 2017 funding: ($1,645,000)

- *Central level coordination of SBCC activities:* Support to the SBCC technical working group to develop standardized malaria SBCC materials for use throughout Mozambique. ($200,000)
- *Provincial coordination and implementation of SBCC activities:* Working with provincial and district malaria focal points and local community groups to plan and implement SBCC campaigns in high burden provinces. ($1,000,000)
- *Support faith based community SBCC activities:* Working with faith-based organizations to target standardized malaria messages through faith based channels and community led activities. ($415,000)
- *Support to community activities:* Support to community-level malaria activity coordination and implementation by US Peace Corps volunteers. ($30,000)

6. Surveillance, monitoring, and evaluation

NMCP/PMI objectives

The 2012–2016 NMCP M&E plan is a tool for monitoring and evaluating the 2012–2016 NMSP. The M&E plan was developed in a participatory way by the NMCP SM&E technical working group, partners, and stakeholders. The objectives of the M&E plan are:

1. Guide the periodic tracking and documentation of the implementation of the MSP 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.

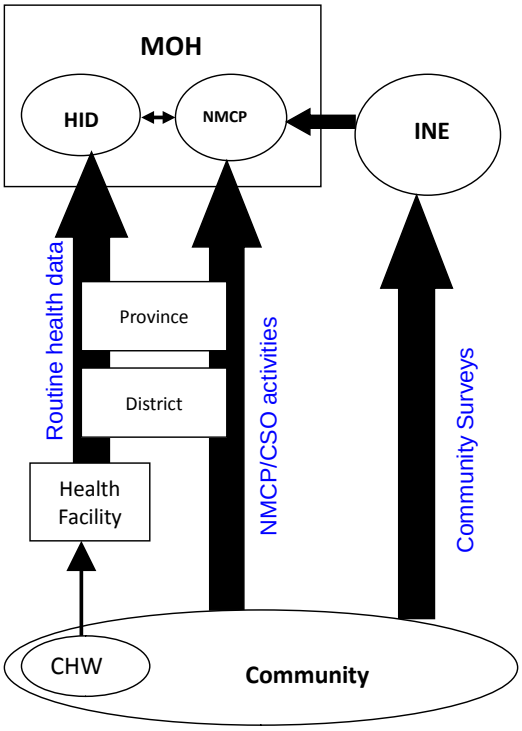
Sources of data and information include the routine health information system, integrated disease surveillance system, activity reports from the districts and implementing partners, periodic household and facility surveys, and operational research studies.

PMI's support to SM&E in Mozambique aligns with the NMCP's M&E plan. 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 the National Health Institute (also referred to as INS for *Instituto Nacional de Saúde*).

The M&E plan will be updated in the coming months to reflect the priorities of the new 2017-2021 NMSP, which is under development.

Figure 2. 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 M&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. Community surveys are not national surveys, but could be a local household survey carried out by the INE or others. These data flow from communities to INE where the data are then shared with the MoH. Unfortunately, there is no feedback loop at this time, but PMI is working to address this weakness.

Progress since PMI was launched

Routine Health Information System

The Health Management Information System (HMIS) has historically been 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 NMCP and has been replaced by a DHIS-2-based system called *Sistema de Informação para a Saúde–Monitoria e Avaliação* (SIS-MA). An interim 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 interim system extracted malaria-specific data from existing registers using parallel malaria data reporting forms. These forms were sent to malaria focal points at the district level. The district focal point then compiled the data and sent them to the malaria provincial supervisor, who entered the data into a malaria database. This database was then shared with the national level. Thus, the reports generated at the central level were based on three different sources: *Modulo Básico,* SIS-MA, and the malaria forms.

In 2014, PMI supported training of three NMCP M&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 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%.

Integrated disease surveillance system

In addition to the monthly DHIS-2 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). Malaria is one of ten notifiable diseases. However, confirmed and clinical cases are not reported separately on a routine basis, 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 - PMI supported a DHS that was undertaken in 2011. PMI has supported ITN universal coverage surveys. The first MIS was in 2007 and a Multiple Indicator Cluster Survey (MICS) occurred in 2008. A combined immunization, MIS and AIDS Indicator Survey was implemented in 2015.

End-Use Verification (EUV) Surveys - 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 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.

Capacity Building
In 2011, Malaria Control and Evaluation Partnerships in Africa placed an SM&E advisor in Mozambique to assist the NMCP and partners to better coordinate SM&E activities. The SM&E advisor played a central role in guiding the process of finalizing the M&E plan, as well as the National Malaria Policy and National Strategic Plan; however, this position no longer exists. PMI has also supported the participation of NMCP staff at malaria SM&E training in Ghana.

