

This Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. The final funding available to support the plan outlined here is pending final FY 2019 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



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PRESIDENT'S MALARIA INITIATIVE

TANZANIA

Malaria Operational Plan FY 2019

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ABBREVIATIONS AND ACRONYMS

ACD	Active case detection
ACT	Artemisinin-based combination therapy
ADDO	Accredited drug dispensing outlet
AL	Artemether-lumefantrine
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
CDC	U.S. Centers for Disease Control and Prevention
CHMT	Council Health Management Team
CHW	Community Health Worker
DHIS2	District Health Information System 2
DHMT	District Health Management Team
DMSO	District Malaria Surveillance Officers
DQA	Data quality audit
eIDSR	Electronic Infectious Disease Surveillance and Response
eLMIS	Electronic Logistics Management Information System
EPI	Expanded Program on Immunizations
EUV	End-use verification
FANC	Focused antenatal care
FELTP	Field Epidemiology and Laboratory Training Program
FSN	Foreign Service National
FY	Fiscal year
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GoT	Government of Tanzania
HCW	Health care worker
HIM	Health Information Mediator
HIS	Health Information System
HMIS	Health Management Information System
HSS	Health systems strengthening
IDSR	Infectious disease surveillance and response
ILS Gateway	Integrated Logistic System Gateway
IPRS	Implementing Partner Reporting System
IPTp	Intermittent preventive treatment in pregnant women
IRS	Indoor residual spraying
IT	Information Technology
ITN	Insecticide-treated mosquito net
LMU	Logistics Management Unit
M&E	Monitoring and evaluation
MCH	Maternal and child health
MCN	Malaria Case Notification System
MEEDS	Malaria Epidemic Early Detection System
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MoH	Ministry of Health
MOHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MOP	Malaria Operational Plan
mRDT	Malaria rapid diagnostic test

MSD	Medical Stores Department
MSDQI	Malaria Service and Data Quality Improvement project
NHLQATC	National Health Laboratory and Quality Assurance Training Center
NIMR	National Institute for Medical Research
NMCP	National Malaria Control Program
OR	Operational research
OTSS	Outreach training and supportive supervision
PBO	Piperonyl butoxide
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PCR	Polymerase chain reaction
PCV	Peace Corps volunteer
PMI	U.S. President's Malaria Initiative
PO-RALG	President's Office – Regional Administration and Local Government
QA/QC	Quality assurance/quality control
RA	Resident Advisor
RBM	Roll Back Malaria
RCH	Reproductive and child health
SBCC	Social and behavior change communication
SM&E	Surveillance, monitoring and evaluation
SNP	School net program
SP	Sulfadoxine-pyrimethamine
SPA/TSPA/SPAm	Service Provision Assessment/Tanzanian Service Provision Assessment/Service Provision Assessment for Malaria
TA	Technical assistance
TDHS	Tanzania Demographic and Health Survey
TES	Therapeutic efficacy study
THMIS	Tanzania HIV and Malaria Indicator Survey
TNVS	Tanzania National Voucher Scheme
TWG	Technical working group
UCC	Universal coverage campaign (of ITNs)
USAID	U.S. Agency for International Development
WHO	World Health Organization
ZAMEP	Zanzibar Malaria Elimination Program

I. EXECUTIVE SUMMARY

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

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

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

Tanzania began implementation as a PMI focus country in Fiscal Year (FY) 2006.

This FY 2019 Malaria Operational Plan (MOP) presents a detailed implementation plan for Tanzania, based on the strategies of PMI and the National Malaria Control Program (NMCP), and the Zanzibar Malaria Elimination Program (ZAMEP). It was developed in consultation with the NMCP/ZAMEP 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 Tanzania, describes progress to date, identifies challenges and unmet needs to achieving the targets of the NMCP/ZAMEP and PMI, and provides a description of activities that are planned with FY 2019 funding.

The proposed FY 2019 PMI budget for Tanzania is \$38 million. PMI will support the following intervention areas with these funds:

Entomologic monitoring and insecticide resistance management: PMI continues to support routine entomologic monitoring on Mainland and Zanzibar consisting of: (1) yearly monitoring of resistance to insecticides used for vector control; (2) monthly cone bioassay monitoring of residual insecticidal activity on sprayed walls in the Lake Zone and Zanzibar; and (3) Monitoring of vector species abundance and distribution, resting behavior, and sporozoite rates at established sentinel sites both on the Mainland and Zanzibar.

Insecticide-treated nets (ITNs): The second ITN universal coverage campaign (UCC) for the Tanzania Mainland, delivering over 27 million ITNs to 22 of the 25 malaria endemic regions, began in mid-2015 and ended in early 2017. PMI procured ITNs covering two regions, with the remainder procured through Global Fund and the U.K Department for International Development. As a means of sustaining universal coverage on the Mainland, PMI is supporting continuous delivery channels, two through the routine health service delivery and an annual delivery through primary schools in 14 regions of Tanzania with the highest prevalence of malaria.

With support from the U.K. Department for International Development, Global Fund, and PMI, Zanzibar completed its second UCC, distributing about 702,000 ITNs between April and July 2016. Zanzibar adopted a continuous approach that includes ITN delivery through community-based, health-facility-based (antenatal care and vaccination clinic) channels. More than 370,000 ITNs were delivered through the continuous distribution approaches between June 2014 and July 2016. In April 2018, the continuous distribution approach was relaunched with modification, based on findings from a 2016 PMI supported evaluation, to improve uptake, availability, and accountability of ITNs.

In the 14 regions of Tanzania with the highest prevalence of malaria, with FY 2019 funds PMI will procure and support the distribution of more than 3.1 million ITNs through the school net program (SNP) and will support delivery of another 2.6 million ITNs procured by Global Fund through antenatal care (ANC) and expanded program on immunizations (EPI). This will include 95,000 piperonyl butoxide (PBO) synergists ITNs for delivery through SNP in Muleba district, Kagera. For Zanzibar, PMI will procure 154,077 ITNs and support distribution of a total of 208,000 ITNs through the community-based channel. Global Fund will procure 180,000 ITNs to make up the balance needed for the community-based delivery and all ITNs needed for the reproductive child health (RCH) channels. For both Mainland and Zanzibar PMI will monitor ITN coverage in order to project the future ITN needs, ensure accountability, and populate the Chandarua Kliniki dashboard.

Indoor residual spraying (IRS): The NMCP Strategic Plan 2015-2020 calls for application of quality non-pyrethroid IRS in selected areas. Over the period 2016 to 2018 PMI has supported annual spraying of between about 420,000 and 600,000 structures in the Lake Zone, protecting about 2 million inhabitants each year. The *Zanzibar Malaria Elimination Strategic Plan IV 2018/19-2022/23* calls for an increase in appropriate vector control measures to the population at risk of malaria to 100 percent by 2023. The goal for IRS is to perform spraying in targeted areas which have an annual malaria incidence of >1 case/1000 population or in areas where entomological investigation in malaria foci indicates the need for IRS intervention.

The target for IRS in 2019 on the Mainland was slightly reduced and the population coverage was set at about 1.8 million protected in areas where there is relatively high malaria annual incidence and

pyrethroid resistance has been detected. For Zanzibar, IRS in 2018 was supported by both Global Fund and PMI and coverage increased from about 40,000 to over 67,000 structures. The target for 2019 and 2020 was set at about 40,000 structures in hot spot areas. With FY 2019 funding, PMI will support IRS spray campaigns in late 2019 and early 2020 in both mainland Tanzania and Zanzibar, covering approximately 450,000 and 40,000 structures respectively. PMI and Tanzania partners will continue to monitor this situation and will utilize the latest tools available for determining resistance to pyrethroid and WHO recommended non-pyrethroid insecticides to guide future decisions on choice of insecticides.

Malaria in pregnancy (MIP): Mainland implements the three-pronged approach to prevent the adverse effects associated with malaria in pregnancy recommended by the WHO: 1) ITNs through ANC clinics, 2) IPTp with sulfadoxine-pyrimethamine (SP), and 3) prompt case management of pregnant women with malaria. The objectives are to achieve 80 percent coverage of two doses of IPTp, and 60 percent of more than three doses of IPTp, 85 percent use of ITNs by pregnant women, and 100 percent prompt case management of malaria infections in pregnancy. The targets in the *Zanzibar Malaria Strategic Plan IV 2018 – 2022/23* are to increase the use of long-lasting ITNs among pregnant women from 68 percent in 2016 to 95 percent in 2022/23 through facility-level distribution of ITNs to pregnant women at their first ANC clinic visit. ZAMEP dropped the intermittent screen and treat strategy and plans to focus on strengthening malaria case management for pregnant women including screening for symptoms, timely diagnosis and treatment, and effective referral.

In 2017, PMI supported NMCP in leveraging existing districts Council Health Management Teams (CHMTs), prevention of mother-to-child transmission of HIV, and reproductive, maternal, newborn, and child health platforms to train staff and improve quality of MIP services through the NMCP quality improvement package, Malaria Services and Data Quality Improvement project (MSDQI), in all seven regions of Lake Zone (1,817 health facilities) and four regions of Southern Zone (1,141 health facilities). This standardized package is used in health facilities to observe diagnostic and treatment practices of providers at ANC. Facilities with low performance are targeted for supportive supervision and mentorship, and performance is monitored using data from the MSDQI package and the District Health Information System 2 (DHIS2). These projects will also perform quarterly tracking of SP stocks at health facilities and conduct feedback meetings with Regional and District Health Management Teams to improve SP availability. Zanzibar continued with implementation of the ITN continuous distribution through EPI and ANC clinics (more details on ITNs section). NMCP, in collaboration with the MIP task force, has been working to update the focused antenatal care (FANC) guidelines to include the 2016 WHO recommendations that call for a minimum of eight contacts with a health provider. In Zanzibar, discussions are expected to start in mid-2018. PMI will support the roll out of these revised ANC guidelines in both Mainland and Zanzibar. PMI also supported ZAMEP to review the diagnostic and treatment guidelines to include the MIP chapter. The strategies in the prevention of malaria in pregnancy are integrated in the overall ANC package for health. They include provision of prompt testing of suspected cases and treatment of malaria positive cases. The guidelines are expected to be finalized by the end of calendar year 2018. PMI will support the rollout of these new guidelines.

Case management: The goal of the malaria control strategy in Tanzania is to achieve and maintain universal access to high quality malaria diagnostic testing and treatment in both public and private health facilities. Since 2006, PMI has supported both the mainland Tanzania and Zanzibar to (1) procure and implement malaria rapid diagnostic tests (mRDT) testing in public health facilities; (2) improve the testing performance of both malaria microscopy and mRDT via trainings and supportive supervision; (3) disseminate revised diagnosis and treatment guidelines; (4) procure ACTs and injectable artesunate for

treatment of severe malaria; and (5) improve supply chain management. In addition, PMI continues to fund drug efficacy monitoring to verify that *in vivo* efficacy of ACT remains high.

With FY 2019 funds, PMI will continue to support mRDT and microscopy quality assurance and quality control systems, including support of the national slide bank on the mainland and in Zanzibar. PMI will support the NMCP to improve case management of malaria and will support facility-based provision of integrated health services for improved malaria diagnosis and treatment through the MSDQI package. PMI will continue to provide support for training on proper use of ACT and adjunctive treatment with single low-dose primaquine in Zanzibar, and strengthening of pharmaceutical management and the supply chain system in both mainland and Zanzibar.

Social and behavior change communication (SBCC): PMI's SBCC investments support NMCP and ZAMEP behavioral objectives such as correct and consistent ITN use, ITN care, ANC attendance, IPTp uptake, prompt care seeking, and adherence to national case management and MIP guidelines. PMI provides support for developing and disseminating key messaging for the following campaigns and initiatives: (1) testing and treatment under the Not Every Fever is Malaria Campaign; (2) prevention and treatment of malaria in pregnancy under the Safe Motherhood Campaign; (3) the school net program; (4) health facility based ITN distribution; and (5) the Malaria Safe initiative to engage private companies in promoting malaria prevention and control for their employees and communities. In addition, PMI supports the community activities platform to directly reach nearly 1 million people with messages on proper net use, care and repair; adherence to diagnostic testing results and treatment; IRS; and MIP. In Zanzibar, PMI supports ZAMEP's SBCC unit to communicate messages on imported malaria cases, active case detection and response, and continuous net distribution.

SBCC efforts in FY 2019 will continue to focus on malaria case management, the IPTp3+ roll out, health facility-based ITN distribution, school net distribution, and IRS. SBCC efforts through mass media and interpersonal communication will also focus on engaging communities to work together to ensure households are accessing, using and caring for their nets as well as accessing health facilities for testing and treatment, and MIP services. Based on malaria stratification, SBCC messaging and interventions will be tailored to respond to each region and district's unique situation. In Zanzibar, PMI will continue to support the ZAMEP SBCC unit and the communication campaigns for imported malaria cases, continuous distribution of nets, and to support the case detection and response teams with messages to promote preventive measures and prompt care-seeking.

Surveillance, monitoring and evaluation (SM&E): Key SM&E objectives of the malaria strategy on mainland Tanzania are to improve reporting of malaria indicators through the health management information system (HMIS), have a well-functioning malaria epidemic detection system, monitor and evaluate malaria control activities through periodic surveys, and promote the use of malaria data for evidence-based decision-making. In Zanzibar, the SM&E priority objective is to develop the malaria surveillance capacity to detect and investigate 100 percent of confirmed malaria cases in order to facilitate malaria elimination goals. PMI has extensively supported the NMCP to expand and improve HMIS and DHIS2, and the Infectious Disease Surveillance and Response (IDSR) systems on mainland Tanzania. It also supports the Malaria Epidemic Early Detection System (MEEDS) and malaria case notification (MCN) in Zanzibar. In addition, PMI contributed substantial funding to several nationwide, periodic surveys including the most recent (2015/2016) Tanzania Demographic and Health Survey (TDHS) and 2017 Tanzania Malaria Indicator Survey (TMIS). With FY 2019 funding, PMI will coordinate with the Global Fund to improve quality, completeness, and timeliness of malaria indicators within HMIS. PMI will continue to successfully build upon lessons learned to strengthen data quality

through routine system strengthening and data management within NMCP to collect, store, analyze, display, and disseminate information for decision making. In Zanzibar, PMI will continue to support the maintenance of critical SM&E capacities needed for malaria elimination through support of MEEDS and the MCN outbreak response system. In addition, PMI will provide funds to the NMCP and ZAMEP to conduct and oversee integrated supportive supervision and to coordinate technical working groups (TWGs) for all malaria control interventions.

Operational research (OR): PMI is currently supporting four active OR studies and following up on a study to identify motivators and existing barriers to ITN care and repair in Tanzania that was completed in 2016. A poster on this work was presented at the 2017 Annual Meeting of the American Society Tropical Medicine and Hygiene and a manuscript has been submitted to a peer-reviewed journal. Of the four ongoing studies one is exploring the relationship between ITN damage, insecticide concentration, and feeding inhibition in susceptible and resistant vectors in semi- field trials. A second study is investigating the magnitude of residual transmission on Zanzibar and characterizing where and when it occurs, including the main anthropological determinants. A third study is evaluating the effectiveness and costs of the malaria surveillance and response system in Zanzibar. Another study is determining the concurrence of telephone-based surveys with household surveys for monitoring ITN coverage. All OR studies are expected to be completed by the end of 2018.

Other health systems strengthening (HSS): PMI and other maternal and child health (MCH) partners support the NMCP and ZAMEP to build and strengthen health systems to ensure maternal and child health efforts are sustainable, country owned, and integrated into the overall health system. By supporting health systems interventions, PMI, NMCP, ZAMEP, and partners aim to continue progress in the achievement of malaria control objectives and to sustain malaria control gains as Tanzania moves towards elimination. In particular, in alignment with the WHO HSS building blocks, PMI has prioritized support in the following areas: 1) addressing critical health workforce shortages by improving recruitment, deployment, and retention systems for health workers; 2) improving the availability of needed skills in the workforce to lead malaria control efforts by strengthening the capacity of staff at the NMCP and ZAMEP; 3) reducing drug stock outs by improving supply chain management and commodity forecasting, procurement, and distribution; 4) decreasing donor dependency for financing of malaria control efforts through innovative domestic resource mobilization activities and public private partnerships; 5) strengthening accountability and management for delivery of health services; and 6) improving data for decision-making by supporting the rollout, scale-up, and improvement of routine information systems including HMIS and electronic logistics management information systems (eLMIS).

With FY 2019 funds, PMI will provide support for the provision of high quality malaria services and to supply chain actors for on time provision of key malaria commodities. To ensure success PMI will support activities to improve distribution and allocation of human resources for health and governance for health and development, and ultimately to increase domestic financing for health. In addition, PMI will continue to support the NMCP and ZAMEP in capacity strengthening activities and provide support for the Tanzania Field Epidemiology and Laboratory Training Program (FELTP) and Peace Corps continues to support activities to enable Peace Corps Volunteers to effectively engage their host communities in malaria prevention and control efforts.

II. STRATEGY

1. Introduction

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

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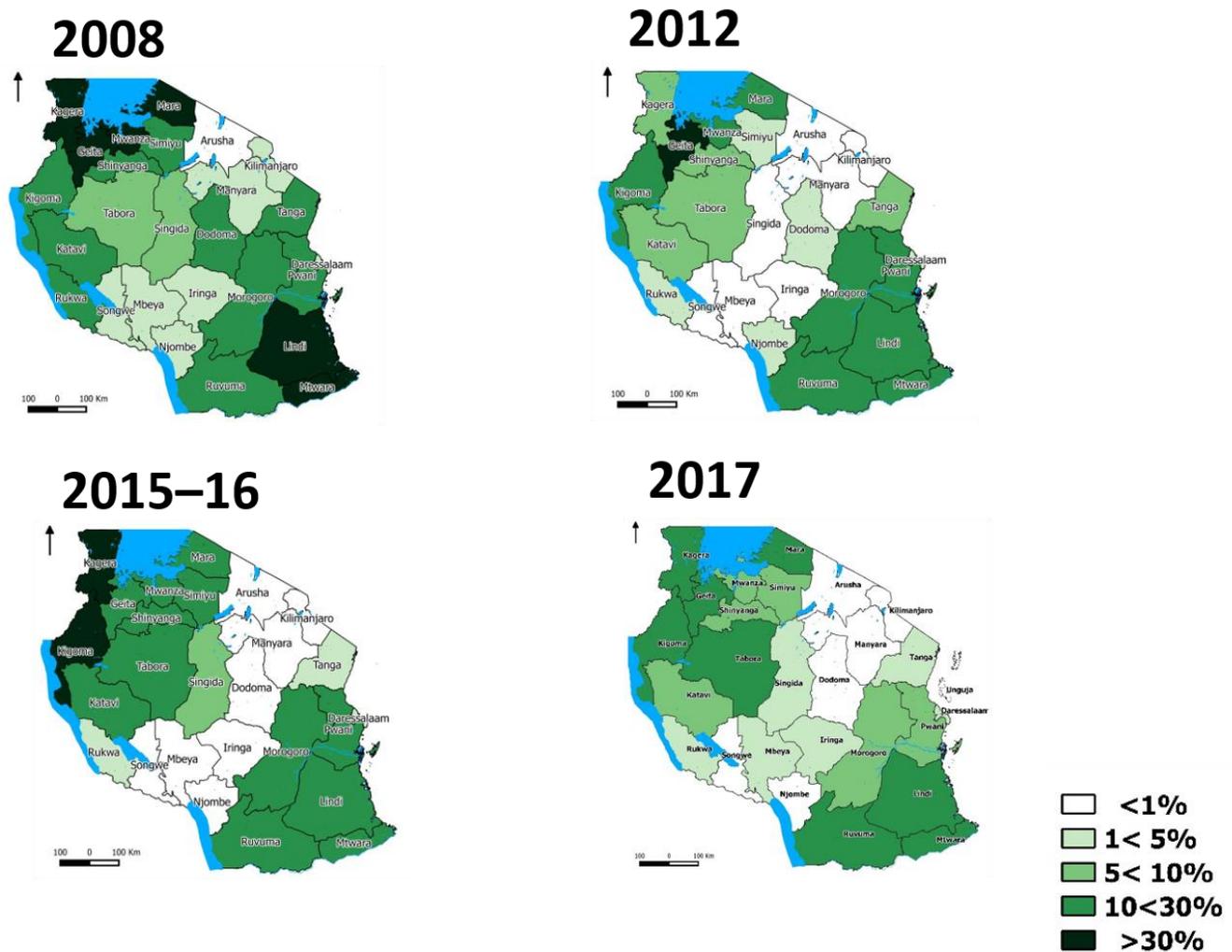
unmet needs to achieving the targets of the NMCP/ZAMEP and PMI, and provides a description of activities that are planned with FY 2019 funding.

2. Malaria situation in Tanzania

a. Mainland

Ninety-three percent of the population on the Mainland lives in areas where malaria is transmitted. Unstable seasonal malaria transmission occurs in approximately 20 percent of the country, while stable malaria with seasonal variation occurs in another 20 percent. The remaining malaria endemic areas in Tanzania (60 percent) are characterized as stable perennial transmission. *Plasmodium falciparum* accounts for 96 percent of malaria infection in Tanzania, with the remaining four percent due to *P. malariae* and *P. ovale*.

Figure 1. Malaria Prevalence in Children by Region



Source: THMIS/TDHS/MIS

The principal vectors of malaria in Tanzania are mosquitoes of the *Anopheles gambiae* complex (*An. gambiae* s.s. and *An. arabiensis*), and more recently, *An. funestus*. *An. arabiensis* represented 65

percent of the vector population in the Lake Zone in 2016 collections, with *An. funestus* at 17 percent and *An. gambiae* s.s. at 15 percent.

The 2015-2016 Tanzania demographic and health survey (DHS)/malaria indicator survey (MIS) showed that 14 percent (via malaria rapid diagnostic test (mRDT)) and six percent (via microscopy) of Mainland children under five years of age had tested positive for malaria, up from the 2011-2012 Tanzania HIV/AIDS Malaria Indicator Survey (THMIS) (nine percent and four percent, respectively) but still below 18 percent in the 2007-08 THMIS. Prevalence varied by region from <1 percent in the highlands of Arusha to as high as 41 percent along the Lake Victoria shores (Figure 1). Although the overall prevalence rose between the two most recent surveys, the number of regions with prevalence of <1 percent increased from six to seven and those with >25 percent decreased from four to three, as compared with results from the THMIS 2011-12. An estimated 6.5 million confirmed and clinical outpatient malaria cases were reported in 2016, 2.7 and 3.8 million cases for under-five and above five years of age, respectively. Inpatient malaria deaths in 2016 were reported at just over 5,000. Tanzania registered a 45 percent reduction in all-cause under-five mortality from 146/1000 live births in 1999 (TDHS 1999) to 67/1000 live births in 2015 (TDHS 2015-16).

Preliminary results from the 2017 TMIS key indicator report showed that 7.3 percent of children under five years of age in mainland Tanzania and Zanzibar had tested positive for malaria by mRDT, down from the 2011-2012 THMIS (9 percent) and 2015-2016 TDHS-MIS (14 percent). Prevalence varied by region from <1 percent in the highlands of Arusha to as high as 15 percent in the Southern Zone and 24 percent along the Lake and Western Zones. The full final 2017 MIS report should be released by August 2018.

Table 1. Infant and Under-Five Mortality Rates for Five-Year Periods Preceding Nationwide Household Surveys, Tanzania

	1999 TDHS	2004-05 TDHS	2007-08 THMIS	2009-10 TDHS	2015-16 TDHS-MIS
Infant Mortality Rate	99	68	58	51	43
Under-Five Mortality Rate	147	112	91	81	67

The trend analysis of 1999-2012 demographic surveys shows that the under-five mortality decline was greater in rural areas compared to urban areas, and more in medium to high malaria risk areas, indicating that interventions are reaching the poor and the more at-risk populations (January 2012 Roll Back Malaria report *Progress and Impact Series: Focus on Mainland Tanzania*; June 2012 [Evaluation of the Impact of Malaria Interventions on Mortality in Children in Mainland Tanzania](#)).

b. Zanzibar

The malaria burden in Zanzibar has remained low over the past several years, with a positivity rate in those seeking treatment at 1.2 percent in 2017. Incidence in 2017 was reported at 2.7 per 1,000 population. The number of total malaria cases increased from 3,025 in 2016 to 4,126 in 2017, with five malaria deaths reported in 2017.

The 2015-2016 Tanzania DHS/MIS showed a malaria prevalence in Zanzibar of 0.0 percent by mRDT and 0.7 percent by microscopy.

High coverage of ITNs and IRS has resulted in a shift in the malaria vector population from *An. gambiae* s.s. to predominantly *An. arabiensis* and reflects the predominant outdoor biting pattern observed on both Pemba and Unguja. Recently, *An. funestus* and *An. merus* have been on the rise in parts of both islands of Zanzibar.

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

Two separate Ministries of Health operate in the United Republic of Tanzania, one for the Mainland and one for Zanzibar. Each Ministry has its own malaria control program and malaria strategic plan. The NMCP serves the Mainland, while the ZAMEP serves Zanzibar.

a. Mainland

The NMCP is led by a program manager and is organized into five strategic components: (1) malaria diagnosis, treatment, preventive therapies, and vaccines; (2) integrated vector control; (3) promotion of malaria prevention and curative services through information, education, and communication; (4) surveillance, monitoring and evaluation; and (5) program management, partnership development, and resource mobilization.

To support their work, the NMCP has established several committees to coordinate and direct national malaria control policies and priorities. A National Malaria Steering Committee, with input from two technical sub-committees (vector control and case management) and several working groups, provides governance on all strategic decisions concerning malaria control in the country. The ITN strategies and policies are coordinated through the National Insecticide-Treated Nets Program. A diagnostics and case management working group guides NMCP policies and strategies for strengthening and expanding malaria case management. Surveillance, monitoring and evaluation (SM&E) and social and behavior change communication (SBCC) technical working groups are also active. PMI is represented on each of the technical working groups.

The Government of Tanzania (GoT) operates a decentralized health system on the Mainland. At the national level, the Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC) establishes the policy framework for all health interventions. It is responsible for supervision and regulation of all health services throughout the country, as well as playing a direct role in the management of tertiary health services. Regional tertiary hospitals and regional staff are supervised directed by the MOHCDGEC. NMCP guides the decisions made by regional health staff related to malaria.

At the regional level, the implementation of health policies and interventions is organized around three functional levels: council (primary level), regional (secondary level), and referral hospitals (tertiary level). Within the framework of the ongoing local government reforms, regional councils have full responsibilities for delivering health services within their areas of jurisdiction, and report administratively to the President's Office – Regional Administration and Local Government (PO-RALG). Under the national administration, PO-RALG has the authority to strengthen the recruitment, deployment, placement, and retention processes to ensure equitable distribution of health sector workers at all levels; improve the working environment for staff at all levels; educate employers and employees on schemes of service, appointments, and conditions of service; and strengthen human resource supervision.

Under this system, the councils have full mandate for planning, implementation, and monitoring and evaluation of health services. Each council has a District Medical Officer who heads the Council Health Management Team (CHMT) and is answerable to the District Executive Director, the head of the council. CHMTs are responsible for provision of services in dispensaries, health centers, and district or district designated hospitals.

The Regional Health Management Teams are responsible for interpreting health policies at the regional level. Under the new administration, Regional Health Management Teams and the CHMTs will have the important role of providing supportive supervision and mentoring services to the health sector workers involved in task sharing implementation, including the new cadre of community health workers (CHWs).

PO-RALG is in charge of implementation of activities at the district level and below. These activities are guided by NMCP policies, and planned, designed, and distributed by the NMCP (MOHCDGEC). While the local government authorities who supervise the district malaria focal persons do not report to NMCP, they work closely with PMI's implementing partners who are on the ground. PO-RALG at the central level is beginning to increase their staff and to take a more active role in supervising implementation of health activities. They are currently negotiating memoranda of understanding (MOUs) with PMI implementing partners.

On mainland Tanzania there are 7,513 health facilities, of which 83 percent are public sector or faith-based (Ministry of Health and Social Welfare 2015). The system is in the form of a pyramid: on top are specialized hospitals owned by the Ministry and at the bottom are primary health care facilities. Almost 85 percent of the population gets their health services from primary health care facilities (Ministry of Health and Social Welfare 2013); however, these facilities face a number of challenges in delivering services due to poor infrastructure, shortage of skilled staff, and inadequate supplies of essential medicines.

Table 2. Health facilities in Mainland

Facility Type	Public or Faith-Based	Private	Total
Hospital	125	153	278
Health Center	535	285	820
Dispensary	4,959	1,456	6,415
Total	5,619	1,894	7,513
Source: http://hfrportal.ehealth.go.tz/ , Accessed 15 April 2018			

b. Zanzibar

The ZAMEP provides leadership for malaria activities on Zanzibar and has established technical working groups (TWGs) for all major intervention areas, e.g. vector control, case management and diagnosis, SBCC, and SM&E. PMI is represented on these TWGs. PMI supported the establishment of the Zanzibar Malaria Elimination Advisory Committee, comprised of local and international experts, to help guide ZAMEP's elimination activities.