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 assure impact in the remaining period of the MSP 2012-2016. The MTR had four major conclusions:

1. Great strides have been made on malaria control and, if efforts are continued, the country will succeed in achieving 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 is planned for July 2016 to inform development of the new Malaria Strategic Plan.

Impact Evaluation
An impact evaluation was undertaken in Mozambique during 2014 and the report 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 5 years of age decreased from 152 to 97 during the same time period.

Progress during the last 12-18 months

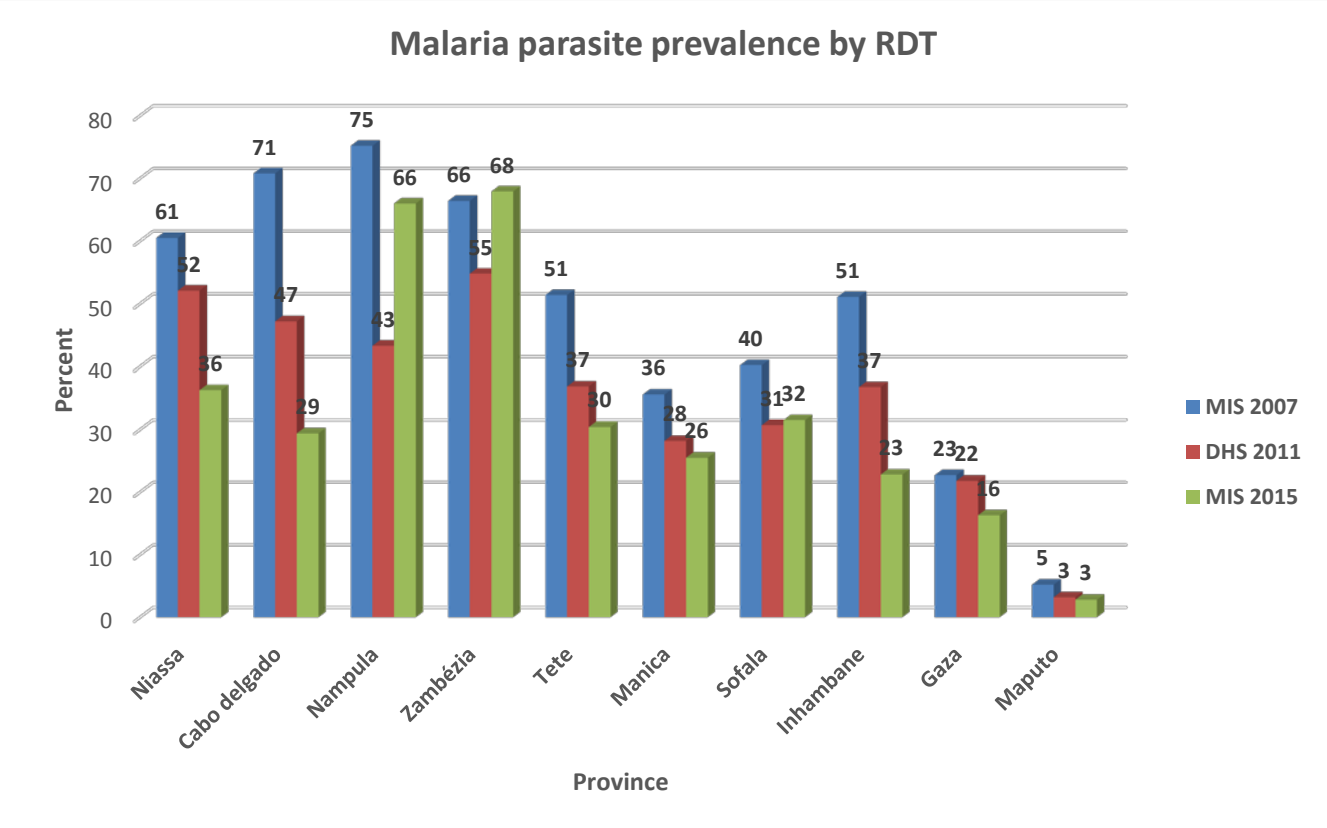
Routine Health Information System
The HMIS has now officially been transitioned from *Modulo Básico* to the SIS-MA (DHIS2) platform. There were, however, delays in the implementation of these activities and the transition was largely

implemented without direct PMI support. As of May 2016, 10 of 11 provinces had reported through the SIS-MA, including Zambézia and Nampula provinces. Completeness of the data reported through the SIS-MA remains a challenge, and thus, the reports generated at the central level still depend on three different sources: *Modulo Básico,* parallel malaria system, and SIS-MA. However, entry into *Modulo Básico* ended in May 2016 and it is expected that a complete transition will be finalized by the end of 2016. PMI support has focused on data use, particularly on using routine data to produce the annual report that included descriptions of epidemiological trends over the past three years. 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. PMI has provided M&E support for strengthening of routine data in 1-2 facilities in select districts. 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 roll out 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.

Surveys

National Level Surveys – Data collection for the joint IMASIDA was carried out between June and September, 2015. A key indicator report is currently being 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. Initial coverage results from the 2015 IMASIDA data have been described in the *progress on coverage* section. Figure 3 shows the progress in reducing malaria prevalence among children under five from 2007 to 2015 by province.

Figure 3: Malaria under-five parasite prevalence by province



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 March 2016. These data show a lot of improvement in the availability of ACTs, as only 2.5% of health facilities sampled were stocked out of all ACTs. Thirty five percent of health facilities had all presentations available. All the warehouses visited had at least one of the four presentations, indicating moderate availability at the provincial level. The EUV also reported a 13% stock out of RDTs. Case management indicators showed malaria accounting for 30% of cases seen, with 99% receiving a test (95% RDT and 4% microscopy). Children under the age of five years accounted for 62% of cases and all were treated with an ACT.

Table 14. Surveillance, Monitoring, and Evaluation Data Sources

Data Source	Activities	Year								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
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)
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)	(X*)
Entomology	Entomological surveillance and resistance monitoring	X	X	X	X	X	X	X	(X)	(X)
Net durability monitoring	ITN monitoring									(X)
Other Data Sources	Malaria Impact Evaluation				X					

( ) denotes planned activity
*Not PMI-funded

Table 15. Routine Surveillance Indicators

Indicators	Value	Comments
1. Total number of reported malaria cases	5,830,322	Weekly notifiable disease reporting database (BES)
Total diagnostically confirmed cases	5,830,322	This includes inpatient and outpatient cases (5,830,322) and by APEs (588,204).
Total clinical/presumed/ unconfirmed cases	0	All cases in the BES are considered confirmed cases
If available, report separately for outpatients and inpatients		
Outpatient number of reported malaria cases	5,744,537	
Diagnostically confirmed	5,744,537	
Clinical/presumed/unconfirmed	0	
Inpatient number of reported malaria cases	85,785	
Diagnostically confirmed	85,785	All cases are considered confirmed
Clinical/presumed/unconfirmed	0	
2. Total number of reported malaria deaths	2,465	Data source: BES
Diagnostically confirmed	2,465	
Clinical/presumed/unconfirmed	0	
3. Malaria test positivity rate (outpatients)	54%	Data source: provincial laboratory reports
Numerator: Number of outpatient confirmed malaria cases	7,718,782*	Includes 735,750 microscopy and 6,983,032 RDTs
Denominator: Number of outpatients receiving a diagnostic test for malaria (RDT or microscopy)	14,241,392	Includes 2,313,129 microscopy and 11,928,263 RDTs
4. Completeness of monthly health facility reporting	94%	Data source: BES
Numerator: Number of monthly reports received from health facilities	74,825	
Denominator: Number of health facility reports expected	79,920	

*The numerator to calculate TPR comes from provincial lab reports rather than the BES. The BES appears to be under reporting outpatient malaria cases.

Plans and justification

PMI/Mozambique will continue to support the NMCP SM&E plan through a combination of routine malaria data collected through the HMIS (SIS-MA platform), household surveys, health facility surveys, and information from partners.

With FY 2017 funding, PMI will continue to strengthen the routine malaria information system at the health facility, district, and provincial levels through the HMIS (SIS-MA). 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 high burden facilities in all districts of two targeted provinces (Zambézia and Nampula). Considerable effort will focus on improving the quality and completeness of malaria data from high volume health facilities and the full implementation of SIS-MA through enhanced supervision and feedback. In addition, PMI will support data use for program decision-making at the NMCP, DPS and DDS 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 health system strengthening section).

Finally, PMI will use FY 2017 funding to support the next MIS in Mozambique planned for 2018.