Within the Zanzibar Ministry of Health, the Minister of Health and Deputy Minister of Health provide policy direction for health service delivery that is executed through the offices of the Principal Secretary and the Director General for Medical Services. At the central level, four directorates have been established to support specific Ministry of Health departments/units/sections and programs, e.g. Planning, Policy and Research; Administration and Personnel; Curative Services; and the Directorate for Preventive Services and Health Promotion, which includes the Zanzibar Malaria Elimination Program.

Health service delivery in Zanzibar is through a hierarchy of health facilities categorized into public facilities, private facilities, and government institutional health facilities, which are managed by military and defense forces. This system allows for a chain of referrals from a basic primary health care facility to the referral hospital across three levels: primary (Primary Health Care Units and Primary Health Care Centers), secondary (District Hospitals), and tertiary (Mnazi Mmoja and other specialized hospitals). There are a total of 168 public and 80 private health facilities in Zanzibar.

The ZAMEP supports districts through two Zonal Health Management Teams, one each covering Unjuga and Pemba. Each zonal team manages five District Health Management Teams headed by a District Medical Officer who is responsible for health, including malaria. The District Health Management Teams monitor the malaria situation in the villages (*shehias*) on a monthly and quarterly basis through *shehia* health custodian committees. Most *shehias* have a functional *shehia* health custodian committee, which acts as the advisory board for all health affairs in their locality. The health custodian committees collaborate with health workers in planning and implementation of malaria services delivered to the community and serve as a link between the health facility and the community.

4. National malaria control strategy

a. Mainland

The NMCP *National Malaria Strategic Plan 2014-2020*¹ outlines a long-term vision of a society free from malaria. The mission articulated in the strategy is that all Tanzanians have access to quality, effective, safe, and affordable malaria interventions through timely and sustainable collaborative efforts with partners and stakeholders at all levels. The goal is to reduce the average country malaria prevalence from ten percent in 2012 to five percent in 2016 and further down to less than one percent in 2020. The strategy to achieve these targets consists of five core interventions: (1) integrated malaria vector control, (2) malaria diagnosis, treatment, preventative therapies, and vaccines, (3) promotion of malaria prevention and curative services through information, education, and communication, (4) surveillance monitoring, and evaluation, and (5) program management, partnership development, and resource mobilization. Each intervention has a strategic objective and target and specific objectives and outcomes.

The five strategic objectives, one for each core intervention are:

- 1) Reduce transmission of malaria to less than 0.1 entomological inoculations rate by 2020 and maintaining effective and efficient vector control interventions;
- 2) Prevent the occurrence of severe morbidity and mortality related to malaria infection through promotion of universal access to appropriate early diagnosis and prompt treatment and provision of preventative therapies and vaccines to vulnerable groups to reduce case fatality rate to less than one percent by 2020;

¹ http://ihi.eprints.org/3314/1/Malaria_Strategic_Plan_Full_Version_02_27_14.pdf

- 3) Create an enabling environment where individuals and household members are empowered to minimize their own malaria risk and seek proper and timely malaria treatment if and when needed so that 90 percent of caretakers are able to take actions to protect their children from malaria;
- 4) Provide timely and reliable information to assess progress towards the set global and national targets to ensure resources are used in the most cost effective manner and to account for investments made in malaria control; and
- 5) Ensure effective programmatic and financial management of malaria control interventions at all levels, implemented through effective and accountable partnerships with adequate funding to reach an overall program performance rate of A+.

Integrated Malaria Vector Control

The strategic objective of integrated malaria vector control is to reduce transmission of malaria by scaling-up and maintaining effective and efficient vector control interventions. The targets are to reduce entomological inoculation rate to <0.1 by 2020 and increase the percentage of the population who slept under an ITN the previous night or in a dwelling sprayed with IRS in the past six months from 73 percent in 2012 to 90 percent in 2020.

The specific objectives of integrated vector control are to: (1) maintain universal access to ITNs among the population; (2) consolidate and expand the scope of IRS interventions in selected areas using evidence-based criteria; (3) scale-up larviciding interventions to selected urban areas where breeding sites are few, fixed, and findable; and (4) promote effective environmental management for malaria control amongst targeted communities; and (5) introduce new innovations in vector control products and information systems to manage insecticide resistance and address changing vector behavior.

Malaria Case Management

The strategic objective of malaria diagnosis, treatment, preventive therapies, and vaccines is to prevent the occurrence of severe morbidity and mortality related to malaria infection through promotion of universal access to appropriate early diagnosis and prompt treatment and provision of preventive therapies in vulnerable groups. The target is to reduce case fatality rate in patients admitted due to severe malaria from three percent in 2012 to less than one percent in 2020.

The specific objectives of malaria diagnosis, treatment, preventive therapies, and vaccines are: (1) all people with signs and symptoms of malaria are able to access prophylaxis and timely malaria diagnosis; (2) all people who have malaria are able to access appropriate and timely treatment; (3) biological and socio-economical population vulnerable to malaria has access to services to reduce the risk of malaria infection and its complications; (4) commodities used in patient care and prevention are consistently available at the points of care and are consistently quality assured; (5) appropriate malaria case management interventions are deployed in malaria epidemics and other emergency and resurgence situations.

Behavior Change Communication and Advocacy

The strategic objective of behavior change communication and advocacy is to create an enabling environment where individuals and household members are empowered to minimize their own malaria risk and seek proper and timely malaria-treatment if and when needed. The target is to increase the proportion of caretakers who are able to take actions to protect their children from malaria from 82 percent in 2012 to 90 percent in 2020.

The specific objectives of behavior change communication and advocacy are (1) community members of all age groups in all strata understand the malaria risk to themselves and their families, as well as the appropriate action they should take for malaria prevention and treatment-seeing; (2) vulnerable groups with increased risk of malaria infection and complication understand and accept their specific situation and are empowered to access the relevant preventive therapy, treatment, and care; (3) communities are actively involved in creating and promoting positive social norms about healthy behaviors around malaria prevention, treatment, and care and are initiating and implementing community-based malaria control interventions; (4) public and private sector stakeholders are actively promoting and implementing the national malaria control strategies within their “sphere of influence” and agreed target areas in a coordinated and harmonized manner; and (5) the political will and commitment to combat malaria is translated into actionable plans and budgets.

Surveillance, Monitoring, and Evaluation

The strategic objective of surveillance, monitoring, and evaluation is to provide timely and reliable information to assess progress towards the set global and national targets, to ensure resources are used in the most cost-effective manner and to account for investments made in malaria control. The target of surveillance, monitoring, and evaluation is to increase the number of national representative population based and service provision surveys that include key malaria indicators that are completed from one in 2012 to two in 2020.

The specific objectives of surveillance, monitoring, and evaluation are: (1) improved quality, completeness, and timeliness of malaria information within the routine health information system; (2) comprehensive framework in place for collecting and storing malaria impact, outcome, and output data from periodic surveys and programmatic monitoring; (3) malaria knowledge management system working effectively to collate, disseminate, and promote use of quality malaria data for evidence-based decision making at national and district level; and (4) malaria epidemics detected within one week and responded to within two weeks from onset.

Program Management

The strategic objective of program management is to ensure efficient programmatic and financial management of malaria control interventions at all levels, implemented through effective and accountable partnerships with adequate funding. The target is increase program performance as rate over time through semi-annual independent evaluation from B+ in 2012 to A+ in 2020. The specific objectives of program management are to (1) improve the effectiveness and accountability of malaria control implementation by strengthening partnerships and cooperation with malaria control stakeholders at all levels; (2) increase the level of resource mobilization to fund the strategic plan, according to programmatic needs; and (3) promote a harmonized regional approach to malaria control in line with the Global Malaria Action Plan.

In addition to the *National Malaria Strategic Plan 2014-2020*, the NMCP has the following supplemental strategic plans:

- NMCP Communication Guide for Malaria Control Interventions 2015-2020
- National Guidelines for the Diagnostic and Treatment of Malaria, 2013
- Malaria Surveillance, Monitoring, and Evaluation Plan 2015-2020
- Insecticide Resistance Monitoring and Management Plan, 2016
- National Guidelines for Malaria Surveillance and Response, July 2017

Given that the current national malaria strategic plan ends in 2020, the NMCP has initiated a process to update and revise the plan.

b. Zanzibar

The ZAMEP's 2018-2023 Strategic Plan IV provides a roadmap to reach the vision of a malaria-free Zanzibar. The Plan identifies three major strategies to achieve this goal:

- 1) Malaria diagnosis and treatment: Ensure quality assured diagnosis and appropriate case management in all health facilities and at community level to 100 percent by 2023
- 2) Integrated malaria vector control: Increase appropriate vector control measures to the population at risk of malaria to 100 percent by 2023
- 3) Surveillance, Monitoring and Evaluation:
 - Actively investigate and classify 100 percent of all confirmed cases of malaria and initiate entomological surveillance in 100 percent of malaria foci by 2023
 - Conduct entomological surveillance in 100 percent of malaria foci areas by 2023

The Plan also identifies three supporting strategies:

- 1) Social Behavioral Change and Communication: Advocacy, behavior, social communication, and mobilization reaches 90 percent of the general population by 2023
- 2) Operational Research: Appropriate operational research undertaken to evaluate and optimize interventions to eliminate malaria
- 3) Program Management and Coordination: Strengthen coordination structures for malaria elimination at different operational levels by 2023

Zanzibar implemented a Malaria Case Notification system (MCN) in 2011. This system requires that the District Malaria Surveillance Officers follow every case to household level and tests all household members. In addition, the District Malaria Surveillance Officers (DMSOs) take the coordinates of each case, allowing ZAMEP to develop a precise and accurate map of cases. Unfortunately, this system experienced several serious logistic and software setbacks in 2017. PMI is working closely with ZAMEP to address these and PMI is also supporting an evaluation of the surveillance system. The ultimate goal is to follow up every case to the household level within 24 hours of notification of a confirmed case of malaria. A recent addition to this is a requirement to collect sufficient information on cases to classify foci as active, non-active, or potential.

In 2014 ZAMEP updated its case management guidelines to include a single low dose primaquine treatment to reduce transmission. Due to logistical constraints this policy was not implemented until October 2016. Following the distribution of over 700,000 ITNs through a universal coordinated campaign (UCC) in April to July 2016, ZAMEP adopted an ITN keep-up approach to maintain this high coverage that relies on community-based and health facility based distribution of ITNs. IRS reaches hot spot areas across Unjuga and Pemba, and new approaches to larviciding are being tested. In spite of high coverage with interventions to reduce indoor transmission, about 3,000 and 4,500 cases are still reported annually. There is some evidence that a significant proportion of these cases may be imported and other evidence to suggest that outdoor transmission may play a major role in transmission. PMI is supporting operational research to investigate the magnitude and drivers of residual transmission in Zanzibar.

In addition to the ZAMEP Malaria Strategic Plan 2018-2023, the ZAMEP has the following supplemental strategic plans:

- Zanzibar Guidelines for Malaria Diagnosis and Treatment, 2014

To assist Zanzibar to eliminate malaria, PMI has supported ZAMEP to develop the terms of reference for the Zanzibar Malaria Elimination Advisory Committee, which will be comprised of international and local malaria experts. This independent group will meet once or twice a year with the first meeting planned for August 2018. PMI will continue to support and strengthen the surveillance and reactive case detection system using results from an ongoing evaluation to guide future improvements to the system. PMI will work to ensure that capacity is built within ZAMEP to solve basic software issues in the surveillance system, and work with management to improve logistic support for the DMSO, with the goal of eliminating delays in reporting and follow-up at household level of all malaria cases. PMI will also work with ZAMEP to improve the accuracy and timeliness of distinguishing between imported and endemic cases, and strengthening appropriate responses to each. Where evidence is sufficient to indicate impact, PMI will support additional approaches for vector control to help eliminate residual transmission.

5. Updates in the strategy section

a. Mainland

The key indicators report for the TMIS 2017 was released in April 2018.

b. Zanzibar

ZAMEP finalized its 2018-2023 Strategic Plan IV in December 2017. The major strategies and targets, which follow from the previous five-year strategy, are presented in Section 4. PMI is supporting ZAMEP to convene the Zanzibar Malaria Elimination Advisory Council to advise the program on the 2018-2023 Strategic Plan. Finally, as is the case in the Mainland, the key indicators report for the TMIS 2017 was released in April 2018.

6. Integration, collaboration, and coordination

a. Mainland

Funding and Integration with Key Development Partners

The Global Fund and PMI provide more than 90 percent of malaria funding to mainland Tanzania. This does not take into account staff salaries, which are paid by the government. Other donors include WHO, UNICEF, African Development Bank, Japan International Cooperation Agency, Danish International Development Agency (Danida), the United Kingdom's Department for International Development, and research institutions.

A total of \$145.2 million has been allocated by the Global Fund in the period 2017-2019 for malaria implementation on the Mainland from 2018-2020.² Approximately ten percent of the Global Fund malaria allocation will support resilient and sustainable systems for health activities.

The RBM Partnership established a China-RBM steering committee by drawing senior leaders from relevant Chinese institutions, the Global Fund, the Bill & Melinda Gates Foundation, and the WHO. The collaboration will leverage China’s investment to better align its bilateral aid to meet national malaria program needs, through contributions to provision of quality-assured commodities, building capacity in surveillance and operations, and innovation. A scoping mission to four African countries, including Tanzania, was conducted in April 2018. The steering committee will organize a high-level malaria summit in 2019.

Table 3. Major non-PMI External Sources of Funding for Malaria Control, Mainland, 2014-Present

Source	Amount (USD millions)	Period	Activities Supported
Global Fund New Funding Model (Mainland)	\$202	January 2016-December 2017	Sustaining universal coverage with continuous distribution channels; improved malaria case management through the use of mRDTs and ACTs in the public and private sectors, and improved quality of care in children with severe malaria; M&E; and health systems strengthening.
Global Fund New Funding Model (Mainland)	\$145.2	January 2018-December 2020	Supporting a mass ITN distribution campaign and sustaining universal coverage with continuous distribution channels; improved malaria case management through the use of mRDTs and ACTs in the public and private sectors, and improved quality of care in children with severe malaria; M&E; and resilient and sustainable health systems.
Swiss Agency Development & Cooperation	\$6	2013 – 2019	Technical assistance to ITN and case management cells within NMCP.

Collaboration with Other U.S. Government Programs

Since FY 2007, PMI has co-funded the Tanzania Field Epidemiology and Laboratory Training Program (FELTP). PMI’s support for strengthening malaria diagnostics uses the infrastructure and equipment supplied by the President’s Emergency Plan for AIDS Relief (PEPFAR). In addition, PMI supports Peace Corps volunteers to develop their capacities for malaria control to promote social and behavior

² <https://www.theglobalfund.org/en/funding-model/funding-process-steps/allocations/>

change communication activities aimed at increasing use of ITNs and promoting early health care seeking behaviors.

b. Zanzibar

Funding and Integration with Key Development Partners

Ninety-nine percent of the total malaria elimination budget in Zanzibar comes from external resources³ with PMI contributing the largest amount followed by the Global Fund. As is the case in the Mainland, this does not take into account staff salaries, which are paid by the government.

The Global Fund malaria funding level for Zanzibar is \$5.1 million for the 2017-2019 allocation period to support malaria elimination activities on Zanzibar from 2018-2020.

Table 4. Major Non-PMI External Sources of Funding for Malaria Control, Zanzibar, 2014-Present

Source	Amount (USD millions)	Period	Activities Supported
Global Fund New Funding Model (Zanzibar)	\$5.6	January 2015-December 2017	Supporting a mass ITN distribution campaign and sustaining universal coverage with continuous distribution channels; improved malaria case management through the use of mRDTs and ACTs in the public and private sectors; SBCC; supply chain strengthening and drug quality monitoring; and health management information system (HMIS) strengthening.
Global Fund New Funding Model (Zanzibar)	\$5.1	January 2018-December 2020	Supporting mass ITN distribution campaign and sustaining universal coverage with continuous distribution channels, improved malaria case management through the use of mRDTs and ACTs in the public and private sectors, SBCC, supply chain strengthening and drug quality monitoring, HMIS strengthening.

Collaboration with Other U.S. Government Programs

Historically, PMI partnered with the Department of Defense Walter Reed Army Institute of Research to strengthen the ZAMEP malaria diagnostics quality assurance (QA)/quality control (QC) system.

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:

³ Zanzibar Malaria Strategic Plan 11 (2013-2018)

1. Reduce malaria mortality by one-third from 2015 levels in PMI-supported countries, achieving a greater than 80 percent reduction from PMI's original 2000 baseline levels.
2. Reduce malaria morbidity in PMI-supported countries by 40 percent from 2015 levels.
3. Assist at least five PMI-supported countries to meet the WHO's criteria for national or sub-national pre-elimination.⁴

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 household survey indicators recommended by the RBM Monitoring and Evaluation Reference Group (RBM MERG) as listed below:

- Proportion of households with at least one ITN
- Proportion of the population with access to an ITN. [Please [see here](#) for a description of this indicator.]
- Proportion of children under five years old who slept under an ITN the previous night
- Proportion of pregnant women who slept under an ITN the previous night
- Proportion of the population that slept under an ITN the previous night
- Proportion of children under five years old with fever in the last two weeks for whom advice or treatment was sought
- Proportion of children under five with fever in the last two weeks who had a finger or heel stick
- Proportion receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs
- Proportion of women who received two or more doses of IPTp for malaria during ANC visits during their last pregnancy
- Proportion of women who received three or more doses of IPTp for malaria during ANC visits during their last pregnancy

8. Progress on coverage/impact indicators to date

a. Mainland

Six nationally representative population-based household surveys and other data sources provided intervention coverage estimates for key malaria outcome indicators between 2004 and 2017. The tables below describe current estimates of intervention coverage and impact indicators, respectively, for mainland Tanzania. The 2004-05 Tanzania DHS provides baseline estimates for the main PMI indicators of interest.

⁴ http://whqlibdoc.who.int/publications/2007/9789241596084_eng.pdf

There was a TMIS conducted in 2017, and the primary objectives were to measure the level of ownership and use of ITNs; assess coverage of IPTp; identify treatment practices, including the use of specific antimalarial medications to treat malaria among children age 6-59 months; measure the prevalence of malaria and anemia among children age 6-59 months; and assess knowledge, attitudes, and practices among adults with malaria. The final report should be released by August 2018.

Table 5. Evolution of Key Survey Based Malaria Indicators in Mainland Tanzania from 2004 to 2017.

Indicator	2004-2005 TDHS	2007-2008 THMIS	2010 TDHS	2011-2012 THMIS	2015-2016 TDHS -MIS
% Households with at least one ITN	23	38	63	92	65
% Population with access to an ITN	N/A	N/A	N/A	74*	56*
% Children under five who slept under an ITN the previous night	16	25	64	73	54
% Pregnant women who slept under an ITN the previous night	15	26	57	76	54
% Population that slept under an ITN the previous night	N/A	N/A	45	67	45
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	-	-	65	78	80
% Children under five with fever in the last two weeks who had a finger or heel stick	-	-	-	25	36
% Children under five years old with fever in the last two weeks who received any antimalarial treatment	58	57	60	55	52
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	22	30	27	33	35
% Women who received three or more doses of IPTp during their last pregnancy in the last two years	N/A	N/A	N/A	N/A	N/A
Under-five mortality rate per 1,000 live births	112	92	81	-	67
% Children under five with parasitemia (by microscopy , if done)	-	-	-	4	6
% Children under five with parasitemia (by mRDT , if done)	-	18	-	9	14

*This indicator is combined for mainland Tanzania and Zanzibar.

Table 6. Evolution of Key Malaria Indicators Reported through Routine Surveillance Systems in Mainland Tanzania from 2012 to 2017

	2012	2013	2014	2015	2016	2017
Total # Cases (Confirmed and Presumed)¹	370,132	4,175,982	7,899,934	8,275,171	6,463,414	5,930,380
# Confirmed Cases²	202,432	2,364,993	5,085,281	6,014,718	5,540,074	5,655,349
# Presumed Cases³	167,700	1,810,989	2,814,653	2,260,453	923,340	295,922
Total # <5 Cases⁴	194,521	2,037,511	3,721,998	3,630,767	2,659,802	2,412,377
Total # Malaria Deaths⁵	7,812	8,526	5,368	6,311	5,143	4,422
Data Completeness (%)⁶	20%	42%	76%	90%	94%	98%
Test Positivity Rate⁷				31%	32%	28%

¹ Total # cases: Total number of reported malaria cases. All ages, outpatient, inpatient, confirmed and unconfirmed cases.

² # confirmed cases: Total diagnostically confirmed cases. All ages, outpatient, inpatient.

³ # presumed cases: Total clinical/presumed/unconfirmed cases. All ages, outpatient, inpatient.

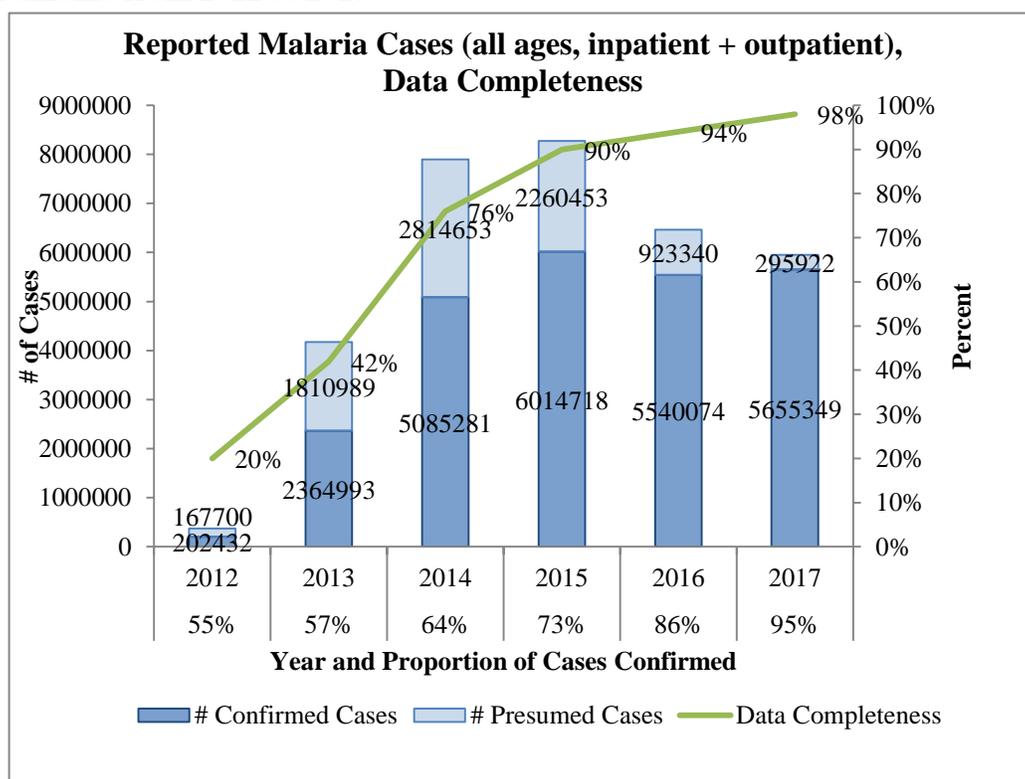
⁴ Total #<5 cases: Total number of <5 cases. Outpatient, inpatient, confirmed, and unconfirmed.

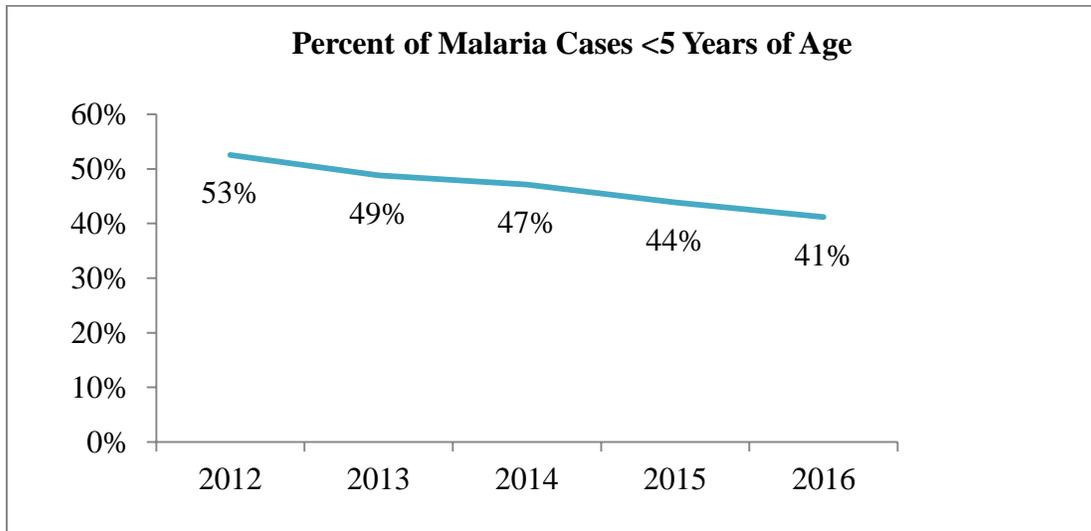
⁵ Total # Malaria Deaths Reported: All ages, outpatient, inpatient, confirmed, and unconfirmed

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

⁷ Test Positivity Rate (TPR): Number of confirmed cases/Number patients receiving diagnostic test for malaria

Figures 2 and 3. Trends in Key Malaria Indicators Reported in Routine Surveillance Systems in Mainland Tanzania from 2012 to 2017





b. Zanzibar

Six nationally representative population-based household surveys and other data sources provided intervention coverage estimates for key malaria outcome indicators between 2004 and 2017. The tables below describe current estimates of intervention coverage and impact indicators, respectively, for Zanzibar. The 2004-05 Tanzania TDHS provides baseline estimates for the main PMI indicators of interest.

There was a MIS conducted in 2017, and the primary objectives were to measure the level of ownership and use of insecticide-treated nets; assess coverage of intermittent preventive treatment for pregnant women; identify treatment practices, including the use of specific antimalarial medications to treat malaria among children age 6–59 months; measure the prevalence of malaria and anemia among children age 6–59 months; and assess knowledge, attitudes, and practices among adults with malaria. The final report should be released by August 2018.

Table 7. Evolution of Key Survey Based Malaria Indicators in Zanzibar from 2004–2017.

Indicator	2004-2005 DHS	2007-2008 HMIS	2010 DHS	2011-2012 HMIS	2015-2016 DHS-MIS
% Households with at least one ITN	28	72	76	74	74
% Population with access to an ITN	N/A	N/A	N/A	74*	56*
% Children under five who slept under an ITN the previous night	22	59	55	51	56
% Pregnant women who slept under an ITN the previous night	20	51	50	36	52
% Population that slept under an ITN the previous night	N/A	N/A	45	37	43
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	-	-	73	69	79
% Children under five with fever in the last two weeks who had a finger or heel stick	-	-	-	26	34
% Children under five years old with fever in the last two weeks who received any antimalarial treatment	61	66	17	2	2
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	14	52	47	48	5
% Women who received three or more doses of IPTp during their last pregnancy in the last two years	N/A	N/A	N/A	N/A	N/A
Under-five mortality rate per 1,000 live births	101	79	73	-	-
% Children under five with parasitemia (by microscopy , if done)	-	-	-	0.4	0.7
% Children under five with parasitemia (by mRDT , if done)	-	0.8	-	0.2	0
% Children under five with anemia (Hb<8g/dL)	6	5	4	4	4

*This indicator is combined for mainland Tanzania and Zanzibar.

Table 8. Evolution of Key Malaria Indicators Reported through Routine Surveillance Systems in Zanzibar from 2012 to 2017

	2012	2013	2014	2015	2016	2017
Total # Cases (Confirmed and Presumed) ¹	2,572	2,548	3,143	3,814	3,025	4,126
# Confirmed Cases ²	2,572	2,548	3,143	3,814	3,025	4,126
# Presumed Cases ³						
Total # <5 Cases ⁴	477	430	456	666	584	520
Total # Malaria Deaths ⁵	1	2	4	6	3	5
Data Completeness (%) ⁶	59%	60%	66%	68%	88%	92%
Test Positivity Rate ⁷	1%	1%	1%	2%	1%	1%

¹ Total # cases: Total number of reported malaria cases. All ages, outpatient, inpatient, confirmed and unconfirmed cases.

² # confirmed cases: Total diagnostically confirmed cases. All ages, outpatient, inpatient.

³ # presumed cases: Total clinical/presumed/unconfirmed cases. All ages, outpatient, inpatient.

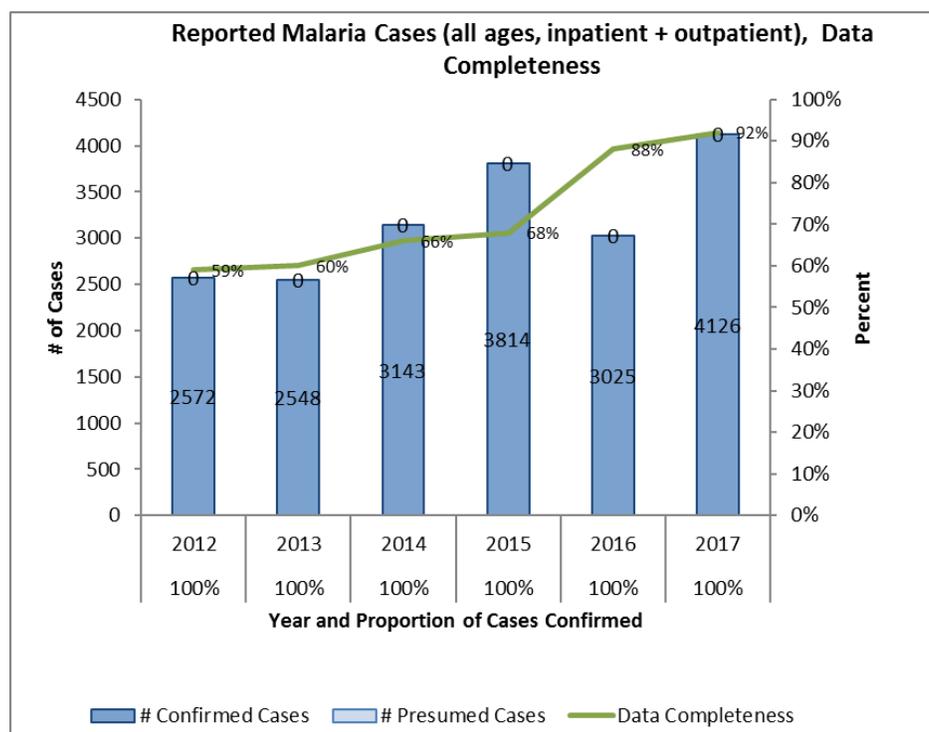
⁴ Total # <5 cases: Total number of <5 cases. Outpatient, inpatient, confirmed, and unconfirmed.

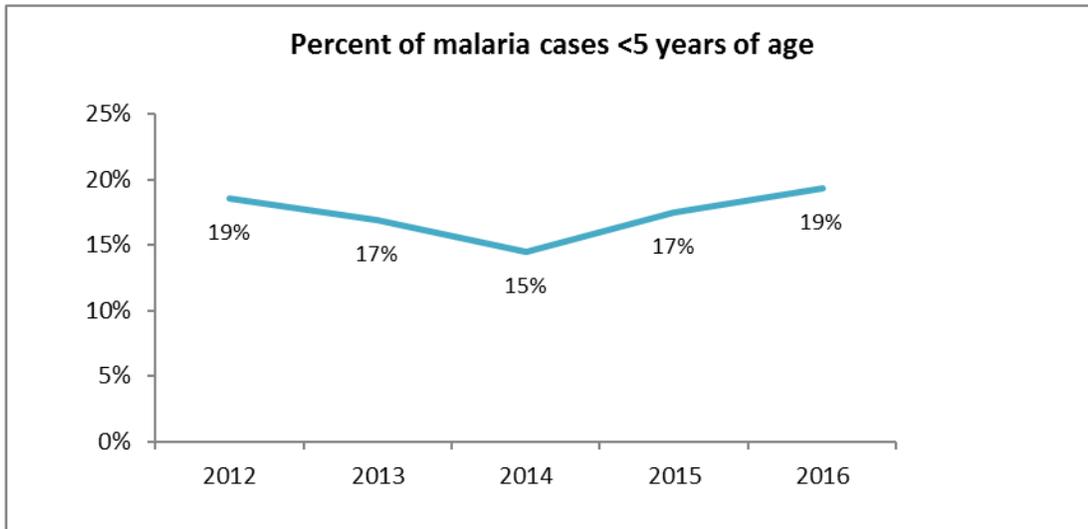
⁵ Total # Malaria Deaths Reported: All ages, outpatient, inpatient, confirmed, and unconfirmed.

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

⁷ Test Positivity Rate (TPR): Number of confirmed cases (#2 above)/Number patients receiving a diagnostic test for malaria (RDT or microscopy)

Figures 4 and 5. Trends in Key Malaria Indicators Reported in Routine Surveillance Systems in Zanzibar from 2012 to 2017





9. Other relevant evidence on progress

a. Mainland

One evaluation was completed in 2017. Highlights of that evaluation are below.

Evaluation of the fourth round of the School Net Program (SNP): An evaluation of SNP-4 was carried out in July and August of 2017 and as with the previous three evaluations, took place in four districts of mainland Tanzania. Two districts from the Southern Zone, Nachingwea and Mtwara Urban, were chosen due to their involvement in the school bed net distribution since SNP commencement in 2013. The other two districts, Sengerema and Chato, are located in the Lake Zone and were selected as comparison sites due to their distance from the SNP sites, which should minimize contamination bias. The comparison sites did not receive bed nets through schools until SNP-4 (2016) when SNP was expanded to this area, but only standard-one students were targeted. The evaluation found that the SNP was the main contributor to sustained ITN coverage in Southern Tanzania. In addition the 2017 MIS shows that population access to the three Southern regions where SNP was being implemented is significantly higher than in regions that only received UCC.

III. OPERATIONAL PLAN - MAINLAND

1. Vector Control

NMCP/PMI objectives

The NMCP's strategic objective for Integrated Malaria Vector Control, as presented in the Tanzania National Malaria Strategic Plan: 2015-2020, is to reduce transmission of malaria to less than 0.1 entomological inoculation rate by 2020, by scaling up and maintaining effective and efficient vector control interventions. PMI specifically supports three of the five operational objectives:

1. Ensure by 2020 that 85 percent of the population of Tanzania have access to an ITN within their household, which will be achieved using three strategic interventions: a) implement a UCC to bring ITN coverage to at least 80 percent of population; b) implement continuous distribution mechanisms to keep ITN coverage at 80 percent population access or above; and c) create an enabling environment to revive the commercial market for ITNs.
2. Consolidate and expand IRS in epidemiologically and operationally suitable areas, covering at least 20 percent of house structures in Tanzania by 2020. The strategic plan calls for: a) capacity building in local government authorities and private sector to plan, manage, implement, and evaluate IRS and b) application of IRS in selected areas.
5. Provide a strategic framework for coordination and continuous assessment for the implementation of evidence-based Integrated Malaria Vector Control interventions, so that at least two new innovations for malaria control are adopted in Tanzania by 2020.

Objectives 3 (larviciding) and 4 (environmental management) are not supported by PMI.

PMI supports entomological monitoring through three activities: yearly nationwide monitoring of resistance to insecticides used for vector control; monthly cone bioassay monitoring of residual insecticidal activity of the IRS program; and monitoring of vector species abundance and distribution, resting behavior, and sporozoite rates at established sentinel sites. The NMCP, with Global Fund support, conducts monthly monitoring on vector species abundance and spatial/temporal distribution in 28 sites nationwide, mainly in areas not supported by PMI.

PMI's support for ITN coverage includes procurement and annual distribution of ITNs to support the SNP in 14 regions with the highest prevalence of malaria. PMI also supports the distribution of Global Fund procured ITNs through reproductive and child health (RCH) channels at all primary health facilities in the same 14 regions of the country. PMI's support for IRS includes procurement of insecticides and for spray operation logistics for about seven districts where there is a combination of high prevalence of malaria and vector resistance to pyrethroid insecticides. The IRS operation adheres to high standards for protection of the environment and safe disposal of waste, in accordance with the approved Pesticide Evaluation Report and Safe Use Action Plans. Environmental inspection visits are conducted regularly to assess compliance with U.S. Government and Tanzanian national environmental standards.

a. Entomologic monitoring and insecticide resistance management

PMI-supported routine entomologic monitoring on the mainland, summarized in Table 9, consists of: (1) yearly nationwide monitoring of resistance to insecticides used for vector control; (2) monthly cone bioassay monitoring of residual insecticidal activity of the IRS program; and (3) monitoring of vector species abundance and distribution, resting behavior and sporozoite rates at established sentinel sites. The NMCP, with Global Fund support, conducts monthly monitoring on vector species abundance and spatial/temporal distribution in 28 sites nationwide, mainly in areas not supported by PMI.

Progress since PMI was launched

PMI-supported national resistance monitoring on the Mainland, carried out by National Institute for Medical Research (NIMR)-Amani, currently consists of 23 sentinel sites, which include PMI IRS districts Mara, Mwanza, Geita, and Kagera Regions and sites spread across non-IRS regions. These sites were selected based on areas with high malaria prevalence, history of insecticide resistance in the area, history of IRS and areas bordering other countries where resistance has been detected. Not all sites are tested every year, the priority being areas with high malaria burden. In addition, in some years, some sites may have insufficient mosquitoes to conduct the assays. The resistance monitoring program consists of the WHO insecticide resistance assay, biochemical assays for insecticide resistance mechanisms and testing for insecticide metabolic resistance mechanisms using synergists. A sub-sample of the mosquitoes from the insecticide resistance testing are selected for molecular species identification and genetic insecticide resistance mechanisms. Future expansion of resistance testing will include insecticide intensity assays in selected areas where resistance is detected.

The NIMR-Mwanza entomology facility, a regional entomology center for the Lake Victoria basin, conducts routine entomologic monitoring of PMI-supported IRS activities in the PMI IRS districts. The numbers of entomologic sentinel sites have changed over the years to reflect changes in PMI-supported IRS activities. In 2017, entomological monitoring was conducted in fourteen sentinel sites. Ten were sprayed districts located in Kagera region (Missenyi, Bukoba Rural and Ngara districts), Geita region (Chato, Nyang'hwale and Geita Town Council), Mwanza region (Sengerema and Kwimba), and Mara region (Musoma Rural and Butiama). Four non-sprayed control districts were in Simuyu region (Busega), Geita Region (Bukombe), Kagera region (Biharamulo) and Mara region (Tarime). Mosquito sampling methods include indoor light traps, outdoor clay-pot traps, Prokopac aspirators and in 2017 the collection bottle rotator trap was implemented as a proxy to collect information on vector feeding time and behavior. Monthly mosquito collections performed by the regional/district health authorities are sent to NIMR-Mwanza for processing and analysis. In addition, WHO cone wall bioassays are conducted to monitor residual insecticide activity of the insecticide used for IRS using NIMR-Amani's susceptible colony of *An. gambiae* s.s. on different wall types. The most common house wall materials in Lake Victoria basin are mud, burnt brick, painted brick, concrete and white-wash. The residual insecticide monitoring consists of testing in three houses of each sprayed wall surface in the selected district.

In 2015, the NMCP established a longitudinal National Malaria Vector Control Surveillance in 62 district councils, as part of the Malaria Strategic Plan 2015-2020. Beginning in 2016, longitudinal entomologic surveillance began in 28 of these 62 sites with Global Fund assistance. A total of seven of the 28 sites are located within the PMI-supported IRS regions of Kagera, Mara, Mwanza, and Geita but not in the same districts/councils as the NIMR-Mwanza entomological monitoring sites. Adult mosquito collection consists of U.S. Centers for Disease Control and Prevention (CDC) light traps for indoor collections and bucket traps for indoor and outdoor collections. The surveillance aims to collect information on mosquito densities, species composition, and malaria infection rates. Monthly collections

are conducted for three days per month in three houses per village. After field morphological identification of the mosquitoes by the district vector control officers, the samples are sent to NIMR-Amani for species identification and malaria parasite testing. In 2016, PMI provided support for oversight and quality assurance for all activities from mosquito field collection, data collection and information quality. This program was supported by Global Fund through 2017 and may receive additional Global Fund support in 2018.

Progress during the last 12-18 months

In 2017, NIMR-Mwanza monitored the residual efficacy of pirimiphos-methyl CS in 10 districts in the Lake Zone starting within a week post-IRS and thereafter monthly until the mortality fell below 80 percent. The assays, using susceptible *An. gambiae* s.s. from NIMR-Mwanza, conducted within a week post-IRS estimated that the quality of spray was acceptable (90.8 – 100 percent mortality) with the majority of the sentinel houses having 100 percent mortality. Monthly testing thereafter indicated a 6-8 month residual efficacy of pirimiphos-methyl CS, depending on site and wall type.

Molecular species identification of 5,845 anophelines, from the Lake Victoria basin entomologic monitoring, confirmed *An. arabiensis* (57.6 percent) as the predominant vector species, *An. funestus* s.s. (12.6 percent), *An. parensis* (7.4 percent), and *An. gambiae* s.s. (5.0 percent). *An. arabiensis* density in sprayed sites were similar to non-sprayed sites however there were six times more *An. funestus* s.s. in non-sprayed sites compared to sprayed sites. Among the sprayed sites, the highest number of *An. funestus* was collected in Chato during the dry season of June-September. In *P. falciparum* sporozoite assays of 6,025 samples, sporozoite rates varied from 0-3.9 percent across the sentinel districts. In general, the average sporozoite rate was lower in the sprayed sentinel sites (1.1 percent) compared with non-sprayed sentinel sites (2.4 percent). *An. funestus*, captured mostly in non-sprayed sites, had the highest sporozoite rate (4.3 percent) compared to the sprayed sites (2.8 percent). Blood-meal analysis of *An. arabiensis* indicated opportunistic feeding behavior, feeding on both human and animal sources, 26 percent with human blood and 32.5 percent with human-animal mix. The highest vector densities were observed between March and June in all sites following the long rains. However, increases in vector densities between March and June were small in most sprayed districts. In the sprayed areas, highest density increases during the long rains were seen in Missenyi and Butiama.

National insecticide resistance from 20 of the 23 sites in 2017, presented in Table 10, include IRS districts of Geita, Muleba, Sengerema, and Musoma rural. Results for sites lower than 98 percent mortality indicate widespread resistance to pyrethroids. In Muleba, possible resistance was detected for bendiocarb and pirimiphos-methyl and pirimiphos-methyl resistance was seen in Manyoni. The malaria vectors in other IRS areas continue to show susceptibility to pirimiphos-methyl. Molecular species identification performed on a sub-sample of *An. gambiae* s.l. from each sentinel site indicated 31.3 percent *An. gambiae* s.s. and 68.7 percent *An. arabiensis*. The kdr-east mutation in *An. gambiae* s.l. was detected in six sites and kdr-west mutation in three sites (Table 10). Metabolic resistance testing using synergists were conducted in nine selected sites that showed permethrin resistance and eight sites that showed deltamethrin resistance. For permethrin, resistance in the sites ranged from 40 percent-85 percent mortality and was restored to 100 percent mortality with the synergist in five of the nine sites. Improvements in the susceptibility were seen in the other four sites, with mortality now ranging between 82.8 percent- 97.7 percent. For sites showing deltamethrin resistance (with 42.5 percent-90 percent mortality), full susceptibility was restored in six of the eight sites. In the other two sites, susceptibility improved to 94 percent-95 percent mortality. This suggests the permethrin and deltamethrin resistance is mediated by an oxidase enzyme mechanism.

National Malaria Vector Control Surveillance, conducted between August 2016 - June 2017, have processed mosquitoes from 22 of the 28 sites. From 3,203 mosquitoes tested, 82.3 percent were from the *An. gambiae* family complex (51.9 percent *An. arabiensis*, 30 percent *An. gambiae s.s* and 0.28 percent *An. quadriannulatus*) and 17.7 percent were from the *An. funestus* complex (17.0 percent *An. funestus s.s* and 0.68 percent *An. lesoni*). The species abundance of *An. gambiae* s.l. and *An. funestus* s.l. varied between sites and time of year of collection. For example in Missenyi, *An. funestus* s.l. was the predominant mosquito collected from August to December 2016. In Kilwa in September-October 2016, *An. funestus* s.l. was the predominant species collected; however in April-May 2017 the collections consisted of *An. gambiae* s.l. only.

Plans and justification for proposed activities with FY 2019 funding

On the Mainland, in PMI IRS areas in the Lake Zone, PMI will support IRS efficacy and longitudinal entomological monitoring and laboratory support for sample processing and analysis. PMI will continue to support the national insecticide resistance monitoring program at 23 mainland sentinel sites.

Entomologic monitoring. This includes longitudinal monitoring in the Lake Region in PMI-supported IRS areas and WHO bioassays to monitor insecticide residual efficacy. PMI will continue to provide laboratory support for the analysis of entomological samples.

National Insecticide Monitoring. Insecticide resistance monitoring at 23 national sentinel sites, and increased testing in regions where there may be the introduction of new interventions. Insecticides to be tested may include next generation insecticides that may be used in IRS or on ITNs and insecticide resistance intensity testing expanded. This will provide a database of insecticide resistance and efficacy and increased monitoring of possible impact on IRS and ITNs for the NMCP and other partners.

Technical assistance for entomological monitoring. PMI/CDC staff will conduct two technical assistance (TA) visits.

Table 9. Summary of Entomological Activities in Mainland Tanzania in the Last 12 months

Entomological Activities	Mainland (Partner)
Insecticide Resistance Monitoring (PMI-supported)	20 national sentinel sites (NIMR-Amani)
IRS Efficacy Monitoring (PMI-supported)	10 sites (NIMR-Mwanza)
Longitudinal Entomological Monitoring in Lake Zone (PMI-supported)	14 sites (NIMR-Mwanza)
National Longitudinal Entomological Monitoring (Global Fund-supported)	28 national sites (NMCP)

Table 10. Susceptibility of *An. gambiae* s.l to WHO-Discriminating Concentrations of Four Different Insecticides on the Mainland in 2017

Site	% Mortality to Different Insecticides			
	Permethrin	Deltamethrin	Bendiocarb	Pirimiphos-methyl
Bagamoyo	68.3	56.3	100	100
Geita	97.5	98.3	100	100
Kahama	100	100	100	100
Kasulu	94.9	88.3	100	100
Kilombero	63.3	52.7	100	100
Kilosa	75.4	68.3	100	100
Kinondoni ²	100	90	100	100
Kyela ^{2,3}	100	100	100	100
Magu	91.7	90	100	100
Manyoni	87.6	78.7	100	86.2
Mpanda	75	75	100	100
Mtwara ²	93.3	86.4	100	100
Muleba ^{2,3}	58.3	75	98.3	100
Musoma Rural	89.4	72.7	100	95.5
Nyasa	95	95	100	100
Nzega	63.3	74.1	100	100
Ruangwa ^{2,3}	93.3	26.7	100	100
Sengerema	98.3	90	100	100
Songea	98.3	100	100	100
Uvinza ²	57.1	77.2	100	100

¹ WHO criteria for insecticide susceptibility: ≥98 percent mortality susceptible, 97-90 percent mortality resistant to be confirmed, <90 percent resistant
² Sites with Kdr-east insecticide resistance mechanism in *An. gambiae* s.l.
³ Sites with Kdr-west insecticide resistance mechanism in *An. gambiae* s.l.

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

b. Insecticide-treated nets

Progress since PMI was launched

Ownership of at least one ITN per household has increased steadily from 23 percent in 2005-2005 (2004/05 DHS) to 77 percent in 2017 (2017 MIS), as seen in Figure 6, due to the success of the following distribution channels.

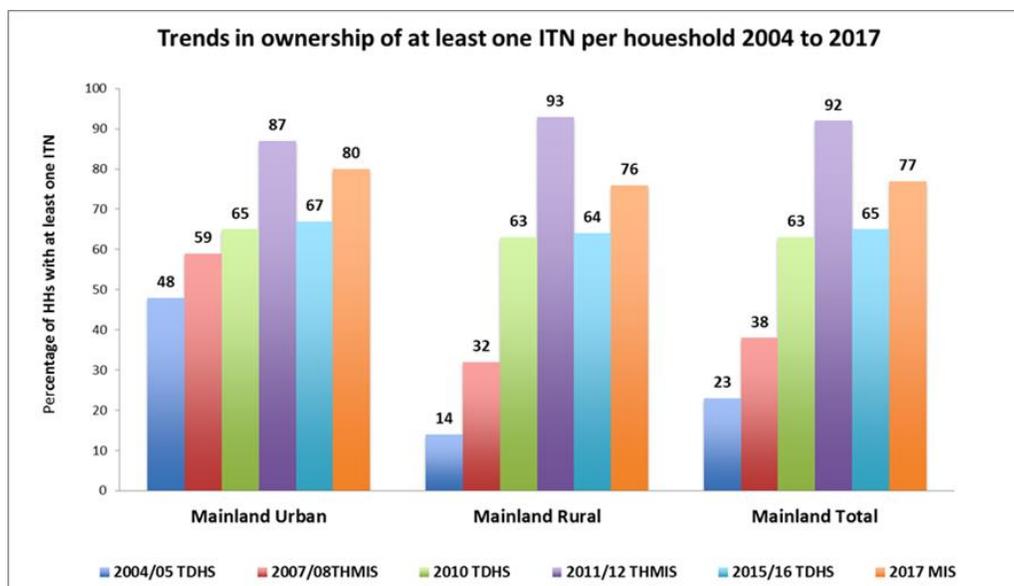
Universal Coverage Campaigns (UCC): The first UCC was conducted from 2009-2011 and delivered over 26 million ITNs to all 25 regions of the country. The success of this UCC was reflected in an increase of ownership of at least one ITN from 52 percent in 2008 (DHS 2007/2008) to 91 percent in 2012 (HMIS 2011/2012). A second UCC was conducted from 2015-2017 and delivered over 27.1 million ITNs to 22 regions. PMI contributed 2.1 million ITNs in 2015 to cover the ITN needs for

Kigoma and Kagera regions. The 2017 MIS, conducted between one to two years after the UCC, reported household ownership of at least one ITN at 77 percent and population access at 62 percent.

School Net Program (SNP): The SNP pilot was launched in 2013 in three regions in the Southern Zone (Lindi, Mtwara, and Ruvuma). Subsequent distributions through SNP were conducted from 2014-2017. A comprehensive analysis of the results from evaluations of SNP-1 (2013), SNP-2 (2014), SNP-3 (2015), and SNP-4 (2016) indicated that ITN population access was maintained at sufficiently high level in intervention areas to eliminate the need of future UCCs. The SNP evaluation findings were presented to the NMCP and partners in March 2017 during a NMCP ITN Strategy Technical Meeting to review the *Tanzania ITN Plan 2016-2020*. A key outcome from that, and other related meetings, was a decision to scale-up SNP to high malaria endemic regions of the country. Under the National Malaria Strategic Plan the continuous distribution approach, SNP and RCH distribution channels, will be regularly monitored to ensure population access is maintained at 70 percent or higher. ITN access is measured using results from MIS/DHS in the year immediately following those surveys. PMI/Tanzania is working on alternative, smaller scale, and less expensive means of measuring ITN access. Approaches being considered are Lot quality assurance sampling, phone surveys, and smaller scale collection of data that have been shown to provide viable results. A drop in population access below 50 percent would trigger the input of additional ITNs, likely through mass campaign. Development partners agreed on a division of responsibilities for this national approach. PMI agreed to provide sufficient ITNs through SNP to maintain population access at 70 percent or above in the 14 regions where malaria prevalence was higher than 10 percent in the Tanzania DHS/MIS 2015-16.

Facility-Based Distribution (RCH): For a decade, the Tanzania National Voucher Scheme served as the key mechanism for distribution of ITNs through the RCH channels. Vouchers, which could be redeemed at a local shop for an ITN, were delivered to pregnant women at ANC clinics and to children at vaccination clinics. In mid-2014, following the collapse of the voucher scheme, the NMCP in collaboration with PMI and other development partners developed an alternative approach that delivers ITNs directly to health facilities for distribution to the same target populations. The RCH program was launched in Mtwara in May 2016 as the *Chandarua Kliniki* program. Related to ITN distribution through RCH channels, at the same aforementioned NMCP ITN Strategy Technical Meeting to review the *Tanzania ITN Plan 2016-2020*, a decision was made to scale-up RCH distribution nationally. A rapid scale-up has been underway since 2016 and now the program is implemented in all regions nationally.

Figure 6. Trends in Ownership of at Least One ITN Per Household



ITN Use: As seen in Figure 7 ITN use reached its highest point in the 2011/12 HMIS and has remained at near a 50 percent level for household members, children under five years of age and women 15-49 years. Improvement in this area is needed, but results from the 2017 MIS, which shows a 0.83 ratio of population ITN use to population ITN access, indicates that a very high proportion of Tanzanians use ITNs when they are available. The conclusion is that emphasis should be placed on ensuring every household has sufficient ITNs for all inhabitants.

Figure 7. Trends in ITN Use Over Time

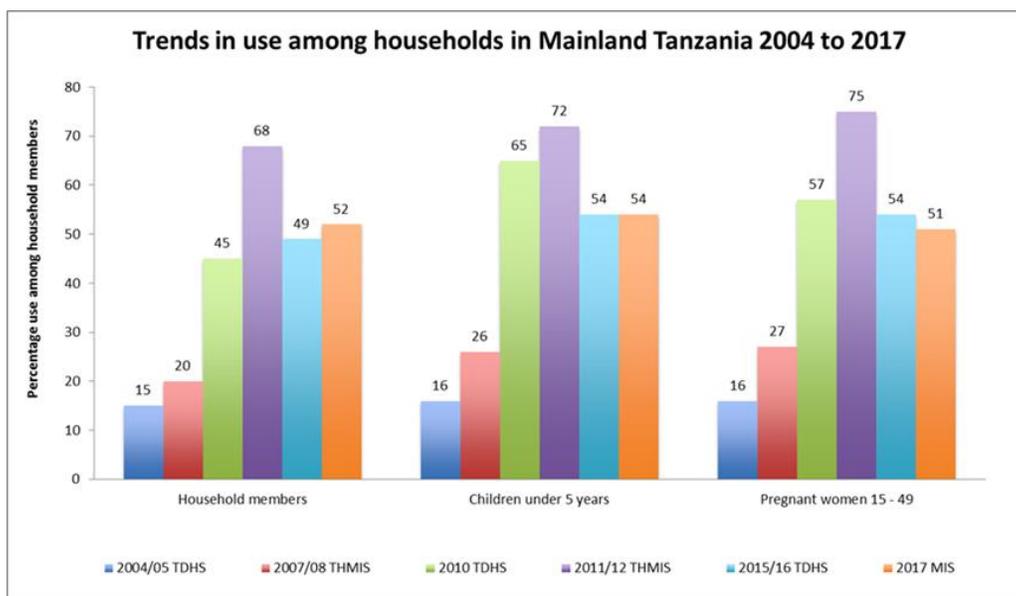
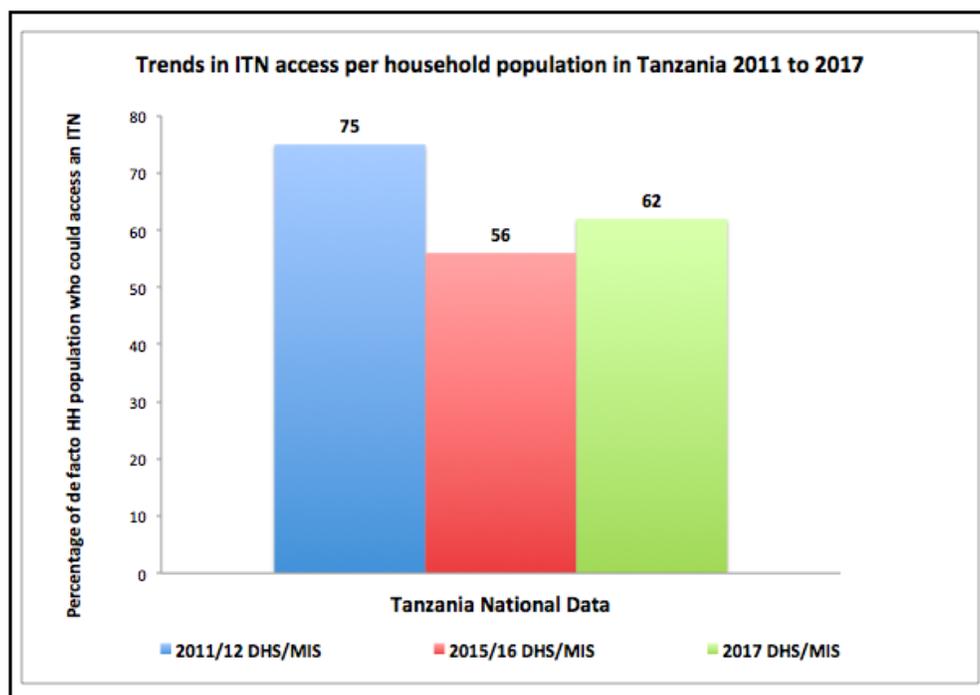


Figure 8. Trends in ITN Access in Tanzania

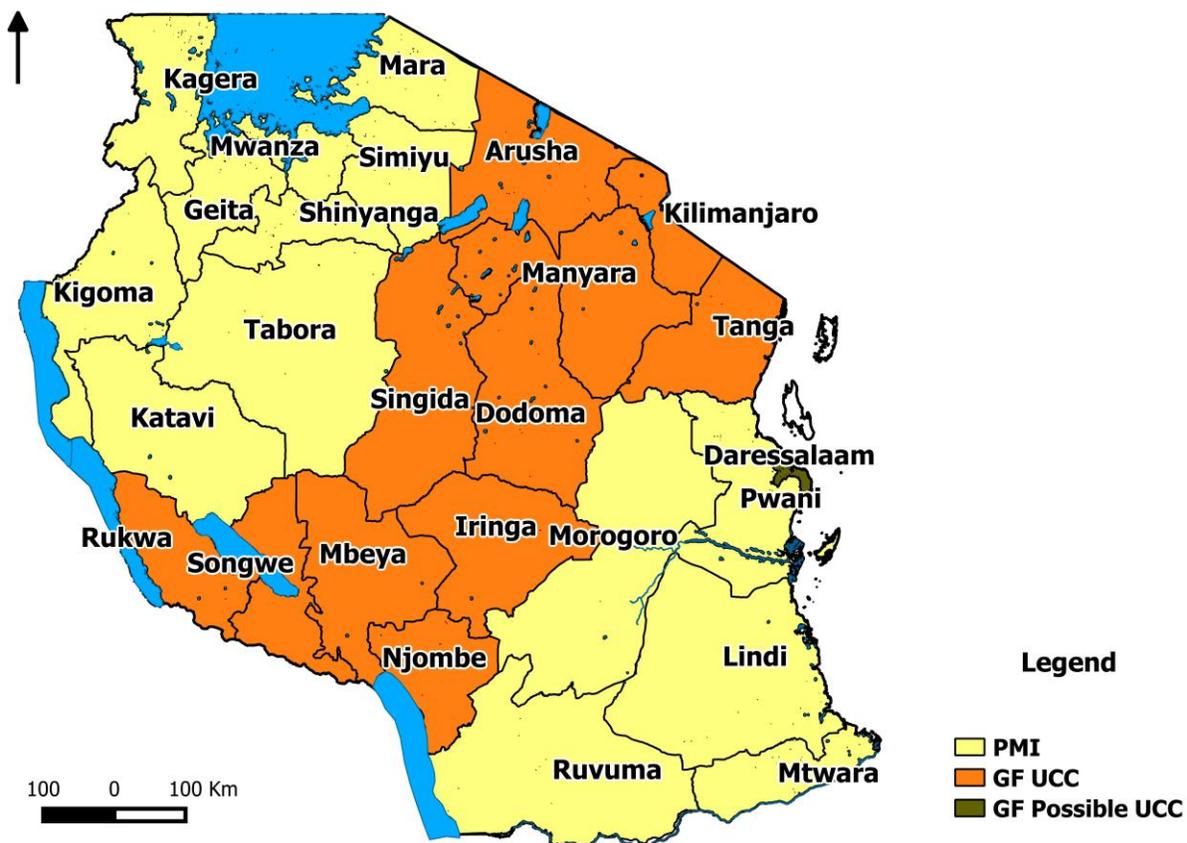


Progress during the last 12-18 months

Universal Coverage Campaign: The UCC (2015-2017) was completed in early 2017 with the distribution of 6.5 million ITNs to the last four regions (Dar es Salaam, Morogoro, Tanga, and Pwani), bringing the total of ITNs distributed to just over 27.1 million to 22 regions.