Proposed activities with FY 2017 funding: ($1,910,000)

- *Strengthen provincial and district HMIS:* Support provincial and district-level training and supervision of health facility, district, and provincial personnel on HMIS and SIS-MA and improve quality and completeness of malaria data in two provinces; and strengthen data use for program decision-making at all levels. ($1,000,000)
- *EUV Surveys:* Support the implementation of the quarterly EUV surveys in a sample of health facilities and medical stores. ($200,000)
- *Support 2018 MIS:* National household survey to measure progress in malaria control including intervention coverage and parasitemia. The support includes technical assistance and operational costs for the survey. ($700,000)
- *CDC SM&E Technical Assistance:* CDC TDY to provide technical support for SM&E activities. ($10,000)

8. Operational research

Table 16. 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	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

NMCP/PMI objectives

Operational research (OR) has been identified as a priority for the MoH. Specific guidelines for OR were developed at the national level, and general priority questions to be targeted for OR for each priority disease have been identified. The NMCP has the goal of first defining specific research priorities within each of its programmatic areas, and then secondly to define roles and responsibilities for the NMCP, INS, CISM, the OR center in Beira, and external partners, for each of these research areas.

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. Work with the MoH to define roles and responsibilities for malaria research in Mozambique; and
3. Support implementation of OR activities that focus on the NMCP's identified priority areas.

Progress since PMI was launched

The two primary local organizations conducting operational research on malaria in Mozambique are CISM and the INS. Historically, there were challenges with communication and sharing of priorities between the organizations. Although there are still obstacles that need to be overcome, with the initiation of pre-elimination activities by CISM in Maputo Province, more opportunities for addressing key OR questions now exist in the country.

A high-level MoH meeting was held in February 2014 to both 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.

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 protocol planning and development for a UNITAID co-funded, cost-effectiveness study of different vector control activities in one district of Zambézia. UNITAID will cover the costs of epidemiological data collection, as implemented by CISM, as well as entomological monitoring implemented by Abt Associates, while PMI will cover the operational costs of implementation of the IRS, as well as costs associated with routine health facility data strengthening. 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 (DALY) saved. It is expected to show the added benefit and cost associated with spraying a long-lasting, non-pyrethroid insecticide in areas with ITNs. This research question is closely aligned with NMCP priorities, particularly in the context of the new vector control strategy.

Plans and justification

PMI will continue to be involved with the planning and implementation of the UNITAID cost-effectiveness study if approved by the OR committee, and will use funding already allocated from FY 2015 and FY 2016 to support IRS implementation and strengthen routine health facility data in the study district of Mopeia in Zambézia Province.

With FY 2017 funds, PMI plans to fund one OR activity. This activity is a study of the cost-effectiveness of different SBCC interventions within two districts with persistently high malaria transmission in Zambézia or Nampula. It is anticipated that study implementation will last one year. It is well-established that SBCC is most effective when mass media activities are complemented by inter-personal communication 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 interventions will focus primarily on ITN use as all households will have recently received ITNs through the UCC, but other malaria behaviors will also be evaluated. Programmatic effectiveness will be determined by differences in ITN use and malaria parasitemia in the interventions groups pre- and post- intervention. Implementation costs will be prospectively collected and combined with evidence on programmatic effectiveness to determine intervention cost-effectiveness. The goal of this project is to guide PMI Mozambique and the NMCP on the appropriate balance and composition of SBCC programming to reduce malaria prevalence. This activity is in line with the NMCP's and PMI's identified priority OR area of collecting data to improve decision-making ability on SBCC.

Proposed activities with FY 2017 funding: ($250,000)

- SBCC cost-effectiveness study: OR study of the cost-effectiveness of different combinations of SBCC interventions. ($250,000)

9. 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, one or more Foreign Service Nationals (FSNs) work as part of the PMI team. All PMI staff members are part of a single interagency team led

by the USAID Mission Director or his/her designee in country. The PMI team shares responsibility for development and implementation of PMI strategies and work plans, coordination with national authorities, managing collaborating agencies and supervising day-to-day activities. Candidates for RA positions (whether initial hires or replacements) will be evaluated and/or interviewed jointly by USAID and CDC, and both agencies will be involved in hiring decisions, with the final decision made by the individual agency.