School Net Program: Between August and November 2017, the SNP-5 program delivered 3,040,488 ITNs through 9,518 primary schools in 14 regions with the highest prevalence of malaria. Of the total ITNs delivered to students, PMI contributed 946,018 ITNs that were distributed in four regions (Tabora, Lindi, Mtwara, and Ruvuma) while Global Fund contributed 2,094,470 ITNs, which were delivered in the remaining ten regions (Kagera, Mara, Mwanza, Geita, Kigoma, Katavi, Pwani, Morogoro, Simiyu, and Shinyanga). The classes receiving ITNs varied somewhat across regions to accommodate the needs based on NetCALC modeling. PMI and its partners used the PO-RALG’s central data, Basic Education Management Information System, to determine student enrollments at each school. Spot checks conducted in 2016 found a close correlation between the PO-RALG’s figure and the registration information at the school. The just-in-time delivery approach also continued in 2017. This avoided the need for storage by moving ITNs directly from large container trucks, which arrived at the respective regional capital, to smaller trucks that delivered ITNs directly to the schools.

Figure 9. Map of 14 PMI Priority Regions



An evaluation of SNP-4 was carried out from July to August 2017 and, as with the previous three evaluations, took place in four districts of mainland Tanzania. Two districts from the Southern Zone, Nachingwea, and Mtwara Urban, were chosen due to their involvement in SNP since SNP commencement in 2013. The other two districts, Sengerema and Chato, are located in the Lake Zone

and were selected as comparison sites due to their distance from the SNP sites, which should minimize contamination bias. The comparison sites did not receive bed nets through schools until SNP-4 (2016) when SNP was expanded to this area, but only students in standard one were targeted. The evaluation found that the SNP was the main contributor to sustained ITN coverage in Southern Tanzania. The 2017 MIS results indicated that population access to ITNs in the three Southern regions where SNP was implemented is significantly higher than in regions that only received ITNs through UCC.

Facility-Based Channels: Chandurua Kliniki was initiated in two regions (Mwanza and Mtwara) in July 2016 and expanded to nine regions (Geita, Ruvuma, Lindi, Kagera, Mara, Simiyu and Kigoma) by July 2017. Through this scale up, a total of 1,422,000 ITNs were distributed in all the nine regions. From September 2017 to early 2018, *Chandarua Kliniki* was scaled up from nine regions to all 26 regions in the country. A total of over 3.3 million ITNs were distributed by PMI to health facilities in the mainland. The targeted recipients of these ITNs are pregnant women attending their first ANC visit and children at the first measles rubella vaccine.

The NMCP, in partnership with the Medical Stores Department, will undertake resupply for all health facilities in the 12 regions with the lowest malaria prevalence, with PMI undertaking resupply in the 14 regions with the highest malaria prevalence (Figure 9). In addition, PMI supported all aspects of the development of the approach and design of training materials, standard operating procedures for implementation, and job-aids needed to ensure that the RCH distribution becomes an integral part of the health system. Guidelines, in English and Kiswahili, were designed and produced, and on-the-job trainings were held in nine regions in collaboration with NMCP. The NMCP with Global Fund support used these materials for training in the remaining regions. These included an overarching RCH Implementation Guide, a Trainers Guide for training health facility workers, and a Health Worker Guide. In addition, a dashboard (*Chandarua Kliniki Dashboard*) was developed to enable the NMCP and other government agencies to track and account for ITNs in the system and monitor the overall system. The *Chandarua Kliniki* dashboard utilizes the DHIS2 platform and automatically triangulates eLMIS commodity data with DHIS2 service data.

The *Chandarua Kliniki* Dashboard produces an accountability report that tracks and reports variances observed, causes for the variance, action taken to mitigate the variances, and next steps and is reviewed monthly by each District Health Management Team (DHMT). The Dashboard assists Local Government Authorities to prioritize supportive supervision by focusing on health facilities that have the most variances between ITNs issued and pregnant women at their first ANC visit and children at their first measles vaccination.

Commercial Sale of ITNs: The Tanzania National Malaria Strategic Plan: 2015-2020 set an ambitious target of reviving the commercial sale of ITNs. At present there is a vibrant commercial market for non-treated bed nets in Tanzania, particularly in the urban areas, indicating a willingness in Tanzania to procure commercially available bed nets. Providing greater choice and lower prices for ITNs is needed to tap into the existing willingness to procure and use bed nets. PMI supported a market landscape analysis to understand the current ITN market dynamics in Tanzania. PMI also supported a secondary analysis of 2015-16 DHS data to determine the market size and characteristics for commercial sale of ITNs. It was obvious that while there are a number of systemic issues that need to be addressed, such as taxation, delays in new product registration, and clarity on NMCP's ITN plan over the next 3-5 years, there is a clear market need for commercial sale of ITNs. Based on these findings, the NMCP and PMI conducted a stakeholders' workshop that brought together local and international ITN manufacturers, wholesalers, representatives from regulatory bodies, members of the parliamentarian group against malaria, and other malaria stakeholders to discuss ways of reviving the commercial sale of ITNs. The

outcome of the workshop was a renewed readiness of ITNs manufacturers to enter the market and guarantee from NMCP to create enabling environment. To date, PMI and parliamentarians against malaria have facilitated the registration of new ITN brands that are expected to be on the market by June 2018. Also, an old ITN manufacturer (MOTEX) is finalizing plans to revive its stitching plant and would start a joint venture stitching of ITNs before September 2018. PMI will work with GoT institutions, such as the Tropical Pesticide Research Institute, Tanzania Bureau of Standards, and the Fair Competition Commission, to support streamlining the process of registration of commercially available ITNs in Tanzania. If those efforts are successful and there is a significant increase in availability of ITNs in the commercial sector, PMI will consider support for SBCC to promote the purchase and use of quality ITNs.

Piperonyl butoxide (*PBO*) *Synergists ITNs*: A randomized control trial conducted between 2014 to 2016 in Muleba district, Kagera region by the London School of Hygiene and Tropical Medicine, NIMR, and Kilimanjaro Christian Medical Centre University reported a reduced prevalence of malaria associated with Piperonyl butoxide (PBO) synergist ITNs of 44 percent and 33 percent as compared to standard ITNs in year one and year two of the study, respectively. The study also found that a standard ITN provided little protection against malaria in this area where vectors showed resistance to permethrin at 2x and 5x the normal test concentration (78.9 percent and 97.7 percent mortality respectively at 24 hours). The findings of this trial catalyzed WHO to recommend wider use of PBO synergist ITNs. PMI procured about 130,000 PBO synergist ITNs with FY 2017 funds for distribution in Muleba district through the 2018 SNP. PMI will procure sufficient PBO synergist ITNs with FY 2018 funds for the 2019 SNP in Muleba district.

Commodity gap analysis

Table 11. ITN Gap Analysis Mainland

Calendar Year	2018	2019	2020
Total Targeted Population	52,209,530	53,827,879	55,514,265
Continuous Distribution Needs			
Channel #1: ANC ¹	2,114,486	2,180,029	2,248,328
Channel #2: EPI ²	1,686,368	1,738,640	1,793,111
Channel #3: SNP ³	2,770,086	3,023,540	3,118,385
<i>Estimated Total Need for Continuous Channels</i>	6,570,940	6,942,210	7,159,823
Mass Campaign Distribution Needs			
2018/2019/2020 Mass Distribution Campaign(s) ⁴	0	11,532,300	0
<i>Estimated Total Need for Campaigns</i>	0	11,532,300	0
Total ITN Need: Routine and Campaign	6,570,940	18,474,510	7,159,823
Partner Contributions			
ITNs Carried Over from Previous Year	322,120	0	0
ITNs from MOH	0	0	0
ITNs from Global Fund	3,286,773	15,838,530	4,441,142
ITNs from Other Donors	0	0	0
ITNs planned with PMI funding	3,328,166	3,023,540	3,118,385
Total ITNs Available	6,937,059	18,862,070	7,559,527
Total ITN Surplus (Gap)	366,119	387,560	399,704

1. ANC ITN needs are based on pregnant women representing 4.5 percent of the total population annually, and ANC ITN delivery reaching 90 percent of pregnant women annually.

2. EPI ITN needs are based on under 1 children representing 3.8 percent of population annually, and EPI ITN delivery reaching 85 percent of children.

3. SNP ITN needs are based on MIS results and modeling to determine the gap between the ITNs needed to maintain 80 percent population access and the ITNs distributed through ANC and EPI channels.

4. Universal coverage campaign will cover all except one (Dar es Salaam) of the Global Fund regions shown in Figure 9.

Plans and justification for proposed activities with FY 2019 funding:

PMI will support rapid assessment surveys to determine the ITN coverage across the 14 regions that are included in the SNP. NetCALC, or other suitable programs, will be used to determine the ITN input required to maintain population access in the SNP regions at greater than 70 percent. PMI will support procurement and distribution of ITNs for SNP, as well as support the distribution of Global Fund procured ITNs through RCH channels in the SNP regions. The NMCP, through the 2018 to 2021 Global Fund grant, will procure all ITNs needed nationally for RCH distribution and will support the Medical Services Department (MSD) for distribution of ITNs through RCH in the 12 low prevalence regions. PMI will continue to support delivery of PBO synergist nets to Muleba district through the SNP channel.

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

c. Indoor Residual Spraying

Progress since PMI was launched

Since 2007, the NMCP has focused spraying in 18 high endemic districts in Lake Zone. This zone was selected based on the Lake Zone having the highest overall malaria prevalence, 34 percent among children under five years of age, at that time (2007/2008 HMIS). By 2012, the national malaria prevalence dropped from 18 percent in 2008 to 9 percent (2011/12 HMIS), with a large rebound to 14 percent reported in the 2015/16 DHS. The Lake Zone has also reflected this trend over time, going from 34 percent to 15 percent to 24 percent, in 2008, 2012, and 2016 respectively. Of three regions with the highest prevalence in 2016, Kagera with 41 percent and Geita 38 percent, are in the Lake Zone, and Kigoma at 38 percent is in the Western Zone.

Blanket spraying at district level in the highest malaria endemic districts, combined with high ITN coverage following the ITN universal coverage campaigns (2009 to 2011), were contributing factors to the dramatic drop in prevalence reported in the DHS/MIS surveys among children under five years of age in the Lake Zone between 2008 and 2012, and low ITN and IRS coverage were certainly among key factors contributing to the increased prevalence across the Lake Zone in 2016.

With increasing evidence of resistance to pyrethroids following the 2012 spray rounds, the insecticide was changed from pyrethroid to a carbamate (bendiocarb) in 2013. Based on evidence of resistance to bendiocarb, the insecticide was changed to pirimiphos-methyl CS, which has been used from 2014 to 2018.

Table 12. PMI-supported IRS activities in the Lake Zone, Tanzania: 2015-2019

Year	No. Districts Sprayed	Insecticide Used	No. Structures Sprayed	Coverage Rate	Population Protected
2015	7 (targeted)	Pirimiphos-Methyl CS (OP)	419,753	94%	2,110,198
2016	8 (targeted)	Pirimiphos-Methyl CS (OP)	487,553	95%	1,912,391
2017	9 (targeted)	Pirimiphos-Methyl CS (OP)	598,719	95%	2,137,746
2018	9 (targeted)	Pirimiphos-Methyl CS (OP) 8 districts Clothianidin 1 district	677,147	96%	2,506,212
2019	7 (targeted)	TBD – non-pyrethroid, long lasting insecticide	~450,000	~90%	~1,800,000
2020	7 (targeted)	TBD – non-pyrethroid, long lasting insecticide	~450,000	~90%	~1,800,000

Progress during the last 12-18 months

A review of the malaria incidence patterns from DHIS2 data for 2016 showed that for the IRS targeted districts in Kagera and Geita, peak incidence of malaria was reported late in the calendar year, with a drop off early in the following year. To optimize the effectiveness of IRS, the NMCP and PMI decided to move the timing of IRS for the three districts in Kagera (Bukoba Rural, Ngara, and Missenyi) and the two districts in Geita (Chato and Nyang'hwale) to a November/December timeframe. Those five districts were sprayed between 23 November and 20 December 2017. Four districts, two each in Mara (Butiama and Musoma Rural) and Mwanza (Kwimba and Sengerema), were sprayed between 14 February and 13 March 2018.

The program successfully sprayed Musoma Rural with a new WHO-approved insecticide: clothianidin. Interviews with household members in structures sprayed with clothianidin 50WG indicated good acceptance. Cone bioassay on five wall types following spraying produced mean mortality rates of greater than the WHO threshold of 80 percent in the two sentinel sites in Musoma Rural District five months after spraying when testing was unavoidably interrupted. This product will be used for all districts in the 2018/2019 IRS rounds.

Cone bioassay of walls sprayed with SumiShield 50WG produced mean mortality rates greater than the WHO threshold of 80 percent in the two sentinel sites in Musoma Rural district five months after spraying.

This was the third year for IRS in eight of the districts (Bukoba Rural, Missenyi, Ngara, Musoma Rural, Butiama, Kwimba, Sengerema, and Chato). This was the second year of repeated IRS in Nyang'hwale, Geita Region. Along with Nyahg'hwale, the 2019 IRS campaign will take place in six or seven new districts, depending on the overall population in those new districts and in view of possible cost saving by the IRS partner. The IRS insecticide to be used in 2019 and 2020 has yet to be determined.

Plans and justification for proposed activities with FY 2019 funding

PMI will work closely with the NMCP to select districts for IRS for spray rounds in late 2018/early 2019. The principal criteria used to determine which districts will be included in the three year cycle of IRS include: (1) overall malaria positivity rates, (2) incidence, as determined using DHIS2 and recent census data, (3) results from recent school-based surveys, and (4) evidence of vector resistance to pyrethroids. Operational factors are also considered. Nyang'hwale district will receive the third year of IRS in 2019. New districts selected in 2019 will be repeated in 2020.

Support blanket IRS in seven districts in the Lake Zone reaching approximately 450,000 structures and protecting about 1.8 million people. Under leadership from NMCP, PMI will select an appropriate non-pyrethroid, long-lasting insecticide for use in the IRS round in late 2019 and/or early 2020. A MOU between the GoT and NgenIRS, valid for a period from 2017 to 2019, allowed PMI to procure subsidized insecticide for IRS during that three year period.

PMI will work with its SBCC partner to mobilize districts and communities, communicate changes in the IRS strategy, such as moving from blanket to targeted and to focal spraying, and communicate changes in the insecticide being used.

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

2. Malaria in pregnancy

NMCP/PMI objectives

Mainland Tanzania implements the three-pronged approach to prevent the adverse effects associated with malaria in pregnancy (MIP) recommended by the WHO: (1) ITNs through ANC clinics, (2) IPTp with SP, and (3) prompt case management of pregnant women with malaria. The objectives are to achieve 80 percent coverage of two doses of IPTp, and 60 percent of 3+ doses of IPTp, 85 percent use of ITNs by pregnant women, and 100 percent prompt case management of malaria infections in pregnancy.

ITNs

Until mid-2014, the Tanzania National Voucher Scheme (TNVS) provided e-coupons to women at ANC visits that were redeemable at nearby retail outlets on the Mainland. This system has been replaced by direct provision of ITNs at first ANC visit.

IPTp

The MOHCDGEC has adopted the updated WHO policy of IPTp3+, which is to give three or more doses of SP monthly until the day of delivery, administered as directly observed therapy during ANC visits. In addition, in 2014 MOHCDGEC started implementation of a policy to screen all women with an mRDT at their first ANC visit, irrespective of symptoms, and treat those who test positive according to national guidelines. Moreover, if a woman is treated for malaria with an antimalarial at the ANC visit or in the 4 weeks before, it is not necessary to give her SP. Instead, she should be instructed to return in about a month for her next ANC visit and IPTp-SP should be given at that time. ANC testing data shows that malaria annual testing coverage increased from 60 percent in 2015 to 89 percent in 2017 and the ANC positivity rate decreased from 8.1 percent in 2015 to 6.7 percent in 2017. The results have been used on forecasting of malaria commodities (mRDTs and AL). These data are currently being used in the ongoing review of the National Malaria Strategic Plan 2015-2020. NMCP has presented these data in the surveillance bulletins that are distributed nationwide.

Iron/folate

Iron/folate combination (ferrous sulphate 200mg + folic acid 0.25mg) is provided at ANC according to national policy for prevention and treatment of anemia. High-dose folic acid is procured and provided for pediatric indications only and is not provided at ANC. The GoT continued to procure these commodities as part of its investments in maternal and child health. Currently MSD has two months of stock of iron/folate; an additional shipment is expected in April and May 2018. The PMI team will continue to work with GoT and donors to make sure appropriate budgets are allocated.

Case management of acute malaria

Case management of uncomplicated malaria in pregnancy follows WHO recommendations. For severe malaria in the first trimester, current national guidelines includes injectable quinine (refer to case management section). NMCP is currently revising the malaria diagnosis and treatment guidelines to include injectable artesunate as the treatment of choice for severe malaria in the first trimester as recommended per WHO guidelines. PMI will support the revision and rollout of the revised guidelines. Treatment in the second and third trimesters is ACTs.

Progress since PMI was launched

The TNVS, which provided highly subsidized ITNs to pregnant women on the Mainland, was introduced in 2004 as part of a keep-up strategy between universal campaigns. The TNVS achieved its goal of distributing two million nets in 2013 but was defunded in 2014 after reports of provider fraud. ITN use among pregnant women was at 76 percent on the Mainland in 2012, but at only 36 percent in Zanzibar (HMIS) after universal coverage campaigns in 2011-2012. Since 2004, PMI and maternal health funding has focused on rolling out the national training on FANC, a package of antenatal services which includes IPTp. Cumulatively, 7,113 providers and trainers of trainers (ToTs) from 3,416 facilities have been trained on FANC clinical skills.

With support from the MIP Task Force, the NMCP updated the IPTp policy (IPTp3+) in all national documents including FANC guidelines, the National Guidelines for Malaria Diagnosis and Treatment, and the 2014 version of the HMIS Reproductive and Child Health book. The IPTp3+ policy was officially adopted by the MOHCDGEC in October 2014 and PMI supported the training of staff at public dispensaries during national rollout (staff at public hospitals and health centers were trained in advance of policy adoption). HMIS registers have also been updated to record up to four doses of IPTp.

PMI has also supported development of pre-service malaria in pregnancy training curriculum, which has contributed to approximately 1,600 new graduates with FANC skills each year since 2004. Training in ANC continues when DHMTs invest their own budgets and use PMI-trained trainers to conduct further training within their district. PMI also supported pre-service education at ten health training institutions on FANC, including MIP and the updated IPTp3+ policy.

In addition, PMI supported results-based financing (see Health System Strengthening (HSS) section for more information) that includes IPTp2+ and SP availability among the indicators used to determine cash incentives paid to individual health care providers, as well as health facilities.

The MIP Task Force, a group composed of members from the NMCP, the Reproductive and Child Health group, and other relevant stakeholders, has been working to address challenges in SP availability and IPTp uptake, and supported the adoption and rollout of IPTp3+ policy. The Ministry-led Safe Motherhood Campaign (*Wazazi Nipendeni*), launched in 2012, has been spreading IPTp messages through multimedia campaigns. PMI has supported implementing partners to conduct several activities in several regions of the Lake Zone and the Southern Zone. These activities include orienting Council and Regional Health Management Teams on MIP, improving supportive supervision for case management through the Malaria Service and Data Quality Improvement project (MSDQI), sensitizing communities for early ANC booking and early health seeking behavior, monitoring stock status of MIP commodities, and periodic data review and quality assessment meetings. Through a combination of MIP activities and change in IPTp3+ policy, Tanzania has observed measurable improvement in IPTp2 uptake. The 2017 MIS shows improvement in IPTp uptake, by 56 percent and 25.8 percent for IPTp2 and 3 respectively. HMIS data also shows good progress; in 2014 IPTp2 uptake was 34.3 percent, rising to 65.4 percent in 2017, while IPTp3 is at 30 percent. In addition, PMI has observed improvement of IPTp2 and 3 in Lake and Southern Zone regions; for example, Mtwara and Lindi have achieved the national target of IPTp2 and nearly reaching IPTp3 target of 60 percent.

Progress during the last 12-18 months

After the TNVS was stopped in 2014, PMI supported a scoping exercise to identify new approaches for routine distribution. Based on this exercise, the MOHCDGEC, PO-RALG, and development partners

established the broad outlines of a system to deliver ITNs, free of charge, to women at ANC clinics. PMI is the principal donor for this new system which is being rolled out in 14 high malaria endemic areas in the Lake Zone (Regions of Simiyu, Shinyanga Mwanza, Kigoma, Simiyu, Geita, Kagera, and Mara), Southern Zone (Regions of Mtwara, Lindi, and Ruvuma), and other regions (Coastal, Tabora, Morogoro, and Katavi). The Global Fund also procured ITNs for 12 regions. Further details can be found in the ITN section of the MOP.

NMCP, in collaboration with the MIP task force, has been working to update the FANC guidelines to include the 2016 WHO recommendations that call for a minimum of eight contacts with a health provider. One contact during the first 12-weeks gestation, and subsequent contacts at 20, 26, 30, 34, 36, 38, and 40 weeks gestation. An extra contact has been added at 13-16 weeks to ensure the first dose of IPTp is administered as early as possible in the second trimester. The approved guidelines are expected to be rolled out nationally starting mid-2018. PMI will support orientation of these new guidelines to health care workers (HCWs) in the Lake and Southern Zones of Tanzania.

PMI supported NMCP in leveraging existing district CHMTs, prevention of mother-to-child transmission of HIV, and reproductive, newborn, and child health platforms to train staff and improve the quality of MIP services through the NMCP quality improvement package MSDQI in all seven regions of Lake Zone (1,817 health facilities) and four regions of Southern Zone (1,141 health facilities). This standardized package is used in health facilities to observe diagnostic and treatment practices of providers at ANC. Facilities with low performance are targeted for supportive supervision and mentorship, and performance is monitored using data from the MSDQI package and DHIS2. MSDQI mentors will support facility HCWs to appropriately assess danger signs, take an adequate clinical history, conduct a sufficient physical examination, provide adequate counseling and communication, and ensure data quality in the HMIS Register, Tally, Summary, and DHIS2. These projects will also perform quarterly tracking of SP stocks at health facilities and conduct feedback meetings with Regional and District Health Management Teams to improve SP availability.

The GoT has consistently allocated and disbursed funds to procure SP as part of its investments in maternal and child health. In 2017, GoT procured 9.7 months of stock, which is above the minimum stock as of February 2018 (the MOHCDGEC has set minimum and maximum standards for stock availability at six and ten months respectively). More shipments are expected to arrive in April 2018. The PMI team anticipates that the GoT will continue their commitment to the procurement of SP. PMI will continue working with NMCP to make sure that the GoT continues to meet its commitments.

Table 13. Status of IPTp Policy in Mainland

Status of Training on Updated IPTp policy		Number and Proportion of HCW Trained on New Policy in the Last Year	Are Updated IPTp Guidelines Available at Facility Level?	ANC Register Updated to Capture Three Doses of IPTp-SP	HMIS/ DHIS2 Updated to Capture Three Doses of IPTp-SP
Completed/Not Completed	Date				
Completed	August 2015	N/A	Yes	Yes	Yes

Table 14. Status of ANC Guidelines in Mainland

Status of 2016 WHO ANC Guidelines Adoption		Number and Proportion of HCWs Trained in New ANC Guidelines in Last Year	Are Updated Adopted ANC Guidelines Available at Facility Level?	Additional IPTp Contact Added to ANC Schedule at 13 Weeks?	ANC Register Updated to Capture 8-9 ANC Contacts?	HMIS/DHI S2 Updated to Capture 8-9 ANC Contacts
Started/ Completed/N of Completed	Date Completed (or expected)					
October 2017	June 2018	N/A	N/A	Yes	N/A	N/A

Commodity gap analysis

In 2017, GoT has allocated resources to procure SP, it is expected that the country will meet its SP needs and hence PMI will no longer be required to procure SP; rather PMI will concentrate on providing supply chain support to address persistent challenges in distributing SP to the peripheral facilities.

Table 15. SP Gap Analysis for Malaria in Pregnancy

Calendar Year	2018	2019	2020
Total Population	52,209,530	53,827,879	55,514,265
SP Needs			
Total Number of Pregnant Women Attending ANC	2,088,381	2,153,115	2,220,571
Total SP Need (in Treatments)	4824161	5232070	5773484
Partner Contributions			
SP Carried Over from Previous Years	3,892,067	3,850,506	3,529,670
SP from Government	4,782,600	4,911,233	5,473,067
SP from Global Fund	0	0	0
SP from Other Donors	0	0	0
SP Planned with PMI Funding	0	0	0
Total SP Available	8,674,667	8,761,739	9,002,737
Total SP Surplus (Gap)	3,850,506	3,529,669	3,229,253

1. DHIS2 and DHS/MIS used as a source of data. Assumptions were made based on ANC attendance and IPTp uptake as follows: The number of pregnant women attending ANC according to the DHS/MIS 2016 is 98 percent and the proportion of women receiving IPTp2 and IPTp4 is from DHIS2 data (2016) adjusted by reporting rate and completeness. Assumptions were made based on ANC attendance and IPTp uptake as follows: in 2018, 84 percent of pregnant women will receive IPTp1, 70 percent IPTp2, 44 percent IPTp3, and 33 percent IPTp4; in 2019, 86 percent of pregnancy women will receive IPTp1, 75 percent IPTp2, 46 percent IPTp3, and 36 percent IPTp4 and in 2020, 90 percent of pregnant women will receive IPTp1, 80 percent IPTp2, 50 percent IPTp3, and 40 percent IPTp4.

2. This is number of treatments not number of pills. Women would get IPTp at 4 visits and each visit they would get 3 tablets.