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

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

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

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

Proposed activities with FY 2017 funding: ($1,575,000)

- Support for two Foreign Service national malaria advisors, an administrative assistant and other Mission related costs. ($1,000,000)
- 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 2017

Mechanism	Geographic Area	Activity	Budget ($)	%
GHSC-PSM	National	Procurement of ITNs	3,456,000	46%
	National	Distribution of ITNs	2,100,000	
	National	Procurement of SP	450,000	
	National	Procurement of RDTs	1,920,000	
	National	Procurement of ACTs	4,390,000	
	National	Supply chain strengthening	900,000	
	National	End-use verification	200,000	
TBD IRS	Zambézia	Entomological monitoring in Zambézia	500,000	24%
	National	Support to national and provincial government for entomologic monitoring	250,000	
	Zambézia	IRS implementation	6,000,000	
	National	Support to national government IRS program	300,000	
TBD Malaria Bilateral	Zambézia and Nampula	Durability monitoring	100,000	18%
	National	ANC support central level	200,000	
	Zambézia and Nampula	ANC training and supervision in Zambézia and Nampula	500,000	
	National	Central level case management support and training	200,000	
	Zambézia and Nampula	Provincial, district, and health center case management support and training	1,000,000	
	Zambézia and Nampula	Laboratory quality assurance at provincial level	250,000	
	Zambézia and Nampula	Provincial level capacity building	500,000	
	National	Strengthen technical capacity and program management NMCP	295,000	
	National	Central level coordination of SBCC activities	200,000	
	Zambézia and Nampula	Provincial level coordination of SBCC activities	1,000,000	
	Zambézia and Nampula	Strengthen provincial and district HMIS	1,000,000	
VectorWorks	National	ITN distribution TA	100,000	0.3%

USP / PQM	National	Strengthen regulatory authority on drug surveillance	100,000	0.3%
PIRCOM	National	Faith-based community SBCC activities	415,000	1.4%
Peace Corps	National	Support to community activities	30,000	0.1%
TBD DHS	National	Support MIS 2018	700,000	2.4%
TBD Research	Zambézia and Nampula	SBCC cost-effectiveness study	250,000	0.9%
CDC IAA	National	CDC technical assistance on entomology activities	29,000	0.1%
	National	CDC SM&E technical assistance	10,000	0.0%
	National	FELTP support	80,000	0.3%
	National	Staffing and administration	575,000	2.1%
USAID	National	Staffing and administration	1,000,000	3.4%
Total			**29,000,000**	**100%**

Table 2: Budget Breakdown by Activity

President's Malaria Initiative–MOZAMBIQUE
Planned Malaria Obligations for FY 2017

Proposed Activity	Mechanism	Budget ($)		Geographic Area	Description
		Total	Commodity		
PREVENTIVE ACTIVITIES					
VECTOR MONITORING AND CONTROL					
Entomologic monitoring and insecticide resistance management					
Entomological monitoring in Zambézia	TBD IRS	500,000		Zambézia	Support entomological monitoring activities in PMI IRS districts in Zambézia Province and continued laboratory support at the central level for mosquito processing and analysis.
Support to national and provincial government for entomologic monitoring	TBD IRS	250,000		National	Support for the national government entomological program for the current 21 established sentinel sites and enhanced capabilities in Nampula Province consistent with the national integrated vector control strategy.
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		779,000	0		
Insecticide-treated Nets					

Procurement of ITNs	PSM	3,456,000	3,456,000	National	Procurement of approximately 1,200,000 ITNs for continuous distribution through routine ANC services and a school distribution pilot.
Distribution of ITNs	PSM	2,100,000		National	Distribution costs for 1,200,000 ITNs from the port-of-entry to provincial level warehouses (national), from provincial warehouses to district-level warehouses (Nampula, Zambézia and Cabo Delgado) and from district warehouse to health facilities (Nampula and Zambézia)
ITN distribution TA	VectorWorks	100,000		National	TA will be provided for the school-based pilot distribution of 10,000 ITNs in one district and for planning ITN continuous distribution.
Durability monitoring	TBD Malaria Bilateral	100,000		Nampula or Zambézia	Implementation of routine durability monitoring of ITNs
Subtotal ITNs		5,756,000	3,456,000		
Indoor Residual Spraying					
IRS implementation	TBD IRS	6,000,000		Zambézia	Implementation costs for IRS activities to cover approximately 440,000 structures. While currently planned for Zambézia, the updated national integrated vector control strategy may necessitate a shift in geographic focus. All insecticide (organophosphate) will be covered by Global Fund.
Support to national government IRS program	TBD IRS	300,000		National	Support for training of trainers to supervise MoH IRS implementation and environmental compliance activities
Subtotal IRS		6,300,000	0		

SUBTOTAL VECTOR MONITORING AND CONTROL		12,835,000	3,456,000		
Malaria in Pregnancy					
Procurement of SP	PSM	450,000	450,000		Procurement of 2,500,000 treatments of SP
ANC support central level	TBD Malaria Bilateral	200,000		National	Support to the central level planning and coordination of MIP activities, particularly its continuing integration into standard ANC packages
ANC training and supervision in Zambézia and Nampula	TBD Malaria Bilateral	500,000		Zambézia and Nampula	Concerted provincial, district and facility level support for the improvement of service delivery of key MIP interventions. To be coordinated with other provincially focused activities to improve supervision, monitoring and performance improvement of MIP services in two target provinces.
Subtotal Malaria in Pregnancy		1,150,000	450,000		
SUBTOTAL PREVENTIVE		13,985,000	3,906,000		
CASE MANAGEMENT					
Diagnosis and Treatment					
Procurement of RDTs	PSM	1,920,000	1,920,000	National	Procurement of 6 million single-species RDTs. Commodities to be pooled and distributed nationally.

Procurement of ACTs	PSM	4,390,000	4,390,000	National	Procurement of 4 million treatments of the national first-line antimalarial (artemether-lumefantrine). Commodities to be pooled and distributed nationally.
Central level case management support and training	TBD Malaria Bilateral	200,000		National	Central level support for appropriate case management and laboratory diagnostics
Provincial, district, and health center case management support and training	TBD Malaria Bilateral	1,000,000		Zambézia and Nampula	Concerted 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.
Laboratory quality assurance at provincial level	TBD Malaria Bilateral	250,000		Zambézia and Nampula	Concerted provincial, district and facility support for laboratory quality assurance
Subtotal Diagnosis and Treatment		7,760,000	6,310,000		
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

Strengthen regulatory authority on drug surveillance	USP / PQM	100,000		National	Strengthen the national Pharmaceutical Department's capacity for drug quality control including the procurement of necessary equipment and supplies. Support will include deployment and use of minilabs for field testing of drugs.
Subtotal Pharmaceutical Management		1,000,000	0		
SUBTOTAL CASE MANAGEMENT		8,760,000	6,310,000		
HEALTH SYSTEM STRENGTHENING / CAPACITY BUILDING					
Provincial level capacity building	TBD Malaria Bilateral	500,000		Zambézia and Nampula	Support in two 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	80,000		National	Support for two FELTP residents
Strengthen technical capacity and program management NMCP	TBD Malaria Bilateral	295,000		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
SUBTOTAL HSS & CAPACITY BUILDING		875,000	0		

SOCIAL AND BEHAVIOR CHANGE COMMUNICATION					
Central level coordination of SBCC activities	TBD Malaria Bilateral	200,000		National	Support to the NMCP Communications Working Group to develop core SBCC materials. This activity will develop a national level package for use my all malaria partners in the country.
Provincial level coordination of SBCC activities	TBD Malaria Bilateral	1,000,000		Zambézia and Nampula	Adaptation and implementation of the national level SBCC materials in Nampula and Zambézia. This includes radio programming, incorporation of malaria awareness in school programming and capacity-building of community structures for malaria SBCC.
Faith-based community SBCC activities	PIRCOM	415,000		National	Support to the PIRCOM community-level SBCC networks to carry out malaria-related IPC activities.
Support to community activities	Peace Corps	30,000		National	Support for two third-year Peace Corps volunteers to coordinate PCV malaria prevention activities at community level. Includes funding for SPA grants to support these activities.
SUBTOTAL SBCC		1,645,000	0		

SURVEILLANCE, MONITORING, AND EVALUATION					
Strengthen provincial and district HMIS	TBD Malaria Bilateral	1,000,000		Zambézia and Nampula	Working with provincial and district 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	200,000		National	Implementation of EUV and development of EUV reports from supply chain data collected throughout the country
Support MIS 2018	TBD DHS	700,000		National	Nationwide household survey to determine progress against PMI indicators, including collection of intervention coverage and parasitemia
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		1,910,000	0		
OPERATIONAL RESEARCH					
SBCC cost-effectiveness study	TBD Research	250,000		Nampula or Zambézia	In light of the need to optimize SBCC resources to enhance malaria prevention in PMI focal provinces, this OR study will determine the cost-effectiveness of different combinations of SBCC interventions (mass media and interpersonal communication), as determined by malaria-related prevention behaviors and parasitemia and prospective micro-costing of the interventions

SUBTOTAL OR		250,000	0		
IN-COUNTRY STAFFING AND ADMINISTRATION					
USAID		1,000,000			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		1,575,000	0		
GRAND TOTAL		**29,000,000**	10,216,000		