Plans and justification for proposed activities with FY 2019 funding

PMI's funding will contribute to a larger effort funded by other U.S. Agency for International Development (USAID) health programs to improve demand for and the quality of ANC on the Mainland, including malaria prevention and treatment of acute infections. In collaboration with the National Ministry Trainers and Region and Council Health Management Teams (R/CHMTs), PMI will continue to support cascading of MSDQI mentorship to ANC healthcare providers across the Lake and Southern Zones and Tabora region. PMI will support continued training and supervision for IPTp3+ and case management integrated with family planning, maternal and child health, and HIV programming. Support for SBCC to increase ITN use, ANC attendance, and IPTp uptake will continue. PMI will support provision of long-lasting ITNs to pregnant women through continuous distribution at ANC on the Mainland (more details in the ITN section).

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

3. Case management

NMCP/PMI objectives

The case management goal of the National Malaria Strategic Plan 2015–2020 is to achieve universal access to high quality malaria diagnostic testing and treatment in both public and private health facilities. The national targets are to increase to 80 percent the proportion of people with suspected malaria who: (1) receive appropriate diagnosis and treatment within 24 hours of onset of fever, and (2) receive appropriate management of both uncomplicated and severe malaria according to the National Guidelines for the Diagnosis and Treatment of Malaria, 2013.

The National Guidelines for the Diagnosis and Treatment of Malaria, 2013 calls for parasitological confirmation by microscopy or mRDT for all patients with suspected malaria before initiation of treatment. The estimate for reliance on the private sector in mainland Tanzania is that approximately 40 percent of patients with fever seek treatment at private health facilities. Microscopic examination of Giemsa-stained blood films remains an important component of malaria diagnosis throughout Tanzania but in the public sector is only available at regional and district hospitals and some health centers (about 20 percent of all health facilities) whereas about 70 percent of malaria cases in the private sector are confirmed via blood smears. Within the Dar Es Salaam region, however, over 50 percent of malaria cases are diagnosed by microscopy in public facilities. HMIS data show that in 2017 overall in mainland Tanzania 79 percent of malaria cases were confirmed by mRDT, 16 percent by microscopy, and 4 percent were unconfirmed in outpatient departments. In the inpatient department in 2017, overall 92 percent of malaria cases were confirmed by mRDT and eight percent by microscopy. The rate of unconfirmed cases has been steadily declining from 36 percent in 2014 to 4 percent in 2017.

A national malaria microscopy quality assurance and quality control (mMQA/QC) was established in 2017 following the completion of the slide bank at the Malaria Reference Laboratory within the National Health Laboratory and Quality Assurance Training Center (NHLQATC). The mMQAQC system includes monthly blinded cross-checking of blood slides by a district supervisor and periodic external QA via blinded positive and negative samples sent from the slide bank. District supervisors also monitor mMQA/QC and mRDT QC at the health facility level through the MSDQI program designed to improve microscopy and mRDT diagnostic quality via routine monitoring and training by district and regional supervisors and mentorship. Lot testing of mRDT kits is coordinated by the NMCP using a

WHO protocol and random samples are sent to the NHLQATC, and to WHO-identified qualified laboratories in Cambodia or the Philippines.

The use of ACTs in mainland Tanzania began in 2006 with artemether-lumefantrine (AL) as the first-line drug for the treatment of uncomplicated malaria. In 2013, the NMCP revised the National Diagnostic and Treatment guidelines to include injectable artesunate for the treatment of severe malaria. The guidelines call for referral of patients with severe malaria from lower level facilities to the nearest health center after first giving the patient an intramuscular injection of artesunate. Intramuscular artemether or quinine can be used as second-line drugs if artesunate is not available. Use of pre-referral rectal artesunate at peripheral health facilities is also permitted if injection is not available yet in practice does not occur as rectal artesunate is not procured by either the GoT or its partners.

The NMCP has participated in renewed efforts by MOHCDGEC in the development of the National Community Based Health Program to further expand health services using CHWs. The proposal from the Technical Advisory Committee is for CHW to perform mRDT and provide first line antimalarials to confirmed cases, but this strategy has not yet been approved by the relevant GoT authorities. The goal of MOHCDGEC is to train and deploy more than 33,000 CHW with the aim of having a minimum of two full-time CHWs per village and linked to a nearby public health facility. As of the end of 2017, the government has trained approximately 2,600 CHWs. The estimated cost for the roll out plan for CHWs is \$150 million over three years based on a concept developed by UNICEF. The NMCP included a proposal within their 2018-2021 Global Fund grant to implement integrated community case management (iCCM) in five priority regions based on the following criteria: (1) malaria transmission using prevalence estimates from the 2017 school malaria parasitological survey (SMPS 2017), (2) access to health facilities based on walking distance time, and (3) population served per health facility. The top 5 priority regions were Katavi, Kagera, Geita, Kigoma, and Ruvuma, all PMI-supported regions. The proposal was approved by Global Fund but above funding allocation so will not be implemented by NMCP through this funding source.

NMCP works with both the public and private sector to promote universal access to mRDTs and ACTs. Through the support of the Global Fund and first-line buyers, the availability of quality, affordable ACT is facilitated in the private sector via a co-pay mechanism. NMCP's anticipated implementation strategies include expansion of mRDT diagnostic services to Accredited Drug Dispensing Outlets (ADDOs) of which there are over 6,000 in mainland Tanzania. The majority are located in rural areas where access to malaria commodities and testing services is limited. However, despite a pilot program that demonstrated the feasibility of mRDT introduction to ADDOs and consensus between the MOHCDGEC and various development and implementing partners that the program should be scaled-up, the relevant regulatory bodies have not yet approved the introduction of mRDT testing in ADDOs.

Table 16. Status of Case Management Policy and Implementation in Mainland Tanzania

Status of Case Management Policy in Mainland Tanzania According to the National Guidelines for Diagnosis and Treatment of Malaria, 2013		Currently Being Implemented? Are there Plans to Modify the Recommendations?
What is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria?	Artemether-lumefantrine (AL)	Currently being implemented? Yes Plans to modify recommendations? No
What is the second-line treatment for uncomplicated <i>P. falciparum</i> malaria?	Dihydroartemisinin-Piperaquine (DPQ) or Artesunate-Amodiaquine (ASAQ)*	Currently being implemented? Yes Plans to modify recommendations? Yes*
What is the first-line treatment for severe malaria?	Injectable artesunate	Currently being implemented? Yes Plans to modify recommendations? No
In pregnancy, what is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria in the first trimester?	Oral Quinine ^a	Currently being implemented? Yes Plans to modify recommendations? Yes ^b
In pregnancy, what is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria in the second and third trimesters?	Artemether-lumefantrine (AL)	Currently being implemented? Yes Plans to modify recommendations? No
In pregnancy, what is the first-line treatment for severe malaria?	Injectable quinine ^a (1 st trimester); injectable artesunate (2 nd and 3 rd trimester)	Currently being implemented? Yes Plans to modify recommendations? Yes ^b
Is pre-referral treatment of severe disease recommended at peripheral health facilities? If so, with what drug(s)?	Intramuscular (IM) artesunate; IM artemether ^e or quinine ^a if artesunate unavailable	Currently being implemented? Yes Plans to modify recommendations? No
Is pre-referral treatment of severe disease recommended for community health workers? If so, with what drug(s)?	NA	NA
If pre-referral rectal artesunate is recommended, for what age group? (note: current international guidelines do not recommend administering to those ≥ 6 years)	Pre-referral rectal artesunate is allowed and is based on weight. Age not specified.	NA

* Dihydroartemisinin-Piperaquine (DPQ) and Artesunate-Amodiaquine (AS/AQ) are the second-line ACT's listed in the NMCP treatment guidelines; however, neither are procured for public sector health care facilities. They are registered by Tanzania Food and Drug Administration (TFDA) and widely available in the private sector. The manufactured DPQ currently registered with TFDA are non-quality assured. NMCP is updating their guidelines to introduce a concept of multi-ACT availability; the updated guidelines are expected to be completed in 2018.

^a Oral and injectable Quinine are currently only procured by GoT and available at the Medical Services Department (MSD).

^b NMCP is updating their treatment guidelines reflecting the most recent WHO recommendations on the treatment of uncomplicated and severe malaria in the first trimester; the updated guidelines are expected to be completed in 2018.

^e IM artemether not procured for public sector health facilities but is registered by TFDA and available in the private sector.

Progress since PMI was launched

PMI has supported several interventions to improve access to ACTs and case management at the health facility level with an emphasis on training health workers in comprehensive malaria case management, including management of severe malaria and malaria in pregnancy. After successfully completing dissemination of the National Diagnostic and Treatment Guidelines, 2013 to public hospitals and health centers in 2015, later that same year, the NMCP, with PMI support, completed dissemination to 4,869 public dispensaries in all regions of mainland Tanzania.

Since 2006, PMI has supported the procurement and scale-up of mRDTs, assisted the MOHCDGEC's Diagnostic Services Section to conduct comprehensive malaria diagnostics training sessions at the NHLQATC, and worked with partners to develop a Malaria Reference Laboratory within the NHLQATC. With PMI and Global Fund support, the NMCP completed implementation of mRDT provision and training to all public health facilities in all districts in November 2012.

In response to assessments showing poor quality of both malaria microscopy and mRDT testing at almost all levels of the health system, in 2014 the NMCP with PMI support implemented Outreach Training and Supportive Supervision (OTSS) to improve the quality of malaria case management. OTSS relies upon trained personnel from District and Regional Health Management Teams to conduct supportive supervision at quarterly intervals, targeting at least two HCWs in each public health facility that performs mRDT testing. Implementation began in late 2014 in one region with scale-up to 13 regions by December 2015, and an additional nine regions were reached in 2016. The success of the malaria diagnostic quality assurance/quality control (QA/QC) programs and the OTSS led the NMCP to work with PMI-supported partners to combine core elements of these case management systems with the Data Quality Audits, another NMCP and PMI-supported system to improve data management and quality. This combined system is referred to as the MSDQI package. In addition to mRDT and microscopy QA/QC, the MSDQI program also focuses on improving the clinical skills of individual HCW and adherence to established IMCI and malaria diagnostic and treatment guidelines. As with the malaria diagnostic QA/QC program, MSDQI also uses the District and Regional Health Management Teams to supervise implementation of the tool at health facilities. MSDQI development was completed in 2016 and nationwide rollout of an orientation to the program began in 2017 (see next section).

In 2016, PMI supported the provision of technical assistance for two NMCP workshops to update the National Malaria Microscopy QA manual and conducted malaria microscopy skills refresher training to 22 laboratory technicians in the Eastern Zone regions. The National Slide Bank was transferred to the NHLQATC in 2016.

PMI also supported therapeutic efficacy monitoring of AL in 2011, 2012, 2016 (see Table 17).

Progress during the last 12-18 months

In PMI supported regions, MSDQI has been introduced in 1,817 facilities across 7 regions of the Lake and Western Zones, and 200 health facilities across four regions in the Southern Zone. In PMI-supported regions of the Lake and Western Zones, the MSDQI supervisors use an electronic data system of the MSDQI tool through tablet devices with comprehensive checklists and provide immediate feedback to the HCW. By the end of 2017, PMI partners have strengthened the capacity of 690 new supervisors in the Lake and Western Zones to provide onsite mentoring in case management. In addition, PMI partners have supported quarterly district and regional-level workshops to provide facility-level results from the MSDQI visits and share lessons learned on MSDQI implementation.

Within PMI-supported regions in 2017, 478 HCWs and 32 trainers received training on IMCI, and 187 health facilities were evaluated for adherence to IMCI guidelines. In the Southern Zone, 180 members of R/CHMTs received supervisor training for MSDQI, and supportive supervision and mentorship visits were conducted in 581 health facilities across 32 councils. A total of 179 HCWs received training on mRDT QC across the 4 regions. In Kigoma, one of the highest malaria burden regions in the Western Zone, 40 regional/council trainers conducted mRDT QC training for 534 HCWs across 267 health facilities. With support from PMI, the NMCP continued the national rollout on orientation to the MSDQI package, which was finalized in 2017. Beginning in the third quarter of 2018, NMCP plans to standardize the MSDQI tool based on the version being utilized in PMI-supported regions, and begin training for implementing the MSDQI tool and site supervision in the regions not supported by PMI.

PMI supported the finalization of the National Malaria Slide Bank located at the NHLQATC in 2017, and 841 laboratory workers were trained using the slide bank through a series of laboratory technician training courses from April to December 2017 with support from the Global Fund. External QA using the slide bank for proficiency testing of microscopists at health facilities was also initiated in 2017. Between July and November 2017, Blood Slides were delivered to the 200 participating health facilities. An electronic data management system has not yet been implemented.

Therapeutic efficacy monitoring to assess continued in vivo efficacy of AL was completed at four out of eight sites in 2017. Of the 907 children between the ages of 6 months and 10 years screened, 272 (30.0 percent) were recruited and 261 (96 percent) either completed the 28 days of follow-up visits or had an assigned treatment outcome. Only one patient at Kyela had early treatment failure and adequate clinical and parasitological response was reported for 216 (82.8 percent) patients. After Polymerase chain reaction (PCR) correction, four patients (one from Kyela and three from Nagaga) had recrudescence infections giving a PCR corrected adequate clinical and parasitological response of 100 percent at Chamwino and Igombe, and 98.5 percent and 96 percent at Kyela and Nagaga, respectively. Samples were tested for molecular markers of artemisinin resistance including K-13 and Pfmdr1, and the findings will be submitted in future reports.

Table 17. PMI-funded Therapeutic Efficacy Studies (TESs)

Completed TESs				
Year	Site Name	Treatment Arm(s)*	PCR-Corrected ACPR	Plans for k13 Genotyping
2011	Mkuzi	AL		
2011	Ujiji	ASAQ		
2011	Kibaha	ASAQ		
2011	Mlimba	AL		
2012	Butimba	AL		
2012	Nagaga	AL		
2012	Kyela	AL		
2012	Chamwino	AL		
2016	Mkuzi	AL	98.6%	PARMA Network
2016	Ujiji	AL	100%	PARMA Network
2016	Kibaha	AL	100%	PARMA Network
2016	Mlimba	AL	100%	PARMA Network
2017	Chamwino	AL	100%	PARMA Network
2017	Igombe	AL	100%	PARMA Network
2017	Kyela	AL	98.5%	PARMA Network
2017	Nagaga	AL	96.0%	PARMA Network
Ongoing TESs				
Year	Site name	Treatment arm(s)	PCR-Corrected ACPR	Plans for k13 Genotyping
2018	Mkuzi	AL	Pending	Local institution
2018	Ujiji	AL		
2018	Kibaha	AL		
2018	Mlimba	AL		
Planned TESs (funded with previous or current MOP)				
Year	Site name	Treatment arm(s)	PCR-Corrected ACPR	Plans for k13 Genotyping
2019	Chamwino	AL	Pending	Local institution
2019	Igombe	AL		
2019	Kyela	AL		
2019	Nagaga	AL		

* Beginning in 2017, ASAQ and DPQ were tested at two sites with Global Fund support. ASAQ was included during the period 2000–2006 before the change of drug policy from SP to ACT. The data for that period were used to justify the selection of Artemether-lumefantrine as the first-line ACT. In the past, DPQ had been tested sporadically by some research groups, mainly to monitor safety, and not systematically included into the context of nationally representative TES.

Table 18. RDT Gap Analysis

Calendar Year	2018	2019	2020
RDT Needs			
Total Country Population	52,209,530	53,827,879	55,514,265
Population At Risk for Malaria	52,209,530	53,827,879	55,514,265
PMI-Targeted At-Risk Population			
Total Number of Projected Fever Cases	29,499,161	25,835,019	27,164,607
Percent of Fever Cases Tested with an RDT	90 percent	90 percent	90 percent
Total RDT Needs	26,549,245	23,251,517	24,448,146
Partner Contributions (to PMI target population if not entire area at risk)*			
RDTs Carried Over from Previous Year	16,946,250	13,942,580	13,935,088
RDTs from Government	0	0	0
RDTs from Global Fund	16,781,350	23,244,025	23,993,825
RDTs from Other Donors	0	0	0
RDTs Planned with PMI Funding	6,764,225	0	0
Total RDTs Available	40,491,825	37,186,605	37,928,913
Total RDT Surplus (Gap)	13,942,580	13,935,088	13,480,767

Footnotes:

1. Malaria RDT quantification is based on the assumption that all cases of fever will be tested for malaria parasites and that 90 percent will be by mRDT. Malaria RDT quantification is also supported by estimating the number of suspected malaria cases necessitating use of an mRDT to align with NMCP's campaign, "Not ever fever is malaria." Estimates for 2019-2020 are based on trends in malaria cases reported between 2014-2017 in the NMCP's HMIS/DHIS2 malaria surveillance system. NMCP's HMIS/DHIS2 surveillance data includes the frequencies of all suspected, clinical, and confirmed malaria cases for both uncomplicated and severe malaria from over 90 percent of all public health facilities on Mainland with an overall reporting rate of 98 percent in 2017.
2. In spite of the appearance of surpluses year to year, in practice the surpluses have not occurred. PMI has been asked to fill gaps between GF procurements. PMI will continue to work closely with the NMCP and Global Fund to analyze commodity quantifications, and future orders will be regularly reassessed and adjusted as needed.
3. Population projections are from the national census done in 2012 with an extrapolation of 2.7 percent population growth.
4. Total fever cases are obtained from DHIS2.
5. RDTs carried over = Stock on Hand at the end of the year, December 31st (from pipeline).
6. The Global Fund contributions are commitments made with the uncertainty of timing of disbursements. RDTs/ACTs planned with PMI funding for 2018 are included in case there are delays with Global Fund planned procurements. All mRDTs will be procured by Global Fund for 2019 and future years.
7. Calendar years used reflect Tanzania's financial years, i.e. July to June.
8. Total mRDTs account for other testing intervention such as TES, training, and QA.

Table 19: ACT Gap Analysis

Calendar Year	2017	2018	2019
ACT Needs			
Total Country Population	52,209,530	53,827,879	55,514,265
Population At Risk for Malaria	52,209,530	53,827,879	55,514,265
PMI-Targeted At-Risk Population			
Total Projected Number of Malaria Cases	13,352,014	10,463,231	10,043,911
Total ACT Needs	13352014	10463231	10043911
Partner Contributions (to PMI target population if not entire area at risk)			
ACTs Carried Over from Previous Year	12,243,600	12,987,806	12,694,035
ACTs from Government	0	0	0
ACTs from Global Fund	7,349,310	10,169,460	10,487,400
ACTs from Other Donors	0	0	0
ACTs Planned with PMI Funding	6,736,910	0	0
Total ACTs Available	26,329,820	23,157,266	23,181,435
Total ACT Surplus (Gap)	12,977,806	12,694,035	13,137,524

Footnotes:

1. Population projections are from the national census done in 2012 with an extrapolation of 2.7 percent population growth.
2. The target population at-risk is mainland Tanzania.
3. Estimates of the total malaria projected cases for 2019–2020 are based on trends in malaria cases reported between 2014–2017 in the NMCP's HMIS/DHIS2 malaria surveillance system. NMCP's HMIS/DHIS2 surveillance data includes the frequencies of all suspected, clinical, and confirmed malaria cases for both uncomplicated and severe malaria from over 90 percent of all public health facilities on Mainland with an overall reporting rate of 98 percent in 2017.
4. ACTs carried over = Stock On Hand at the end of the year (from pipeline). In spite of the appearance of surpluses year to year, in practice the surpluses have not occurred. PMI has been asked to fill gaps between GF procurements. PMI will continue to work closely with the NMCP and Global Fund to analyze commodity quantifications, and future orders will be regularly reassessed and adjusted as needed.

Quantification of microscopes

NMCP procured 739 microscopes for the public health centers and hospitals where malaria microscopy is conducted to target one microscope per facility through funding from the Global Fund grant that ended in 2017. NMCP is currently coordinating with MSD to distribute these microscopes to those facilities and expects this to be completed in 2018. The current need for and gap of microscopes for NHLQATC is 40 (need) and 10 (gap), for Singida HTI is 50 (need) and 40 (gap), and MDC-Sekou Toure is 20 (need) and 10 (gap).

Quantification of IV artesunate/IM artemether

Intramuscular Quinine is currently only procured by GoT and available at the MSD. Intramuscular Artemether is not procured for public sector health facilities but is registered by the Tanzania Food and Drug Administration (TFDA) and available in the private sector.

Table 20. Artesunate Gap Analysis

Calendar Year	2018	2019	2020
Artesunate Needs			
Total Country Population	52,209,530	53,827,879	55,514,265
Population At Risk for Malaria	52,209,530	53,827,879	55,514,265
PMI-Targeted At-Risk Population			
Total projected number of severe malaria cases	468,574	457,722	447,122
Total Artesunate Needs	2,606,509	2,673,831	2,878,887
Partner Contributions			
Artesunate Carried Over from Previous Year	3,838,395	1,231,886	3,451,473
Artesunate from Government	0	0	0
Artesunate from Global Fund	0	2,715,220	2,964,327
Artesunate from Other Donors	0	0	0
Artesunate Planned with PMI Funding		2,178,198	0
Total Artesunate Available	3,838,395	6,125,304	6,415,800
Total Artesunate Surplus (Gap)	1,231,886	3,451,473	3,536,913
Footnote: 1. The number of severe malaria cases are estimated based on trends in severe malaria cases reported between 2014-2017 in the NMCP's HMIS/DHIS2 malaria surveillance system. NMCP's HMIS/DHIS2 surveillance data includes the frequencies of all suspected, clinical, and confirmed malaria cases for both uncomplicated and severe malaria from over 90 percent of all public health facilities on Mainland with an overall reporting rate of 98 percent in 2017.			

Quantification of rectal artesunate

Use of pre-referral rectal artesunate at peripheral health facilities is also permitted if injection is not available yet. In practice it does not occur as rectal artesunate is not procured by either the GoT or its partners. The NMCP submitted a Global Fund grant application that included the implementation of iCCM and the use of rectal artesunate in five priority regions for 2018-2020. The proposal was approved by Global Fund but above funding allocation so will not be implemented by NMCP through this funding source (see NMCP/PMI objectives in case management section). Even without an iCCM program, PMI/Tanzania would be supportive of procuring rectal artesunate when the guidelines incorporate implementation of rectal artesunate consistent with WHO recommendations. The NMCP guidelines are scheduled to be updated by the end of 2018.

Plans and justification for proposed activities with FY 2019 funding

The NMCP's continuing priorities for 2020 are to improve the quality of diagnostic and case management services in both the public and private sectors; to maintain and improve antimalarial drug supplies in the public sector; to improve access, quality, and affordable ACTs in the private sector; to strengthen the pharmacovigilance system; and to strengthen therapeutic drug efficacy monitoring.

Tanzania procures most of its malaria commodities through the Global Fund and intends to procure 100 percent of mRDTs and injectable artesunate for FY 2019 through the same mechanism. PMI supports

drug procurement for a portion of the ACTs required by the public sector and helps fill unexpected gaps throughout the year.

PMI has fully funded the establishment of the National Malaria Slide Bank, the foundation of the microscopy external quality assurance system, and maintenance of the bank will be provided by the Global Fund. PMI FY 2019 support will include the expansion of capacity from one to three national laboratories to provide microscopy training and administration of the National Competency Assessment, as well as funds for the every three year recertification of microscopy skills using the National Competency Assessment for those certified in 2017.

Optimizing case management of febrile illness remains an ongoing challenge in Tanzania as it is throughout much of Africa. PMI will continue to support improvement of malaria case management with an emphasis on integration of service delivery with other major health priorities. PMI funds will be used to support the continued implementation of the MSDQI package and scale up of the electronic data system for recording, reporting, and using data in the Lake and Southern Zones as well as in Tabora region. Implementation of the MSDQI package in other regions of mainland Tanzania will be funded by the Global Fund with partial support from PMI via funds allotted to the NMCP for integrated supportive supervision and technical oversight.

Programmatic decisions regarding changes to malaria treatment policy require continuous data to demonstrate that first and second-line regimens remain effective at treating malaria parasitemia. In FY 2019, PMI will continue to support drug efficacy monitoring following the standard WHO protocol at four sentinel sites in mainland Tanzania and will include molecular testing of antimalarial resistance markers.

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

4. Cross-cutting and other health systems strengthening

In order to successfully implement the aforementioned activities, PMI Tanzania supports a suite of activities that cut across and benefit insecticide- and drug-based prevention and case management activities. For example, availability of high-quality commodities is necessary to ensure high ITN coverage and effective case management, and health-seeking behavior of individuals and communities is necessary to improve coverage of all interventions. In addition, the gains achieved in malaria control in Tanzania can only be sustained if there are strong health systems and local capacity. Hence, systems strengthening and capacity building are intrinsic in all PMI intervention-specific activities previously mentioned (e.g., training and supervision of health workers, technical assistance for planning and monitoring interventions, etc.). Non-intervention specific or cross-cutting health systems strengthening activities are described below.

a. Pharmaceutical management

NMCP/PMI objectives

The NMCP objective for pharmaceutical management is to ensure that commodities used in malaria prevention and case management are consistently safe, quality assured, and available in at least 90 percent of the points of care by 2020. Procurement and supply management on the Mainland is supported by the GoT, Global Fund, and PMI. The MOHCDGEC has set minimum and maximum

standards for stock availability. The minimum is two months and maximum is four months at health facility level, and the minimum is five months and maximum is nine months at MSD level.

Progress since PMI was launched

PMI supported the strengthening of the logistics system for ordering essential medicines, which includes ACTs, artesunate, SP, and mRDTs and is also working to improve the distribution system for essential medicines. PMI supported end-use-verification exercises which were conducted on a quarterly basis on the Mainland. Starting October 2014, the activity was extended to Zanzibar covering 110 facilities. End use verification (EUV) surveys showed that there has been a steady reduction in the percentage of facilities experiencing a stock out of anti-malarials or mRDTs on the day of assessment but some stock outs remained, particularly for SP, which has largely been procured by GoT. In general, a combination of the rollout of the Integrated Logistic System (ILS) Gateway, involvement of the Logistics Management Unit (LMU), the use of the eLMIS, and a consistent and adequate supply of key malaria commodities at the national level have led to this reduction. PMI continues to support the capacity strengthening of GoT partners within the national system, stakeholders, and institutions in supply chain management. The LMU, a part of the MOHCDGEC, provides mentoring and on-the-job training to health facility personnel and the CHMT on logistics issues. They also support MSD zones on zonal orders and respond to questions and address challenges from facilities on stock availability. They support redistribution of commodities and monitor the commodity pipeline at MSD facilities and health facilities to avoid stock imbalances. MSD distribution processes continue to be a challenge and are one of the main causes for continued stockouts at health facilities.

PMI has co-funded the LMU's development of a Performance Monitoring Plan for key indicators including on-time delivery and order fill rate. Measuring these indicators and raising awareness of this performance will help the LMU and other stakeholders to hold the MSD accountable. On an annual basis, with support from PMI and other partners, NMCP, and MSD conduct a quantification of malaria commodities and monitor the supply plan for the whole country. Bi-annual reviews are conducted to update stock status tables and procurement plans. This exercise has assisted the MOHCDGEC, NMCP, MSD, and the Pharmaceutical Services Section to manage the commodity pipeline for the country.

Progress during the last 12-18 months

Through its procurement contractor, PMI facilitated the procurement of malaria commodities. A total of \$2,009,806 was spent on delivery of commodities (ACTs and mRDTs) during the period from January 2017 through December 2017. PMI was able to deliver 2,543,790 treatments of ACTs.

PMI continued to support national quantification review of malaria commodities for the forecast period from July 2017 to June 2019. Support on monitoring of stock levels of all malaria commodities at MSD central and zones and health facilities through routine physical counts, the eLMIS, and Epicor 9 at MSD also continued.

PMI supported improvement of the visibility and management of logistics data for malaria commodities through development of dashboards which integrated data on ITNs across the eLMIS and DHIS2, to better visualize clients given ITNs with consumption and stock on hand data.

PMI contributed to support planning, designing, and carrying out the holistic supply chain review activity, facilitated development of the Costed Implementation Plan and recommended reprioritization

of activities, all geared to enable coordination of supply chain interventions by the GoT which includes management of malaria commodities.

Also, PMI continued to support a malaria commodities quantification exercise; results were used to inform funding mobilization and budgeting by the GoT and donors. PMI support has enabled the NMCP to achieve a forecast accuracy of 82 percent for antimalarial and over 90 percent for (mRDT) kits. The stock out rate for selected tracer commodities has decreased to 15 percent (Jul-Sep, 2017) from 37 percent (October – December 2016).

PMI also supported the redesigning of logistics systems in Tanzania mainland (recommendation from holistic supply chain review), geared to increase delivery of health commodities to health facilities. The redesign also addresses the inventory holding levels in the supply chain and to free up funds for other supply chain activities; increases visibility of health commodities by increasing and harmonizing reporting frequencies on a range of program commodities including malaria, introduced monthly reporting by last mile health facilities, and bi-monthly resupply by MSD.

Plans and justification for proposed activities with FY 2019 funding

To improve the availability of needed commodities at all levels, PMI will continue to support NMCP to conduct quantification exercises and the quarterly review of the supply plan to improve coordination and procurement planning across development partners. It will also continue to support monitoring of stock levels of ACTs, mRDTs, and SP across all MSD zones through routine physical counts and use of Epicor 9 and eLMIS data, to ensure on-time and in-full distribution of all orders. PMI will continue to support improvement of data quality within the eLMIS and ILS Gateway to ensure increased data visibility and use for routine supply chain decision-making (rollout of IMPACT teams) across all levels. At the health facility level, stock status and stock management information is used to understand what they need to order, quantity of commodities they are supposed to maintain at a certain period of time, and to know where there are over- and under-stocks of commodities at different facilities to inform redistribution of commodities from one facility which is overstocked to the other which is under stocked. These redistribution exercises ensure stock availability and minimize risk of drug expiries at health facilities. At the central level, the eLMIS system, in combination with other sources of data such as demographics, gives consumption data to help with quantification.

PMI will also support strengthening capacity of the Directorate of Health and Nutrition at PORALG to enhance its oversight and capacity building role to local government authorities (CHMTs and primary health care facilities).

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

b. Social and behavior change communication

NMCP/PMI objectives

The NMCP's *Communication Guide for Malaria Control Interventions 2015-2020* aims to promote positive human behaviors for malaria control in mainland Tanzania. The NMCP's SBCC strategies serve as a guide to coordinate SBCC efforts, messages, and activities for all malaria implementing partners. The NMCP's SBCC strategy aligns with the *Malaria Strategic Plan 2015-2020* and is acknowledged as a major cross cutting intervention. The communication guide identifies behavioral challenges for all malaria control interventions and potential strategies for addressing those challenges.

The behavioral objectives (Table 21) included in the NMCP SBCC strategy include correct and consistent ITN use, ITN care, ANC attendance, IPTp uptake, prompt care seeking, and adherence to national case management and MIP guidelines. In addition, the NMCP SBCC strategy promotes high level political advocacy, and local government level advocacy for planning, budgeting, and coordination of malaria control interventions.

All malaria SBCC activities are coordinated by the NMCP’s SBCC Unit. The SBCC Unit holds quarterly TWG meetings that all malaria SBCC implementing partners attend to review progress of the activities including reviewing and approving all new activities. The Health Promotion Section does attend all the SBCC TWG meetings.

Currently there are only two donors (PMI and Global Fund) that are funding malaria specific SBCC activities in Tanzania. However, Global Fund is supporting SBCC activities for ITN use and not every fever is malaria. PMI is supporting SBCC activities in 14 regions (which are the highest malaria burden areas) and Global Fund does the remaining 16 regions. We support the same campaign and same messages.

USAID *Tulonga Afya* will implement malaria SBCC activities that reflect the behavioral priorities determined during stakeholder meetings in October 2017 (see behavioral objectives in Table 21 below), which align with several of the NMCP’s behavioral priorities, as outlined in the *Communication Guide for Malaria Control Interventions 2015-2020*. The communication objectives associated with each behavioral objective presented below are currently in draft form, and will potentially be refined and revised based on the results of additional formative research which will be forthcoming later this workplan year or early in FY 2019. Similarly, official baseline and target figures will be available following completion of baseline study data analysis, which will be available early in FY 2018 Q3.

Table 21. Behavioral and communication objectives included in the NMCP’s *Communication Guide for Malaria Control Interventions 2015-2020*

Behavioral Objective	Baseline*	Target⁺
Sleep under an LLIN/ITN every night	TBD	TBD
Communication Objective (s)	Baseline	Target
1. Increase the proportion of people who believe that using an LLIN/ITN is an effective way to protect themselves and their loved ones from malaria	TBD	TBD
2. Increase the proportion of people who believe that the insecticides used in LLIN/ITNs are safe	TBD	TBD
3. Increase the proportion of people who feel able to use and maintain LLIN/ITNs correctly and consistently	TBD	TBD
4. Increase the proportion of people with positive attitudes toward LLIN/ITNs	TBD	TBD

Behavioral Objective	Baseline	Target
Seek and receive prompt and appropriate care at the health facility if experiencing signs of malaria	TBD	TBD
Communication Objective (s)	Baseline	Target
1. Increase the proportion of people who have accurate knowledge of the signs and symptoms of malaria	TBD	TBD
2. Increase the proportion of people who are aware of their malaria risk, particularly vulnerable groups	TBD	TBD
3. Increase the proportion of people who believe that the consequences of malaria are serious and can lead to death if not properly diagnosed and treated	TBD	TBD
Behavioral Objective	Baseline	Target
Get tested for malaria before taking treatment	TBD	TBD
Communication Objective (s)	Baseline	Target
1. Increase the proportion of people who know that the consequences of self-diagnosing and treating malaria are serious	TBD	TBD
2. Increase the proportion of people who believe it is important to test before using a malaria medication	TBD	TBD
3. Increase the proportion of clients who trust and accept the test results	TBD	TBD
4. Increase the proportion of prescribers who trust the lab test results and treat malaria accordingly	TBD	TBD
5. Increase the proportion of targeted population who know that the appropriate treatment for Malaria is ACTs	TBD	TBD
6. Increase the number of targeted population who believe that ACTs are safe and effective malaria treatment products	TBD	TBD
Behavioral Objective	Baseline	Target
Seek and receive prompt and appropriate care at the first sign of newborn or child illness	TBD	TBD
Communication Objective (s)	Baseline	Target
1. Increase the proportion of parents and caregivers of children under five who recognize the signs and symptoms of malaria, including signs of severe malaria	TBD	TBD
2. Increase the proportion of parents and caregivers of children under five who believe malaria to be a serious childhood illness that can be fatal if they do not access prompt treatment at a health facility	TBD	TBD

Behavioral Objective	Baseline	Target
Receive three or more doses of IPTp during pregnancy to prevent malaria	TBD	TBD
Communication Objective (s)	Baseline	Target
1. Increase the proportion of pregnant women and their partners who believe that attendance at a full course of ANC is important for the health of mother and baby	TBD	TBD
2. Increase the number of pregnant women who know that they should receive at least three doses of IPTp in pregnancy, beginning in the second trimester	TBD	TBD
3. Increase the proportion of pregnant women and their partners who believe that IPTp is a safe and effective malaria prevention method	TBD	TBD
4. Increase the number of pregnant women and their partners who have accurate knowledge of the dangers of acquiring malaria when pregnant	TBD	TBD
5. Increase providers' knowledge on the benefits and correct timing of IPTp doses (<i>provider focus</i>)	TBD	TBD
Notes		
* PMI is currently supporting ongoing data collection and analysis to determine the baseline for each behavioral and communication objective.		
+ PMI is currently supporting effort to establish targets for each behavioral and communication objective.		

Progress since PMI was launched

PMI-supported SBCC activities have evolved since PMI was launched: from initially supporting campaigns and activities to increase malaria-related knowledge, to currently supporting the development of evidence-informed, theory-driven campaigns and activities targeting specific behaviors and their associated determinants. To date, on the Mainland, PMI has supported the following national level SBCC campaigns and activities: *Sio Kila Homa ni Malaria* (Not All Fevers are Malaria Campaign); *Wazazi Nipendeni* (Love Me Parents or Safe Motherhood Campaign); School Net Program; *Chandarua Kliniki* (support for ITNs distribution through ANC/EPI); and Community Change Agent Platform.

PMI-supported SBCC campaigns have contributed to progress towards achievement of the aforementioned communication objectives. According to the 2015-2016 DHS, knowledge of the signs and symptoms of malaria is high (77 percent of women and 72 percent of men indicated fever as a sign and symptom of malaria). Additionally, according to the 2015-2016 DHS, 98 percent of women and men recognized that “sleeping under a mosquito net” is protective against malaria. Self-efficacy has been identified as one of the critical determinants of malaria-related behaviors and has been targeted by SBCC activities over time, resulting in a notable increase of women ages 15-49 who indicated adequate self-efficacy to ensure their children sleep under an ITN every night of the year from 80 percent (2011-2012 HMIS) to 87 percent (2015-2016 DHS). However, gaps still remain. Knowledge of malaria prevention methods is variable: only five percent of women and 17 percent of men indicated that IRS is protective and two percent of women and men indicated that IPTp is protective.

Progress in the achievement of communication objectives has contributed to the achievement of malaria-related behavioral objectives. According to secondary analysis of the DHS 2015-2016, the Tanzania ITN use: access ratio (use given access to an ITN) was 0.88. While the ratio has fluctuated slightly, the ratio increased from 0.80 in 2007-2008 (DHS) to 0.92 in 2011 (HMIS). Additionally, uptake of IPTp2 has significantly increased from 35 percent in 2015-2016 (DHS) to 56.1 percent in the 2017 (HMIS). Significant behavioral challenges remain, so PMI will continue to support the NMCP to develop and implement SBCC activities that address determinants of malaria-related behaviors and contribute to the achievement of malaria-related behavioral objectives.

In addition to supporting SBCC activities to promote individual, community, and behavior change, PMI supports high level advocacy efforts to encourage local government to plan and budget for malaria control interventions.

Progress during the last 12-18 months

PMI continues to support efforts to understand and explore the factors that influence key malaria-related behaviors. Preliminary results from PMI-supported formative research indicate that the following issues remain obstacles or barriers to the practice of key malaria-related behaviors: perception by caregivers that malaria is an inconvenience, not a risk; myths around ITNs adverse effects, including impotence, infertility, and attracting bedbugs; satisfaction with health workers' behavior, which is often disrespectful, dismissive, and abusive; and denial of services to pregnant women at ANC if their husband/partner does not attend ANC with them, or if they do not bring their ANC card. PMI will continue to support the analysis of this formative research to inform existing and planned SBCC activities.

Also, the preliminary results of the aforementioned PMI-supported formative research, indicate that the most important emotional drivers for parents/caregivers to perform malaria-related priority behaviors include reinvention (of a better life for their child); nurturing (protecting their child); security (a healthy child will grow to be a successful adult that is able to take care of them in their old age); and recognition (as an exemplar parent in the community to whom others will come for advice). Similarly, the most important emotional drivers for pregnant women to perform malaria-related priority behaviors include nurturing (protecting her baby) and recognition (being viewed positively by others). And, lastly an emotional driver for facility-based health workers is recognition (as a leader and well-regarded person in their community). These preliminary findings and additional findings will inform the refinement of existing PMI-supported SBCC activities, such as those listed below, and the development of PMI-supported SBCC activities.

Sio Kila Homa Ni Malaria (Not All Fevers are Malaria Campaign):

PMI continued to support *Sio Kila Homa Ni Malaria Campaign* (Not All Fevers are Malaria Campaign), a test-and-treat SBCC campaign focused on encouraging community members, especially care takers and parents of children under five years of age, to seek care and testing for all fevers. The campaign targeted both provider behaviors at health facilities and client demand at the community level.

The first phase of the campaign used broad messaging about getting treated if ill, as well as specific messaging promoting the use of mRDTs in private sector clinics after they were widely introduced. The campaign included radio spots and print materials for health facilities as well as outreach materials for community volunteers. After one year of implementation of the campaign, a qualitative assessment was conducted to inform development of the second phase of the campaign. One key piece of feedback from the qualitative assessment was that while clients were going to the health facilities for testing when ill

and mRDTs were being administered, in many instances providers were not necessarily adhering to the test results and were treating those with negative mRDT results. Based on this feedback, the second phase of the *Sio Kila Homa Ni Malaria* campaign was designed to improve knowledge and trust by providers and clients in the use of mRDTs and their accuracy and reliability. The newly awarded project USAID *Tulonge Afya* continued to run this campaign as part of its accelerated activities.

PMI also used data from a nationally representative quarterly Omnibus survey to better understand the impact of the *Sio Kila Homa Ni Malaria* campaign on client behaviors. The March 2016 Omnibus survey found that 67 percent of respondents had seen or heard *Sio Kila Homa Ni Malaria* in the last three months. When exposed respondents were asked what the campaign encouraged them to do, the most frequent response was get tested when you have a fever (57 percent), followed by get tested when you think you have malaria (50 percent). Among the exposed respondents, 31 percent had discussed the campaign with someone during the past three months.

According to the 2017 MIS preliminary results, in mainland Tanzania, advice or treatment was sought for 77.3 percent of urban and 74.4 percent of rural dwelling children under the age of five with fever in two weeks preceding the survey. In 2015-2016, the DHS indicated that advice or treatment was sought for 84.2 percent of urban and 78.6 percent of rural dwelling children under the age of five with fever in two weeks preceding the survey.

Wazazi Nipendeni (Love Me Parents or Safe Motherhood Campaign):

PMI continued to support the national integrated multimedia *Wazazi Nipendeni* Campaign (Love me Parents or Safe Motherhood Campaign) focused on IPTp uptake and ITN use during pregnancy. The campaign used a SMS platform to send weekly messages to providers and clients. As of December 2016, there were 1.4 million registered users of the SMS platform and more than 80 million text messages with various information had been sent to registrants. Of the total registered users, 36 percent were general information seekers, 14 percent supporters, 14 percent mothers of newborns, and 36 percent were pregnant mothers. Demonstrating user friendliness of the platform, 97 percent of all registrants self-registered themselves while three percent were assisted to register for the platform.

The second phase of the campaign was developed based on the results of a post-hoc evaluation conducted in November 2013. The post-hoc evaluation indicated that due to the significant lack of education and employment and low socio-economic status among surveyed women, the second phase of the campaign should target low literacy, low socio-economic status, and rural populations. Furthermore, given that respondents did not know why they should take SP doses, the second phase of the campaign should focus on reasons why pregnant women should take SP for IPTp and why it should be three or more doses. Based on these insights, the second phase of the *Wazazi Nipendeni* campaign was developed and was broadcast until December 2016. The first and second phases of the campaign were monitored quarterly through Omnibus surveys, clinic data, and SMS registration reporting.

School Net Program Campaign:

PMI supported SBCC activities to increase awareness of SNP and promote correct and consistent ITN use and care during SNP. This included the airing of promotional radio spots and production and distribution of print and promotional materials for the children, their schools, and their communities to promote correct and consistent ITN use, encourage ITN care, and encourage sharing of ITNs with households without sufficient ITNs.

PMI supported school-based activations and public announcements through road shows, were conducted in the 14 SNP regions. A total of 878 road shows were conducted in the 14 SNP regions in 49 councils.

Through these road shows, a total of 645,888 people (266,864 men and 379,024 women) were reached directly with SNP messages meant to increase awareness and knowledge of the importance of SNP, encourage consistent and proper use of ITNs, promote care of ITNs to increase their durability, and encourage washing the ITNs in non-water masses such as lakes and rivers.

The SNP-3 evaluation indicated that awareness of SNP remains high (90 percent).

Chandarua Kliniki Campaign (support for ITNs distribution through ANC/EPI):

Since the launch of *Chandarua Kliniki* in 2016, PMI has supported SBCC activities to reintroduce *Chandarua Kliniki*, create awareness of *Chandarua Kliniki*, and promote correct and consistent ITN use and care. This included the airing of promotional radio spots and production and distribution of print and promotional materials for the health facilities and communities to promote correct and consistent ITN use and encourage ITN care. In newly scaled up regions of Morogoro, Pwani, Katavi, Shinyanga, and Tabora, PMI supported roadshows and clinic-based events to create awareness about the revamped program. A total of 454,998 people (191,184 men and 261,814 women) were reached via these activities.

Plans and justification for proposed activities with FY 2019 funding

SBCC activities will continue to address the factors that influence the correct and consistent ITN use, ITN care, prompt care seeking, ANC attendance, IPTp uptake, and adherence to malaria case management and MIP guidelines in the 14 PMI focus regions (Tabora, Pwani, Shinyanga, Katavi, Morogoro, Mwanza, Mara, Kagera, Geita, Simiyu, Kigoma, Lindi, Mtwara, and Ruvuma). SBCC activities will be tailored according to the national malaria epidemiological stratification, as outlined in the NMCP's Malaria Strategic Plan and *Communication Guide for Malaria Control Interventions 2015-2020*. PMI will support activities that address identified factors that are known to influence the practice of key malaria-related behaviors.

For vector control, specifically for ITNs, PMI will support SBCC activities in the 14 SNP regions to increase awareness of SNP, increase awareness of *Chandarua Kliniki*, and promote correct and consistent net use and net care. PMI-supported SBCC activities supporting ITN distribution and use will be informed by formative research on the factors that influence obtainment, correct and consistent net use, and net care. Given the increasing need to revive the commercial ITN sector as a continuous distribution channel according to the *Tanzania ITN Plan 2015-2020*, PMI will support SBCC activities to promote uptake and use of quality, privately-procured ITNs.

For IRS, SBCC activities will be used to inform people where, when, and why IRS activities are being conducted in their community; inform people in areas where IRS was withdrawn why IRS was withdrawn and inform them of available methods of alternative protection; and, inform communities of the reasons why other insects appear after IRS. PMI-supported SBCC activities will be informed by formative research, which, in the case of SBCC activities targeted IRS-related behaviors, indicates that SBCC activities should focus on addressing changes in perceived risk and perceived severity of malaria.

For case management, PMI will support efforts to increase demand for mRDTs by clients, improve acceptance of and adherence to mRDT results by providers, promote prompt care seeking, and improve adherence to national malaria case management guidelines. For malaria in pregnancy, PMI will support SBCC activities to increase ANC attendance, IPTp uptake, and adherence to national MIP guidelines. For IPTp, based on an understanding that provider bias towards SP persists, SBCC activities will address provider bias and barriers against SP provision. All PMI-supported SBCC activities, including selection of influencers and secondary audiences to target, such as men and household decision makers,

will be informed by formative research. To isolate the behavioral challenge and ensure the success of SBCC activities to increase the uptake of IPTp, coordination with service delivery partners will be crucial to ensure that stock outs of SP and other malaria commodities are rare. Opportunities for integrated SBCC activities will be identified and prioritized where possible and appropriate.

With exception of the SMS platform, PMI continues to support the *Wazazi Nipendeni* campaign. USAID *Tulonga Afya* project is still researching an appropriate platform that can continue supporting the SMS platform of the *Wazazi Nipendeni* campaign.

Generally, PMI will continue to support the NMCP coordination platforms at national and regional levels to ensure proper coordination and implementation of SBCC activities at all levels. PMI will support a mid-term review and revision of the NMCP's *Communication Guide for Malaria Control Interventions 2015-2020* informed by recently collected quantitative and qualitative data.

PMI will support monitoring and evaluation of PMI-supported SBCC activities to ensure that PMI-supported SBCC activities are contributing to the desired shift in behavioral factors that are known to influence the practice of malaria-related behaviors and to ensure that the practice of positive malaria-related behaviors is increasing. Monitoring methodologies may include the use of omnibus surveys and behaviorally-focused sentinel surveys; however, PMI remains open to exploring rapid, low cost monitoring methodologies for SBCC activities.

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

c. Surveillance, monitoring, and evaluation

NMCP/PMI objectives

As stated in the Malaria Surveillance, Monitoring and Evaluation Plan 2015–2020, which was developed in line with the National Malaria Strategic Plan 2014–2020, the NMCP's overarching goal of surveillance, monitoring, and evaluation is to provide timely and reliable information for assessing progress; ensure cost-effective uses of resources; and account for investments made in malaria control. The NMCP's SM&E strategy emphasizes four specific objectives, which target funding and guide the implementation of SM&E activities throughout the Mainland.

- Objective 1: Improve quality, completeness, and timeliness of malaria indicators within the routine health information system to reach 90 percent of health facilities reporting monthly through the HMIS by 2020
- Objective 2: Establish a comprehensive framework for collecting, processing, and storing essential malaria indicators from periodic service delivery and programmatic surveys
- Objective 3: Establish and maintain a comprehensive and effective malaria knowledge management system to collate, interpret, disseminate, and promote the use of quality malaria data for evidence-based decision making at national and district levels
- Objective 4: Design and support the implementation of a comprehensive malaria surveillance and response system for epidemic-prone districts to ensure that 80 percent of malaria epidemics are responded within 2 weeks from the onset by 2020.

As malaria prevalence has decreased more in some regions than in others, the malaria risk is becoming increasingly heterogeneous throughout mainland Tanzania. In response, the NMCP is implementing a

wide range of activities to meet the SM&E objectives. The NMCP, with support from PMI and Global Fund, is working towards improving the quality and timeliness of routine malaria data collection and reporting through HMIS and eIDSR using the DHIS2 electronic platform. In epidemic prone regions, the NMCP is working towards developing a sustainable Malaria Epidemic Early Detection System (MEEDS) for mainland Tanzania that can detect sudden increases in malaria cases. The NMCP, PMI, and other stakeholders continue to support the inclusion of malaria indicators in periodic national representative household surveys. Other SM&E activities include establishing a comprehensive framework for collecting, processing, and storing essential malaria indicators from periodic service delivery and programmatic surveys; and establishing a comprehensive and effective malaria data management system to facilitate the use of quality malaria data for evidence-based decision making at national and district levels.

The NMCP receives a large amount of data from its own M&E activities and those of multiple national and international malaria partners. For several years, PMI has supported efforts to: (1) strengthen the data management unit within the NMCP to store, analyze, and disseminate information for decision making, (2) hold regular meetings to discuss M&E activities, and (3) make regular M&E supervisory visits to the field. PMI will continue to support these activities.

PMI has worked closely with colleagues from the NMCP, the ZAMEP, Global Fund, WHO, World Bank, Malaria Control and Evaluation Partnership in Africa, other units of the MOHCDGEC (e.g., HMIS, IDSR, and Health Sector Reform), and other sectors of the GoT (National Bureau of Statistics, Ministry of Education) to promote coordinated M&E efforts.

The following data sources and timelines provide the foundation for PMI and the GoT for evaluation of malaria control outcomes and impact.

Demographic and Health Surveys (DHS):

Every four to five years, the DHS collects nationally representative, population-based data for a variety of demographic and health indicators, including core malaria intervention coverage indicators, anemia, and all-cause under-five child mortality. It is conducted by the National Bureau of Statistics with technical assistance from partners. Field data collection for the 2015 survey was completed and the results were disseminated in 2016.

Malaria Indicator Survey (MIS):

The MIS assesses core indicators for malaria intervention coverage and malaria morbidity. In 2007 and 2011, PMI co-funded the first and second population-based MIS combined with an AIDS Indicator Survey (HMIS). The 2011-12 HMIS survey results were officially released in March 2013 and provided critical data for NMCP/PMI's effort to evaluate the impact of malaria control efforts (see *Progress on Coverage and Impact Indicators section* for results). The main benefit to malaria is that with the larger AIDS Indicator Survey funding and sample size, regional-level data were obtained for malaria parasite and HIV prevalence without any added cost. However, new PEPFAR requirements call for a different sampling that precludes combining the AIDS Indicator Survey and MIS. Therefore a Malaria Module was included in the DHS in 2015/16. The DHS field work was conducted during September 2015 - February 2016 and results were released in 2016. The next MIS was conducted between October and November 2017, and the official results are planned to be released on World Malaria Day April 25, 2018 by the GoT.

Health Management Information System (HMIS/DHIS2):

The objectives of the HMIS/DHIS2 are to provide data for monitoring key process, outcome, and impact

indicators over time: (1) standardized laboratory-confirmed malaria cumulative incidence per year, among patients under five years of age, patients older than five years, and pregnant women; (2) IPTp uptake among pregnant women; and (3) standardized crude laboratory-confirmed malaria death rate among patients under five years of age, patients older than five years, and pregnant women. Historically, the majority of malaria cases reported to this system represented clinical diagnoses, usually non-specific fever. However, this situation changed as Tanzania scaled up the use of mRDTs at all health facilities. HMIS data show that in 2017 overall in mainland Tanzania 79 percent of malaria cases were confirmed by mRDT, 16 percent by microscopy, and four percent were unconfirmed in outpatient departments. In the inpatient department in 2017, overall 92 percent of malaria cases were confirmed by mRDT and eight percent by microscopy. The rate of unconfirmed cases has been steadily declining from 36 percent in 2014 to four percent in 2017. HMIS information is reported annually through CHMTs and the Health Statistics Abstract. Data flows from the health facility level up to the district level, where it is compiled, analyzed, and reported. A major multi-donor initiative (including PEPFAR) has been reforming the existing paper-based HMIS platform to the electronic DHIS2. PMI staff continues to ensure that malaria is well represented in the ongoing effort to improve DHIS2, which has been rolled out in all regions.

Integrated Disease Surveillance and Response (IDSR):

IDSR captures data on notifiable/epidemic-prone diseases which are reported on a daily, weekly or monthly basis depending on the disease. Three malaria data variables are captured in the IDSR – total tested (mRDT/microscopy), total positive, and total treated clinically. The long-term strategy for IDSR is to use mobile phone technology for data submission (eIDSR). It was piloted in 12 districts across four regions using PMI support and seven districts were covered by MOHCDGEC. It has now been fully implemented in ten regions of the Mainland. The eIDSR uses an Unstructured Supplementary Service Data (USSD) application to transmit data to DHIS2 platform for subsequent analysis, and reporting. Under the Global Health Security Agenda, CDC is working with Tanzania to improve the performance and quality of IDSR to prevent, detect, and respond to infectious disease threats. However, IDSR is not a surveillance system routinely utilized by NMCP. Efforts by NMCP to strengthen malaria surveillance for Mainland have focused on routine health facility HMIS/DHIS2; therefore, PMI will not support eIDSR in FY 2019.

Implementing Partner Reporting System (IPRS):

Effective performance monitoring is critical to PMI success in achieving results. Since 2010, PMI has relied on the Implementing Partner Reporting System (IPRS), which is part of the Tanzania Monitoring & Evaluation Management Service, as the USAID/Tanzania Mission's source of data for PMI Annual Reporting. IPRS is a web-based system where PMI implementing partners enter their performance data on a quarterly basis which is then certified by the USAID Agreement/Contract Officer's Representative. PMI will support the new partner Data for Development that is managing the Mission-wide database. Data for Development also provides support in data quality assurance for key indicators and provides data analysis to improve decision-making, planning, and implementation of malaria activities.

End-Use Verification Surveys (EUV):

This is a public health facility supply chain monitoring activity to assess the performance of the public health supply chain, focused first on malaria commodities. The activity provides key information regarding the availability of these products, as well as visibility into how malaria is being diagnosed and treated at the health facility level. Supply chain information is captured not only for malaria commodities, but also for other essential medicines and reproductive health commodities. Tanzania was the pilot country for the EUV in January 2009 and was continued on a rolling annual basis until it was transitioned to the Data Quality Audits (DQA) for the eLMIS in July 2017. An additional DQA on

malaria commodities at the facility level is one of the modules within the MSDQI package (see Case Management section).

Between July 2016 and June 2017 with support from PMI through technical guidance from the Global Health Supply Chain partner, GoT staff reviewed a total of 33,512 Report and Requisition forms from health facilities (out of expected 26,175) and helped resolve data quality issues on 5,542 (17 percent) forms. Submission of Report and Requisition forms has significantly improved since deployment of the LMU within the GoT and the eLMIS. During FY 2017, the LMU team facilitated an average reporting rate of 95 percent and reporting timeliness of 89 percent. In addition, the Global Health Supply Chain partner provided on-the-job training to 3,307 HCWs on logistics data management and commodity management at 1,883 health facilities, and 20 Health Management Teams (RHMT and CHMTs) across 104 Councils (56 percent of total councils). The activities also included training for 923 HCWs on eLMIS and 563 HCWs on the ILS Gateway, and 300 HCWs on ordering and managing data quality. Between July 2016 and June 2017, the forecast accuracy for ACTs was 82 percent and mRDTs was 98.5 percent. The stock out rate for malaria commodities at facility level in the third quarter of 2017 was 15 percent.

Health Information Mediator (HIM):

The USAID-supported Maternal and Child Survival Project is working with the MOHCDGEC to strengthen Tanzania's health information system and align it with the key priorities of the health sector as espoused in the Health Sector Strategic Plan IV. As part of the eHealth Strategy implementation, the Maternal and Child Survival Project is working with the MOHCDGEC to bring together the multiple vertical health information systems, such as HMIS/DHIS2, that are currently implemented. The plan is to achieve a uniform National Health Information Exchange (HIE) architecture built on the principle of standards for integration and interoperability that will ultimately improve data quality, increase accessibility to drive informed decision making, and thereby encourage evidence-based planning and problem solving at all levels of the health system.

In the first, and current phase, the focus is on implementation of the health information mediator (HIM)/Interoperability Layer to support three use cases, including:

- Extracting malaria and other programs data from hospital electronic systems to a Health Data Repository , focusing on;
 - Number of patients who received particular services including malaria services
 - Number of deaths by disease cases, which include all malaria deaths reported from selected national and specialised hospitals
- Aggregate data exchange from existing systems including
 - The Human Resource for Health Information Systems,
 - Consumption and stock status data from health facilities through eLMIS,
 - Routine Immunization data from Vaccine Information Management System, to the DHIS2, and
 - Daily Stock status of antimalarial and all other health commodities and medical supplies from MSD central, zones, and sales points to eLMIS and any other health information systems.
- Facilitate exchange of Health Facility Registry information through the HIM to all other health information systems.

In the second phase, the proposed activities will focus implementation on (depending on funding availability):

- Supporting visualization of program specific cross-cutting indicators, e.g. Service provided versus Number of commodities consumed within the same reporting period, Number of Malaria cases reported versus Stock status of antimalarial at all stock keeping levels, Number tested versus Test kits used, etc.
- Linking Malaria cases with other program such as ANC, etc.
- Access to client level/encounter level data to facilitate analysis for M&E purposes i.e. analysis by age, location, test type, type of antimalarial provided, etc.
- Combining climate data with malaria cases (client data) reported, the system will be used to predict malaria cases based on location and seasonal changes.

Table 22. Surveillance, Monitoring, and Evaluation Data Sources

Data Source	Survey Activities	Year										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
National-level Household Surveys	Demographic Health Survey (TDHS)						X					X
	Malaria Indicator Survey (MIS)		X		X		X		X			X
Health Facility and Other Surveys	SPA Survey							X				
	EUV Survey			X	X	X	X	X				
Malaria Surveillance and Routine System Support	Integrated Disease Surveillance and Response (IDSR)		X	X	X	X	X	X	X	X	X	X
	District Health Information Software 2 (DHIS2)					X	X	X	X	X	X	X
Therapeutic Efficacy Monitoring	<i>In vivo</i> Efficacy Testing	X	X	X	X	X	X	X	X	X	X	X
Other Data Sources	Malaria Impact Evaluation	X				X						
	ITN Efficacy and Physical Durability Monitoring							X	X	X	X	

Data Source	Survey Activities	Year										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	School Malaria Parasitological Survey (SMPS)						X		X		X	
	National Malaria Vector Surveillance							X	X	X	X	X
	Insecticide Resistance Monitoring		X	X	X	X	X	X	X	X	X	X
	Entomological Monitoring in Lake Zone	X	X	X	X	X	X	X	X	X	X	X
	SPAm					X		X				
	MSDQI								X	X	X	X
	ITN Delivery and IRS Monitoring	X	X	X	X	X	X	X	X	X	X	X
	LSM Monitoring									X	X	X
	LMIS (Malaria Commodities Accountability Tool)									X	X	X

Progress since PMI was launched

PMI support for M&E and survey related activities started in 2006 and focused on the following: (1) the HMIS and routine services statistics, (2) DHS, (3) MIS, (4) Service Provision Assessments (SPA), (5) IDSR, (6) the IPRS, (7) the Monitoring and Evaluation Strengthening Initiative, (8) EUV, (9) Entomologic monitoring, (10) supporting Malaria Program Review, and (11) impact evaluation.

Among the PMI supported surveys are the Tanzania HIV and Malaria Indicator Survey (HMIS 2007-08, 2011-12), 2015-2016 DHS/MIS, and MIS 2017. Performance monitoring has been a PMI priority to ensure that data collected and reported by implementing partners are of high quality to inform management decisions. This has been realized through supporting routine data quality assessments of all PMI indicators and financial support to manage the IPRS which is a web-based information system where PMI partners enter program data on a quarterly basis. This system has been a source for Tanzania PMI reports. In 2012, PMI also supported the SPA which was implemented in FY 2014. PMI also

supported a one-year pilot in 2014 of sentinel population malaria surveillance among pregnant women and infants in the Lake Zone.

In 2010, Tanzania was the first PMI focus country to carry out an in-depth evaluation of the impact of the scale up of malaria control interventions on all-cause under-five mortality. This evaluation was conducted in collaboration with the NMCP, the RBM partnership, WHO, and the Ifakara Health Institute. Results from the evaluation were published in November 2015.

In 2011, the NMCP, in collaboration with partners, undertook a comprehensive review of the progress and performance of the malaria program for the period of 2002 to 2011. The Malaria Program Review identified gaps which the NMCP has been working to address. Between July and August 2017, the NMCP in collaboration with the WHO and other key stakeholders conducted a Mid-Term Review to appraise progress towards the current Strategic Plan 2015 - 2020. The methodology entailed an internal desk review of relevant documents conducted by country malaria experts, and validation of desk review findings with technical assistance from WHO Regional Office for Africa and country offices. Validation involved the interrogation of the desk review findings and consultations at national, regional, district, health facility, and community levels. Four regions were purposely selected for the validation at sub-national level including Geita (Lake Zone), Mtwara (Southern Zone), Kigoma (Western Zone), and Mbeya (Southern Highlands). The review highlighted a declining trend in all cause under-five mortality and in malaria related health facility based mortality, with an approximately 50 percent reduction in infant, child, and under 5 mortality from 1999 to 2016. Similarly, there was great improvement of access to health facilities by the communities, the availability of quality assured lifesaving medicines –AL as the first-line treatment for malaria and Artesunate injectable for severe malaria, diagnostic facilities including the availability mRDTs at all levels of health care delivery, and improved health seeking practice for febrile illnesses.

In 2013, PMI supported a pilot of the eIDSR in 12 districts and to date it has been implemented in 10 regions (Dar es Salaam, Mwanza, Mara, Geita, Kagera, Manyara, Dodoma, Singida, Arusha, and Kilimanjaro).

PMI identified Tanzania as a site for the pilot routine information system strengthening activity initiated in 2014. The main objective is to improve malaria data quality and use within the HMIS in order to monitor changes in malaria burden over time and inform program planning. This activity was implemented in three phases including: (1) planning, (2) implementation, and (3) evaluation. During the first phase malaria data quality problems were identified, prioritized, and a work plan was developed for addressing the problems in a collaborative manner with all stakeholders. The second phase, implementation, was conducted in collaboration with the MOHCDGEC. The pilot for the implementation project was conducted in Pwani region in August and September of 2015.

With FY 2012 funds, PMI contributed \$450,000 to support the second national facility-based survey—the Tanzania SPA. The survey fieldwork was conducted during October 2014 - March 2015 and the final report was released in February 2016, which found nearly 25 percent of facilities offering curative care for sick children to have all components of malaria service readiness (diagnostic capacity, treatment guidelines, first-line antimalarial, and trained personnel). These findings have also been stratified for each region, which will help improve the availability, readiness, and quality of malaria services at the regional level.

In addition to the periodic nationwide SPA, the NMCP instituted the Service Provision Assessment for Malaria (SPAm) in January 2015 as a tool to monitor malaria-specific quality of care more intensively

and frequently than the SPA. Indicators originate from sentinel districts and are analyzed on an annual basis. SPAm activities include medical records review to ascertain completeness and appropriateness of care, observation of individual HCWs as they attend patients, and patient interviews to determine satisfaction with medical services and commodity availability. The SPAm was funded by PMI and Global Fund but administered by the NMCP. In the framework of SPAm, a sample of private drug outlets selling malaria commodities are visited twice per year to monitor availability and the composition and market share of different antimalarials and diagnostics. The aim of the private arm of the SPAm is to track the availability of the pre-qualified recommended antimalarials, especially the ones procured under the Global Fund co-payment mechanism. Retail prices are also monitored. This biannual survey was last conducted in December 2016. In 2017, key elements of the SPAm were integrated and expanded into the MSDQI package for the provision of malaria services and data quality assessment of malaria surveillance, diagnosis, and treatment (described in case management section).

Progress during the last 12-18 months

The basic HMIS/DHIS2 system has been rolled out countrywide as of December 2013. In order to improve HMIS data quality, the NMCP with PMI support successfully built upon lessons learned during the routine system strengthening pilot and developed a DQA process. The DQA process included comparing received reports from HMIS with source documents that generate malaria information (registers, tally sheets, monthly summary, ledgers, Report and Requisition forms, MSD sales invoices). In 2016, the NMCP conducted DQAs in 312 health facilities in 26 regions with 78 district councils. Through this process, the NMCP incorporated the DQA process into the MSDQI package, a comprehensive OTSS tool, which was finalized and rolled out nationally in 2017 to incorporate supervisory activities to improve the quality and use of routine malaria data reported from health facilities to HMIS nationwide. As part of a strategy to improve HMIS data availability and use, PMI has provided technical assistance and support to the NMCP in preparing quarterly and annual malaria bulletins using HMIS data.

PMI supported the electronic IDSR surveillance system across 10 regions in 2017. To improve eIDSR performance, training workshops were conducted from December 2016 to February 2017 which trained 180 participants including Regional and District Medical Officers, and malaria focal persons on data reporting, analysis, and use. To improve IDSR reporting in Dar es Salaam region, 120 participants, including Regional and District personnel and HCWs from 107 health facilities, were trained on using eIDSR in October and November 2016; and IDSR booklets listing reportable priority diseases were distributed to 2,247 health facilities in eight regions. As a result of these activities, eIDSR reporting improved from 50 percent in August 2016 to 80 percent in September 2017.

The NMCP, in conjunction with the KEMRI-Wellcome Trust and Ifakara Health Institute, has developed a Malaria Epidemiologic Profile, which it will use to better focus malaria control efforts. NMCP's Malaria SM&E Strategic Plan 2015-2020 was released in 2016 and is being used to target efforts. With PMI support, the NMCP has reconstituted the Surveillance, Monitoring & Evaluation TWG, which meets on a quarterly basis.

Since 2017, with support from PMI the NMCP has been developing two distinctly separate but complementary electronic platforms within DHIS2 for the storage, analysis, visualization, interpretation, and utilization of aggregated malaria-related data. These are the 'Malaria Dashboard' and 'Malaria Composite Database.'

The Malaria Dashboard is accessed in DHIS2 by anyone with login credentials through the ‘malaria dashboard’ icon on the DHIS2 apps page. To date, the Malaria Dashboard currently displays and provides access to five categories of indicators, populated primarily with data from the HMIS and service delivery departments. The categories include: (1) Uncomplicated malaria diagnosis through outpatient department, (2) malaria testing, (3) malaria commodities or pharmaceuticals, (4) severe malaria morbidity and mortality through inpatient department, and (5) preventive services through RCH. The Malaria Dashboard displays the malaria-related data for each indicator through figures in the DHIS2 web interface. The format for these figures have been designed through an iterative process among key stakeholders, including PMI and our implementing partners, at SM&E TWG meetings with plans to continue this process through a dashboard taskforce that as of the first quarter of 2018 has not yet been established. HMIS data within the Malaria Dashboard can be focused down to the administrative hierarchal level within the health care system (i.e., national, regional, and district), by health facility type from the lowest level ‘dispensary’ to the main referral ‘health centers,’ and finally by facility ownership (i.e., private, governmental, faith-based, and parastatal).

In addition to the malaria indicators in the HMIS/DHIS2 Malaria Dashboard, NMCP in collaboration with the HMIS unit developed the HMIS Laboratory and Dispensing registers to capture both diagnosis and consumption data in health facilities. The tools were piloted and completed in 2017. The HMIS unit has added new indicators to better quantify at the health facility level the number of patients with a positive malaria test who are dispensed antimalarial drugs. This data is now accessible through the Malaria Dashboard.

In the last quarter of 2017, NMCP began 1-3 day Malaria Dashboard orientation training sessions designed for various audiences, such as ministry of health leadership and programs integrated with malaria care services; regional, district, and community officials; and development and implementing partners. These sessions have continued in 2018.

The Malaria Composite Database is the second DHIS2 electronic data platform currently being designed to systematically organize and integrate malaria-related information collected outside the routine HMIS. It is being developed in partnership by the University of Dar Es Salaam College of Information and Communication Technologies. These data sources for the composite database are from: (1) programmatic and operational studies (e.g., therapeutic efficacy and insecticide resistance monitoring), (2) survey and surveillance outcomes (e.g., entomological and parasitological surveillance), (3) vector control performance indicators (e.g, ITN, LSM, and IRS distribution), (4) malaria commodities accountability through the eLMIS, (5) the MSDQI package and SBCC monitoring, and (6) the Tanzania Meteorological Agency for evaluating climatic variations and suitability for malaria transmission. The composite database is currently being hosted on a separate, dedicated website but will eventually serve as a source of consolidated malaria-related data with full integration into the routine HMIS (*refer to explanation on the ‘interoperability layer’ described in the HIM section*).

In June 2017, NMCP released their first quarterly Malaria Surveillance Bulletin that included HMIS/DHIS2 data from 2014 through June 2017. NMCP also released a third quarter 2017 report and annual 2017 report populated with data and formatted with figures from the DHIS2 Malaria Dashboard. PMI has supported the development and dissemination of the Malaria Surveillance Bulletin. NMCP’s goal is to automate the development of the quarterly bulletin by linking the DHIS2 Malaria Dashboard data outputs.

Plans and justification for proposed activities with FY 2019 funding

The core of the routine malaria surveillance system in mainland Tanzania is the HMIS and IDSR which are both on the DHIS2 platform. In coordination with Global Fund and other donors supporting routine surveillance in the mainland, PMI is targeting attention and resources to improving data quality in HMIS/DHIS2 through the continued implementation of MSDQI and support to routine Health Information System strengthening. With FY 2019 funds PMI will support district and regional strengthening of routine data collection, quality, and use in high malaria burden regions. However, PMI will not support continued development of eIDSR in FY 2019.

In addition to data from the routine surveillance system, the NMCP receives reports and data from a wide array of their own M&E activities, plus ongoing activities in other parts of the MOHCDGEC, sentinel surveillance sites, and from all PMI-funded partners. Data flow and utilization of these data need to be improved. PMI support will strengthen the data management unit within NMCP to collect, store, analyze, display, and disseminate information for decision making through continued development and use of the malaria dashboard and composite database within DHIS2.

PMI will continue to support and evaluate the Mission-wide M&E services contract which covers a broad range of M&E services such as: (1) performance monitoring (via a web-based reporting system), (2) M&E capacity building, and (3) data quality assessment and evaluation. The web-based performance monitoring system will collect and store data before reporting and includes all required PMI reporting indicators. Implementing partners enter performance data quarterly and upload their narrative reports that serve as data sources.

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

d. Operational research

NMCP/PMI objectives

The National Malaria Strategic Plan 2015-2020 indicates that a national malaria operational research agenda will be developed by NMCP and research partners to guide the strategic plan implementation and provide evidence for innovative initiatives. The agenda and the identified operational research priorities will form the basis for resource mobilization. A provisional research priority list includes research on outdoor biting, insecticide resistance, chemoprevention, introduction of a malaria vaccine, interaction of ACTs and antiretrovirals, and therapeutic efficacy studies.

The Zanzibar Malaria Strategic Plan III, 2013/14 - 2017/18, sets a major objective to conduct relevant operational research to evaluate and optimize ongoing activities and monitor resistance to antimalarials and insecticides up to 2018. ZAMEP, with PMI support, is currently conducting several operational research activities.

Progress since PMI was launched

Placental parasitemia among women who have not had intermittent preventive treatment (IPTp) for malaria in Zanzibar

Zanzibar conducted a placental parasitemia study among women who had not had IPTp for malaria. The goal of this study was to measure placental parasitemia rates among pregnant women delivering in the selected facilities in Zanzibar who had not received IPTp and to provide cost-benefit analyses to help

inform policy decisions on the IPTp program in Zanzibar; the study results were published in 2014⁵ and served as the basis for the ZAMEP decision to discontinue IPTp in Zanzibar.

The Effectiveness of Non-Pyrethroid Insecticide-Treated Durable Wall Liners as a Method for Malaria Control in Endemic Rural Tanzania: Cluster Randomized Trial

This was a multi-year study led by the NIMR Amani Centre with management support from a PMI partner. It was funded primarily by PMI core funds, with additional support for ITN procurement provided by PMI Tanzania. This study was ended prematurely in July 2016 based on evidence indicating unexpectedly rapid deterioration of insecticidal impact in bioassays performed using susceptible *An. gambiae*.

Progress during the last 12-18 months

Decoding perceptions, barriers and motivators of net care and repair in Tanzania

This study, approved by the OR Committee in June 2015, is a joint effort by Ifakara Health Institute, London School of Hygiene and Tropical Medicine, NMCP and Swiss Tropical and Public Health Institute. The study began in December 2015 and was completed in December 2016. A mix of qualitative research methods highlighted potential motivators and existing barriers to net care and repair from local user contexts. The study objectives are:

1. To understand local understanding of net care and repair behaviors in Tanzania.
2. To investigate actions associated with different net damage attributes (number, size, and location of holes).
3. To elucidate motivators and barriers to repairing nets.
4. To explore perceptions on how to overcome barriers to net care and repair.

Barriers to net care included it not being a priority in the day-to-day activities, lack of education, and understanding of the importance of net care. Net repair was reported necessary as soon as a hole was identified; however, during the net assessment and participatory activity, most of the nets with smaller holes were less likely to be repaired than to be left as is for continued use. Protection against mosquitoes, malaria, and cost saving were identified as motivators to net repair. Barriers to net repair included it not being a priority, especially as holes at the bottom could be tucked under the mattress, and lack of education on the how to and the importance of repairing nets. A poster on this work was presented at the 2017 Annual Meeting of the American Society Tropical Medicine and Hygiene.

Determining the effect of holes of different sizes and varying concentrations of insecticide in bed nets on personal and community protection using Pyrethroid resistant and Pyrethroid susceptible *Anopheles arabiensis* as well as pyrethroid susceptible *Anopheles gambiae*

This study was approved by the OR Committee in 2014 and will be implemented by the Swiss Tropical and Public Health Institute and Ifakara Health Institute using MOP FY 2014 funds. An extension was approved by the OR Committee for an additional \$78,000 of FY 2016 funds. The study began in April 2017 and will end in May 2018. The study will explore the relationship between net damage, remaining insecticide, and feeding inhibition in susceptible and resistant vectors in hut trials. The results will help to define a) the cut-offs to be used to determine “end of useful life” and b) how the cut-offs need to be adjusted with increasing vector resistance.

⁵<http://www.ajtmh.org/content/91/2/367.long>

Determining the concurrence of telephone-based surveys with household surveys for monitoring ITN coverage

This study is designed to assess the use of mobile phone-based surveys for the rapid monitoring of ITN coverage in Tanzania. The study is designed to provide evidence of the inter-rater reliability of telephone surveys vs. household surveys for measuring ITN ownership, access and use, as well as to determine population-level reliability of indicators calculated from household surveys vs. telephone surveys for this purpose. The study will also identify the potential use of post-hoc adjustment methods, including post-stratification and survey ‘raking’, to increase the representativeness and accuracy of random digit dialed telephone surveys in these settings. Though the end of February 2018, this study protocol had been fully developed and approved by all necessary ethics committees including the Tulane University Institutional Review Board, Ifakara Health Institute Institutional Review Board, and the NIMR Ethics Committee in Tanzania.

Table 23. PMI-Funded Operational Research Studies, Mainland

Completed OR Studies			
Title	Start Date	End Date	Budget (USD)
Decoding perceptions, barriers, and motivators of net care and repair in Tanzania ¹	04/2015	12/2015	157,000
Ongoing OR Studies			
Title	Start Date	End Date	Budget
Determining the effect of holes of different sizes and varying concentrations of insecticide in bednets on personal and community protection using Pyrethroid resistant and Pyrethroid susceptible <i>Anopheles arabiensis</i> as well as pyrethroid susceptible <i>Anopheles gambiae</i>	04/2017	05/2018	241,198
Determining the concurrence of telephone based surveys with household surveys for monitoring ITN coverage	09/2017	10/2018	336,181
Planned OR Studies FY 2019			
Title	Start Date	End Date	Budget
N/A			

Publications

¹“*Sleep is leisure for the poor*” – Understanding perceptions, barriers and motivators to net care and repair in southern Tanzania. Mageni, Z, Dillip, A, Makungu, C, Kramer, K, Greer, G and Lorenz, L.M. 2017, Am Soc Trop Med Hyg, Annual Meeting, Abstract

Plans and justification

N/A

Proposed activities with FY 2019 funding:

N/A

e. Other health systems strengthening

NMCP/PMI objectives

PMI and other malaria control partners support the NMCP to build and strengthen health systems to ensure malaria control efforts are sustainable, country owned, and integrated into the health system. By supporting health systems interventions, PMI, the NMCP, and malaria partners aim to continue progress in the achievement of malaria control objectives and to sustain malaria control gains as Tanzania moves towards elimination. In particular, in alignment with the WHO HSS building blocks, PMI has prioritized support in the following areas:

- 1) Addressing critical health workforce shortages by improving recruitment, deployment, and retention systems for health workers;
- 2) Improving the availability of needed skills in the workforce to lead malaria control efforts by strengthening the capacity of staff at the NMCP;
- 3) Reducing drug stock outs by improving supply chain management and commodity forecasting, procurement, and distribution;
- 4) Decreasing donor dependency for financing of malaria control efforts through innovative domestic resource mobilization activities and public private partnerships;
- 5) Strengthening accountability and management for delivery of health services; and
- 6) Improving data for decision-making by continuing to support improvement of routine information systems including HMIS and eLMIS.

Progress since PMI was launched

Initially, PMI support for health systems strengthening focused on activities closely linked to malaria control, such as routine information systems strengthening for supply chain, institutional strengthening of planning capabilities of the NMCP and capacity building of the National Bureau of Statistics to conduct major surveys like the DHS, SPA, and the HMIS. These efforts have resulted in the establishment of the country's first integrated eLMIS detailing the availability and consumption of commodities, including those related to malaria. The National Bureau of Statistics' ability to lead its first THMIS has increased country ownership, institutionalization, and use of routine nationally representative surveys to capture the burden of disease due to malaria.

Over the years, PMI has provided support aimed at strengthening the health system more broadly such as efforts to address workforce shortages, inadequate management and planning of health services, and limited resources that will impede a sustained malaria response. Such efforts, co-funded with other U.S. Government funding sources (including PEPFAR, maternal and child health, family planning and reproductive health, and tuberculosis), have strengthened human resources planning, budgeting, financial management, and accountability at the national and local government authority level. These efforts influenced CHMTs and RHMTs to integrate malaria in their comprehensive council and regional health plans and as a result, 70 percent of targeted health facilities now use their own cost-sharing funds to contribute to procuring malaria commodities.

The African Field Epidemiology Network, the USAID Global Health Bureau, CDC-Atlanta, and CDC-Tanzania (with PEPFAR funding) have all worked with PMI and PEPFAR since 2008 to develop and strengthen the Tanzania FELTP. FELTP is a public health training program to build competencies in applied epidemiology, implementation, evaluation, and management of disease interventions, surveillance strengthening, epidemic preparedness and response, and leadership skills. The program is managed by the MOHCDGEC in collaboration with Muhimbili University of Health and Allied

Sciences and NIMR. To date, there have been eight graduating classes of 100 FELTP students, out of whom, 79 have returned to government institutions and hold positions such as head of the Epidemiology units in Tanzania mainland and Zanzibar, while others have been promoted to be District and Regional Medical Officers (D/RMO). For example, the RMO in Kagera has played a crucial role in the implementation and oversight of the IRS program in the Lake Zone. In addition, the RMO for Simiyu region and the DMOs for Karagwe and Musoma District Councils and Njombe Municipal Council have played a crucial role in the implementation of the malaria control program at regional and district levels. FELTP graduates who hold regional leadership positions are expected to chair these technical committees thereby contributing to the oversight of important malaria related issues including surveillance, disease control, and commodities, and initiating discussions in these meetings which might have impact on malaria interventions. The eighth cohort of 14 trainees graduated in December 2017.

Since 2011, PMI has supported Peace Corps' Stomping Out Malaria in Africa program in Tanzania. Peace Corps has incorporated basic malaria information into all mandatory Peace Corps Trainee and Peace Corps Volunteer (PCV) trainings and offers a twice annual in-service malaria TOT for PCVs and counterparts interested in learning more about malaria and malaria control. The volunteer-led Tanzania Malaria Team consists of eight volunteer Malaria Coordinators and offers support and resources for PCVs and coordinates all training activities. The team hosted the Stomp Out Malaria World Malaria Month Challenge for PCVs. The challenge, hosted annually, encourages PCVs to develop innovative and creative methods to engage their host communities in malaria control. Recent methods range from distributing bed nets at boarding schools to travelling to clinics during baby weighing days and teaching mothers about malaria prevention and treatment. Lessons learned in the field have been incorporated in the in-service malaria TOT. Best practices are also highlighted in the Peace Corps Tanzania Malaria bulletin, a newsletter that highlights best practices conducted by PCVs in Tanzania. PCVs work closely with the NMCP, PMI, and USAID implementing partners, and other NGOs to increase awareness of the school net program, promote preventative and care-seeking behaviors, support IRS-related data collection and analysis, conduct trainings using a malaria curriculum called 'Malaria Skillz', and participate in World Malaria Day events.

Progress during the last 12-18 months

Capacity building for NMCP

In the past 12 months, NMCP has engaged in various activities to increase capacity of NMCP staff in various areas, including participation in international and national-level trainings. Representatives from the NMCP also participated in international meetings, such as the annual American Society of Tropical Medicine and Hygiene meetings, Roll Back Malaria Technical Working Group meetings (both Vector Control and Social and Behavior Change Communication working groups), and regional medical and vector-borne diseases conferences. At the 2017 American Society of Tropical Medicine and Hygiene meeting, NMCP staff were coauthors on presentations that reported on assessing thresholds for detecting malaria epidemics in Tanzania; evaluation of round four of the SNP, and efficacy and safety of AL.

Results Based Financing

USAID and PMI supported the rollout and scale-up of Results based financing in two of the nine focus regions—Mwanza and Shinyanga. Results based financing is designed to incentivize improved quality of services in participating health facilities, enhanced support from CHMTs, RHMTs, and improved performance by MSD Zonal Stores. There have been tangible results. For example, the number of women receiving two doses of IPTp2 in Mwanza has increased from 3,356 in April-June 2016 to 18,356 in October-December 2017 and in Shinyanga from 4,367 in January-March 2016 to 14,834 in October-December 2017. Also, the availability of mRDTs, SP, and AL has improved in public facility

pharmacies in these regions. The data available for on-time delivery of commodities for vertical programs has improved from 43 percent in July-September 2016 to 80 percent in July-September 2017, decreasing slightly to 62 percent in Oct-Dec 2017. ACTs and mRDTs were included among these commodities, so while actually measuring the availability of these commodities has not been completed, it is presumed that increasing the on-time delivery of these commodities translates into a greater availability at the public health facilities.

Public Sector System Strengthening

PMI is supporting improvement of systems issues at both the national and district levels in 13 regions on the Mainland, including seven high prevalence malaria regions.⁶ Activities have garnered strong support from MOHCDGEC, PORALG, and the President's Office of Public Service Management and are: 1) strengthening national and district government to use malaria resources more transparently and are enabling citizens to participate in planning and monitoring, 2) increasing efficiencies in resource allocation for malaria activities- through improved financial planning and management at the local government authority level, 3) improving equity in the distribution of HCWs, including CHWs, and 4) promoting the use of available data to inform decision-making, particularly at the district level and 5) building national health information systems, including the malaria database, for increased use for data for planning, analysis and program management. Districts are increasingly able to better plan for the right number and skill mix of facility- and community-based providers for malaria services and to better financially plan for providing these services.

Health Information Mediator

The MOHCDGEC, with support from USAID, is working to ensure that information sharing and exchange across systems is mediated through a middleware called HIM. The implementation of the HIM aims to address challenges of the point to point approach currently being used in the health sector for systems integration, which normally becomes very complex and costly to scale and maintain as more and more systems are added to it. The Ministry with USAID support aims to facilitate the following: optimized information exchange for enhanced evidence-based decision making; and access to 'real time' integrated view of health facilities (hospitals etc.) activities' status to managers and decision makers; and through implementation a centralized data repository. In the past year the configuration of HIM has been completed allowing the exchange of data from eLMIS, the Human Resources for Health Information System, Vaccine Information Management System, to DHIS2. In addition, a configuration of HIM to support exchange of health commodities stock status from MSD Epicor 9 to eLMIS is being tested.

FELTP

In the past 12 months, FELTP graduated its eighth cohort of 14 residents and enrolled the tenth cohort (17 residents). Residents have undertaken field placement assignments and conducted evaluations of various malaria activities including an evaluation of mRDT surveillance system, analysis of 2016 SPAm, ANC data from 13 regions in Tanzania Mainland, assessment of factors associated with plasmodium infection among public primary school pupils, and investigations of upsurges of malaria cases in Buhigwe District Council, Kigoma region, Tanga region, and Dar Es Salaam region. Each trainee participates in several outbreak investigations in Tanzania, thereby developing their skills for future malaria outbreak investigations. Between 2016 and 2017, residents participated in 16 outbreak investigations. Residents presented their findings from these projects at several local and international conferences. All residents wrote and defended their master's graduate dissertation before they graduated.

⁶Seven targeted malaria regions: Kagera, Kigoma, Lindi, Mara, Mtwara, Mwanza and Shinyanga

The FELTP program also organizes seminars and dissemination meetings for residents to present and discuss their malaria projects. In 2017, there was one seminar and one dissemination meeting facilitated by staff from PMI and NMCP on the aforementioned and other selected topics including malaria epidemiology and current trends, overview of various malaria data sources and surveillance systems, current policy and implementation challenges in malaria diagnosis and case management, status of current malaria interventions in the Mainland and Zanzibar, and key priorities in the new National Malaria Strategic Plan.

PMI staff coordinates with the CDC-Tanzania FELTP program and work with the Tanzania FELTP Resident Advisor (RA) to facilitate linkages between Tanzania FELTP residents, the NMCP and ZAMEP, and implementing partners to ensure that residents take advantage of available opportunities and experiences in the area of malaria control in Tanzania. PMI staff helps to identify meaningful and appropriate field placements and research areas that allow the residents to select thesis topics around malaria.

Peace Corps

PMI supports three PCVs who work closely with the NMCP and PMI implementing partners. During the past 18 months, PCVs and their counterparts conducted social and behavior change communication activities, including the use of mobile video, to promote ITN use and care, prompt care seeking, uptake of IPTp, and adherence to national malaria case management and MIP guidelines. Volunteers also implemented malaria education activities at both community- and facility-based events and engaged with the District and Regional Malaria Focal Persons to provide training on malaria prevention and control for Community Change Agents. PCVs were also engaged in World Malaria Day events and supported ITN hanging demonstration events at facilities and aided in the distribution of malaria SBCC materials. PCVs and communities also engaged with the malaria month challenge where several malaria competitions were conducted, and several prizes contributed by PMI and IPs were presented to the winners.

The PMI-supported Peace Corps Volunteer Leader for malaria, a third-year volunteer based in Dar es Salaam, has been instrumental in coordinating, planning, and implementing malaria activities. By serving as a liaison between the PMI team, NMCP, malaria stakeholders, and Peace Corps, the Peace Corps Volunteer Leader has helped to enhance coordination of Peace Corps-supported malaria control activities. Among other tasks, the Peace Corps Volunteer Leader has facilitated a biannual malaria TOT and played a crucial role in preparing training materials.

In 2017, 12 volunteers and their 12 counterparts from government entities, community-based organizations, and the community attended the malaria training of trainers. The continually evolving training of trainers ensures that PCVs and their counterparts have the knowledge, skills, and resources to conduct education and SBCC activities related to malaria in their host communities. This initiative has led to all 100 PCVs (58 Education, 21 Agriculture, and 21 Health) being trained. Furthermore, PCVs implemented 11 community-led grants in 2017 to support community-based malaria control activities.

Table 24. Health Systems Strengthening Activities for Mainland and Zanzibar

HSS Building Block	Technical Area	Description of Activity
Health Services	MIP	Refresher trainings and integrated supportive supervision for MIP interventions in eight Mainland regions.
	Case Management	Support for case management trainings, including primaquine roll out in Zanzibar.
		Support mRDT and microscopy quality assurance and quality control systems; including maintenance of the National Archive of Malaria Slides (NAMS) on both Mainland and Zanzibar.
Health Workforce	Health Systems Strengthening	Support to FELTP trainees with focus on malaria.
		Strengthen capacity of the NMCP and ZAMEP by building staff knowledge and skills via attendance at conferences, participation in short-terms trainings, study tour and other educational programs, and other needs as determined by the teams.
		Improve equity in the distribution of health care workers providing quality essential health services.
Health Information	Vector Control	Support routine entomologic monitoring on Mainland and Zanzibar consisting of: 1) yearly monitoring of insecticide resistance monitoring of products used for vector control; 2) monthly cone bioassay monitoring of residual insecticidal activity on sprayed walls in the Lake Zone and Zanzibar; 3) monitoring of vector species abundance and distribution, resting behavior and sporozoite rates at established sentinel sites.
		Continue to support maintenance of MEEDs reporting and outbreak preparedness and response in Zanzibar.
	M&E	Support the NMCP to conduct semi-annual assessments of quality of malaria-related services and malaria commodities availability in 25 sentinel districts via SPAm.
		Support routine system strengthening to improve malaria data quality and use within HMIS in order to monitor changes in malaria burden over time and inform program planning.
		Increase use of available data to inform decision-making processes at both the national and local levels
Essential Medical Products, Vaccines, and Technologies	Vector Control	Supporting continuous distribution of nets through RCH clinics and schools (Mainland) or community (Zanzibar).
	Pharmaceutical Management	Support improved forecasting, procurement, quality control, storage and distribution of malaria commodities, such as ITNs, ACTs, and mRDTs.
		Support routine in vivo therapeutic efficacy monitoring of AL and second-line treatments at four to five sites.
		Support the introduction and scale up of mRDTs in ADDOs and to improve case management of febrile illnesses including malaria.

HSS Building Block	Technical Area	Description of Activity
Health Finance	Cross-Cutting	Support for GoT-led results based financing by supporting performance payments to facilities for provision of high quality malaria services and to supply chain actors for on time provision of key malaria commodities.
		Increase domestic resources for health care as well as improve use of funds in terms of effectiveness, efficiency, and obtaining value for money.
Leadership and Governance	Cross-Cutting	Strengthen governance at the national and district levels of the Mainland to use resources transparently, to enable citizen engagement in planning and monitoring, and to produce results in health care.

Plans and justification for proposed activities with FY 2019 funding

Reaching and sustaining malaria control and elimination goals requires effective and efficient local systems. Accordingly, PMI funds will be used to address key health system challenges to build capacity in the NMCP in order to sustain program gains. PMI will strengthen capacity of NMCP and field staff by supporting supervisory visits across interventions (case management, MIP, SM&E, SBCC, vector control) and workshops with district and regional medical officers and malaria focal points. In addition, these funds can be used to increase opportunities for staff attendance at conferences, participation in short-terms trainings, study tours, other educational programs, and other needs as determined by the training needs assessment conducted by the NMCP.

PMI will support the development and roll-out of the HIM, a MOHCDGEC-led data exchange platform that facilitates the use of data from multiple courses (DHIS2, eLMIS, etc.) to improve malaria program monitoring and management. These efforts complement the NMCP-led national malaria database and dashboard.

PMI will continue support to the FELTP program and contribute to the advanced training of Tanzanian epidemiologists for a 12-month period. The trainees will receive assistance from RAs and participate in malaria field assignments and investigations throughout Mainland and Zanzibar. PMI will continue to track the placement of FELTP graduates into post-training MOHCDGEC assignments that directly influence malaria control policies and practices. In addition, PMI through implementing partners, will support training for district level health officers through the CDC FETP-Frontline course. The budget for these district level officers will be included in implementing partners work plans. PMI will ensure that the frontline training does not duplicate ongoing PMI supported training and capacity building efforts supported by implementing partners. PMI and partners will consult the in-country FETP Program for exact costs, but it is expected that the implementing partner will need to budget no more than \$10,000 per student.

PMI will support up to three PCVs to work with the NMCP and PMI implementing partners. PMI will provide funds for Small Project Assistance grants that are available on a competitive basis to support PCVs' community-based malaria SBCC activities.

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

5. Staffing and administration

Two health professionals serve as RAs to oversee PMI in Tanzania, 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.

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

IV. OPERATIONAL PLAN - ZANZIBAR

1. Vector Control

ZAMEP/PMI objectives

The Zanzibar Malaria Strategic Plan IV 2018/19-2022/23 includes Integrated Malaria Vector Control as one of four major strategies for malaria elimination and sets as the objective to increase appropriate vector control measures to the population at risk for malaria to 100 percent by 2023. PMI supports three of the four activities identified to achieve this objective, these include: (a) IRS in identified areas, targeting all areas that have an annual malaria incidence of >1 case/1000 population or in areas where entomological investigations indicates the need for an IRS intervention; (b) maximize LLIN ownership and use and (c) vector surveillance in hotspot areas. The fourth intervention is larviciding and PMI/Tanzania does not currently support this activity.

PMI-supported entomologic monitoring in Zanzibar, summarized in Table 25, consists of: (1) yearly monitoring of resistance to insecticides used for vector control and testing for insecticide resistance mechanism; (2) monthly cone bioassay monitoring of residual insecticidal activity on sprayed walls, and (3) monitoring of vector species abundance and distribution, resting behavior, blood feeding, and sporozoite rates at established sentinel sites.

PMI's support for ITN coverage includes procurement and distribution of ITNs to support the community-based distribution and distribution of Global Fund or PMI procured ITNs through RCH channels at all primary health facilities. Procurement of insecticides for IRS is supported in Zanzibar by both Global Fund and PMI. In addition, PMI supports spray operation logistics for reaching between 30,000 and 60,000 households. Site selection is based on the incidence of malaria the previous year. The IRS operation adheres to high standards for protection of the environment and safe disposal of waste, in accordance with the approved Pesticide Evaluation Report and Safe Use Action Plans. Environmental inspection visits are conducted regularly to assess compliance with U.S. Government and Tanzanian national environmental standards.

a. Entomologic monitoring and insecticide resistance management

Progress since PMI was launched

ZAMEP conducts regular IRS monitoring activities, which include residual efficacy testing using the WHO cone bioassay. The numbers of sites for residual efficacy testing have changed over the years to reflect changes in PMI-supported IRS activities. Monitoring of residual efficacy pirimiphos-methyl CS, was conducted in 2016 in a total of five districts, two on Pemba (Chake-chake and Micheweni Districts) and three in Unguja (Kati, Magharibi and Kaskazini B Districts). Three shehias were selected in each district and monitoring began within seven days post-spray and continued monthly. Six types of surfaces (mud, oil-painted, water-painted, lime-washed, un-plastered cement block, and un-plastered stone block) are tested on both islands. Susceptible *An.gambiae s.s.* mosquitoes from the insectaries in Pemba and Unguja were used for these assays.

ZAMEP conducts yearly insecticide resistance monitoring with the WHO resistance assay. Currently the insecticide resistance monitoring is carried out at ten sites (six sites in Unguja and four sites in Pemba) at the same sites as the longitudinal entomological monitoring. However due to insufficient mosquitoes, testing could not be completed on some insecticides and at some sites. Since 2016 some insecticide

intensity monitoring using the CDC Bottle Assay has been carried out. A subset of mosquitoes from the resistance monitoring is processed at the ZAMEP laboratory for molecular species identification and genetic insecticide resistance mechanisms.

Monthly entomologic monitoring is conducted at sentinel sites with village collectors supervised by ZAMEP entomology team. The number of entomologic sentinel sites has varied to reflect changes in the PMI and ZAMEP IRS strategies. In 2015, there was an increase to 22 sentinel sites to evaluate the areas of persistent malaria transmission. Currently entomologic monitoring is conducted in ten sentinel sites, six in Unguja and four in Pemba, and provides information on vector species and density, blood feeding behaviors and malaria infection rates. On Unguja, four of the sentinel sites (Bumbwini, Donge, Muyuni, and Cheju) are in IRS districts and two are in non-IRS districts (Stonetown and Mwera). In Pemba, one of the sites (Tumbe) is in an IRS district and three are in non-IRS districts (Bopwe, Uwandani, and Wambaa). Entomologic monitoring techniques include indoor and outdoor human landing collections, pyrethrum spray collections, light traps, and pit traps.

Historically, ZAMEP outsourced molecular species identification of the mosquito material to national and international laboratories. In 2015 a molecular and immunodiagnostic laboratory was established in ZAMEP which provided on-site capacity to support both epidemiological and entomological surveillance. Since the establishment of this facility, ZAMEP has performed on-site entomological laboratory assays for molecular mosquito species identification, detection of target site mutations of insecticide resistance mechanisms (kdr), and blood meal analysis. In addition, the laboratory performs immune-diagnostic assays to detect malaria infected mosquitoes to determine the sporozoite rates.

Progress during the last 12-18 months

Insecticide residual efficacy testing carried out within seven days post-spray indicated that the quality of the spray was high and homogenous between districts. Residual efficacy of pirimiphos-methyl CS in Pemba and Unguja indicated that efficacy was maintained at >80 percent up to five months post-spray in Pemba and four months post-spray in Unguja. The decrease in efficacy was the highest in mud walls.

Molecular species identification of 520 mosquitoes from Pemba entomologic monitoring indicated a predominance of *An. arabiensis* (92.4 percent), followed by *An. merus* (5.2 percent). Other species were *An. lesoni* (1.4 percent) and *An. rivulorum* (1 percent). In Unguja, 1070 mosquitoes were identified as *An. arabiensis* (88 percent), followed by *An. rivulorum* (5.3 percent), *An. merus* (3.6 percent), *An. lesoni* (1.8 percent) and *An. gambiae* (1.2 percent). *An. arabiensis* was the predominant vector at all sites except for Stone Town where 68.7 percent of the mosquitoes collected were *An. gambiae s.s.* 916 mosquito samples from Unguja and 288 from Pemba were tested for malaria infections. No infected mosquitoes were detected in the Pemba samples of the samples from Unguja, 0.5 percent were found positive for *P. falciparum* and were from Mwera and Bumbwini. *An. gambiae s.l.* abundance, linked with the rainy season, is highest between April-June and October-December. Most of the biting occurred outdoors at all sites except at Uwandani in Pemba and Muyuni, Mwera, and Stone Town in Unguja. In Pemba, the mean biting rate in Pemba (0.093 – 0.77 bites/man/night) was the highest in Wambaa, which is a non-IRS area. In Unguja the highest biting rate (0.078 – 1.69 bites/ man/night) were in the IRS areas of Bumbwini and Cheju. In Pemba, the predominant biting activity of *An gambiae s.l.* appears to occur outdoors between 18:00-24:00hrs with decreased biting from midnight to early morning hours. Although indoor biting activity shows a small increase between 19:00-22:00hrs, the predominant biting is outdoors at this time. Indoor biting peaks between 01:00-03:00 hrs. In Unguja, the biting behavior appears to be different from Pemba in that biting occurs throughout the night both indoors and outdoors.

ZAMEP planned to conduct annual insecticide resistance monitoring on both islands in the same 10 sites as the longitudinal entomology sentinel sites in ten districts. However, a total of eight sites (four in Unguja and four in Pemba) were completed as there was insufficient mosquitoes for testing two sites in Unguja (Muyuni and Stone Town). Insecticide resistance was conducted for permethrin, lambda-cyhalothrin, deltamethrin, bendiocarb, alpha-cypermethrin, and pirimiphos-methyl. Data from the 8 sites, presented in Table 26 for *An. gambiae* s.l., shows high levels of pyrethroid resistance continues in all sites in Pemba. There was complete susceptibility to bendiocarb and pirimiphos-methyl. The resistance varied from site to site indicating that resistance is not homogenous across Pemba. In Unguja, there were difficulties in collecting enough mosquitoes to perform the assays so not all the insecticides were tested at every site. *An. gambiae* s.l. resistance to pyrethroids also varied across Unguja ranging from sites that showed no resistance, possible resistance in some sites, to high levels of resistance. No resistance was detected for bendiocarb at the four sites tested and to pirimiphos-methyl at two sites tested.

Intensity resistance assays, using the CDC bottle assay, conducted in Pemba in 2016, indicated that despite rotation of IRS with bendiocarb followed by pirimiphos-methyl CS, per WHO recommendations for insecticide resistance mitigation, levels of resistance intensity to pyrethroids in Pemba are increasing. In 2017, insecticide intensity assays using the CDC bottle assay with 5x and 10x of the diagnostic dose of alpha-cypermethrin and permethrin were conducted at Tumbe and Uwandani in Pemba. *An. gambiae* s.l. was found to be resistant to permethrin at 5x the diagnostic dose in Tumbe with 85 percent mortality and Uwandani with 92 percent mortality but susceptible to 10x the diagnostic dose. In Tumbe, *An. gambiae* s.l. was resistant to 5x alpha-cypermethrin at 86 percent mortality and with possible resistance to 10x with 98 percent mortality. In Uwandani, resistance was seen at 5x alpha-cypermethrin with 90 percent mortality and no resistance at 10x. This situation should be monitored closely as this may impact the efficacy of long-lasting ITNs.

Table 25. Summary of Entomological Activities in Zanzibar in the Last 12 Months

	Unguja	Pemba
Insecticide Resistance Monitoring	6 sites	4 sites
IRS Efficacy Monitoring	5 sites	4 sites
Longitudinal Entomological Monitoring (PMI-supported)	6 sites	4 sites

Table 26. Susceptibility of *An. gambiae* s.l. to WHO-Discriminating Concentrations of Four Different Insecticides on Zanzibar

Location	Sites	% Mortality to Different Insecticides					
		Per-methrin	Delta-methrin	Alpha – cypermethrin	Lamba-cyhalothrin	Bendiocarb	Pirimiphos methyl
Unguja	Mwera	96	95	--	64	100	100
	Donge	100	90	100	--	100	--
	Bumbwini	98	90	77	--	99	99
	Cheju	98	91	81	--	100	--
Pemba	Uwandani	34	18	9	50	100	100
	Bopwe	79	64	6	41	100	100
	Tumbe	79	52	55	80	100	100
	Wambaa	91	56	70	53	100	100

¹ WHO criteria for insecticide susceptibility: ≥98 percent mortality susceptible, 97-90 percent mortality resistant to be confirmed, <90 percent resistant

Note: The mosquitoes tested in these assays were morphologically identified as *An. gambiae* s.l. ZAMEP is currently processing and analyzing the mosquitoes from the insecticide resistance testing to identify species.

Plans and justification for proposed activities with FY 2019 funding:

PMI will continue support to the ZAMEP in entomologic monitoring including insecticide resistance testing, longitudinal monitoring, and insecticide efficacy evaluations for IRS. As Zanzibar moves towards elimination there will be increased focused of entomological investigations on hot-spots, PMI will support sentinel sites for longitudinal monitoring focusing on hot-spot areas and will be based on the latest entomological and epidemiological data. PMI will continue to support the ZAMEP advanced molecular and immunodiagnostic laboratory for analysis of samples for entomologic and epidemiological monitoring, this includes reagents, supplies, and maintenance costs.

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

b. Insecticide-treated nets

Progress since PMI was launched

Ownership of at least one ITN per household has increased markedly in Zanzibar from 28 percent in 2004-2005 (2044/05 DHS) to 80 percent in 2017 (2017 MIS), as seen in Figure 10, due to the success of the following distribution channels.

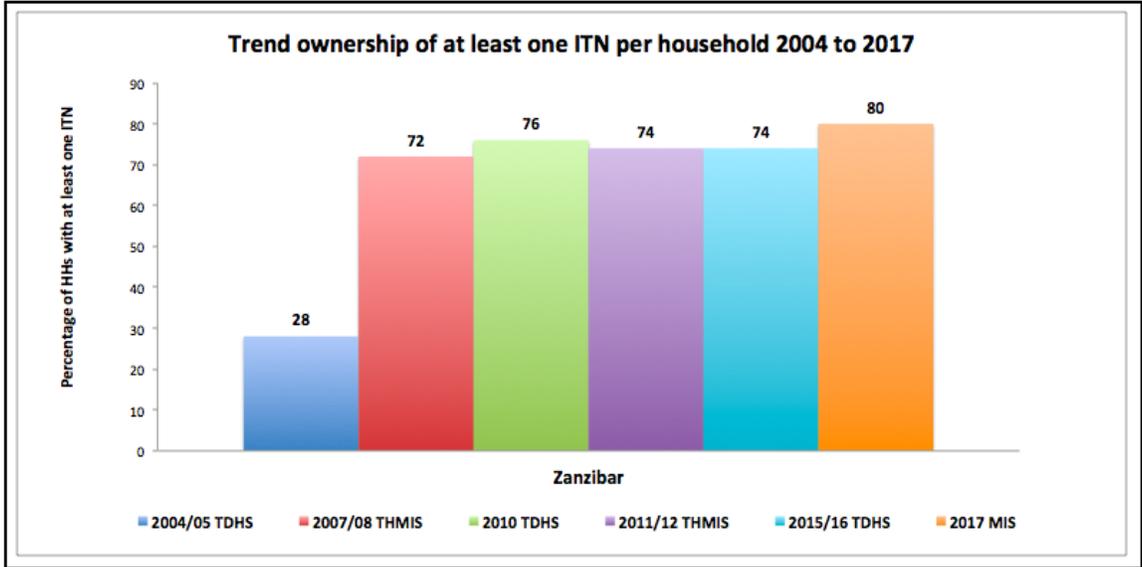
Universal coverage campaigns: The first UCC was implemented in Zanzibar by ZAMEP in March 2012 and distributed 660,000 ITNs. A second UCC was undertaken from April to July 2016 and distributed 702,185 ITNs. Household surveys were carried out in the same years as these two campaigns but were too early to capture the impact of the UCCs.

Continuous distribution channels: Between June 2014 and July 2016, a total of 371,160 ITNs were distributed through continuous distribution channels with PMI support. Of these, 71,898 and 48,271 ITNs were distributed through the ANC and vaccination clinic channels, respectively, and 250,991 ITNs were distributed through the community-based channel.

A process evaluation of the Zanzibar continuous distribution approach was finalized in October 2016. This study indicates that inclusion of additional stakeholders, such as imams and teachers, is an opportunity to build broader support at the community level for continuous distribution of ITNs. The expansion of community health committees to additional *shehias* would further augment stakeholder engagement. The conclusion was that the continuous distribution system in Zanzibar is functioning well across channels, with some locations functioning at a high level. There is a need to address lower-performing areas, using lessons learned from high-performing areas.

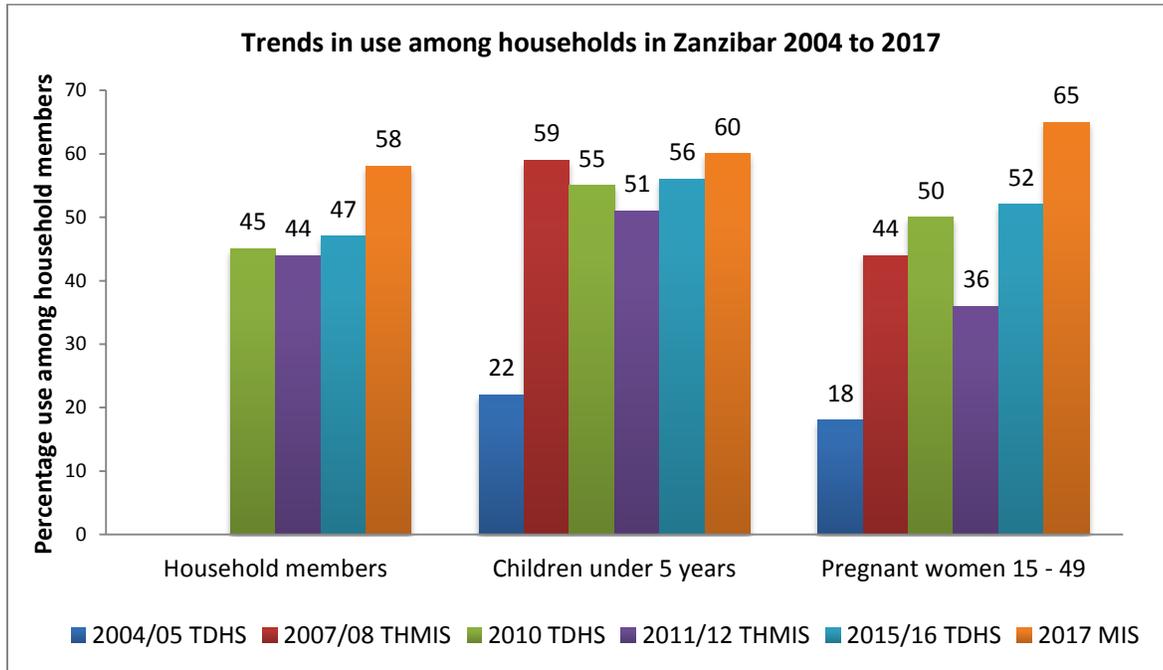
It was also noted that the management of continuous distribution in Zanzibar should be integrated into the existing logistics and supply chain system. PMI supported a review of the existing supply chain system and identified ways the continuous distribution system could be integrated into the health commodity supply chain.

Figure 10. Trends in Ownership of at Least One ITN per Household in Zanzibar



ITN Use: Figure 11 shows significant increases in ITN use among pregnant women and children under five years of age between 2004/05 and 2007/08. In the more recent population based surveys use among children has been steady while use among women has varied. In all groups, 2017 results are the highest recorded points for ITN use. This is supported by the ratio of population ITN use to population ITN access which was over 0.95 for Zanzibar in 2017. This extremely high ratio indicates that the major component for net use in Zanzibar is availability of ITNs.

Figure 11. Trends in ITN Use in Zanzibar



Progress during the last 12-18 months

A PMI-led review of the ITN distribution approaches in Zanzibar was captured in the revised *Technical Guidelines for the Implementation of Insecticide Treated Nets in Zanzibar, March 2017*. Based on the evidence that continuous distribution channels maintained high ITN coverage and access following the 2016 UCC, ZAMEP adopted a continuous distribution approach to maintain ITN coverage, with an understanding that a drop in population access below 50 percent would trigger another UCC. Between December 2017 and January 2018, PMI supported the distribution of a total of 69,080 ITNs through continuous distribution channels. All ITNs were distributed through the ANC and EPI channels. The community-based channel distribution was relaunched in April 2018 with modifications designed to increase accountability and uptake through this system.

PMI supported the realignment of responsibilities for supply chain management for the ANC, EPI, and community-based continuous distribution channels from ZAMEP to Central Medical Stores (CMS). With this the ITN storage, ordering and reporting will be integrated into the existing eLMIS and HMIS systems. In addition, PMI supported all aspects of the development of the approach and redesign of materials needed to ensure that continuous distribution through ANC and EPI becomes an integral part of the Zanzibar health system. Guidelines and job aids in English and Kiswahili, were designed and produced, and on-the-job trainings on ANC and EPI channels were held in all 11 districts in Zanzibar. PMI supported the adoption of the *Chandarua Kliniki* Dashboard to track and account for ITNs. As in the case on the Mainland, the Zanzibar *Chandarua Kliniki* dashboard utilizes the DHIS2 platform and automatically triangulates eLMIS commodity data with DHIS2 service data.

An ITN durability monitoring activity started in November 2016. Data collection will be carried out over 36 months, with the last collection in May/June 2019. PMI will continue to support this activity and ZAMEP, with technical assistance from PMI, will continue to play a lead role. Results from the 12

month sampling for the physical durability were within the expected range (Unguja site) or slightly below (Pemba site) for the “three year” standard.

Commodity gap analysis

Table 27: ITN Gap Analysis Zanzibar

Calendar Year	2018	2019	2020
Total Targeted Population	1,556,530	1,603,225	1,651,322
Continuous Distribution Needs			
Channel #1: ANC	63,039	64,931	66,879
Channel #2: EPI	50,276	51,784	53,338
Channel #3: Community	190,975	198,084	208,185
<i>Estimated Total Need for Continuous Channels</i>	304,290	314,799	328,401
Mass Campaign Distribution Needs			
2018/2019/2020 Mass Distribution Campaign(s)	0	0	0
<i>Estimated Total Need for Campaigns</i>	0	0	0
Total ITN Need: Routine and Campaign	304,290	314,799	328,401
Partner Contributions			
ITNs Carried Over from Previous Year	2,898	0	0
ITNs from MOH	0	0	0
ITNs from Global Fund	0	0	180,000
ITNs from Other Donors	0	0	0
ITNs Planned with PMI Funding	195,000	200,000	154,077
Total ITNs Available	197,898	200,000	334,077
Total ITN Surplus (Gap)	-106,392	-114,799	5,676

Footnotes:

1. ANC ITN needs are based on pregnant women representing 4.5 percent of the total population annually, and ANC ITN delivery reaching 90 percent of pregnant women annually.
2. EPI ITN needs are based on under one children representing 3.8 percent of population annually, and EPI ITN delivery reaching 85 percent of children.
3. Community ITN needs are based on MIS results and modeling to determine the gap between the ITNs needed to maintain 80 percent population access and the ITNs distributed through ANC and EPI channels.

Plans and justification for proposed activities with FY 2019 funding

PMI will support the procurement and distribution of ITNs for the community-based continuous distribution channel. This will include support for projecting ITN needs, tracking, accountability, and the Zanzibar *Chandarua Kliniki* dashboard.

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

c. Indoor residual spraying

Progress since PMI was launched

After blanket spraying (2007-2011), Zanzibar moved to targeted spraying for two years (2012-2013), and to focal spraying of hot spots beginning in 2014. For each round, household coverage for areas selected for IRS was over 90 percent. Low malaria prevalence, combined with robust and reliable surveillance and entomological monitoring systems, allowed Zanzibar to adopt an entirely focal spraying approach. Malaria incidence at village levels is used as the criteria for IRS. Zanzibar has used pirimiphos-methyl CS insecticides from 2014 to 2017.

Table 28: PMI-supported IRS activities on Zanzibar: 2015-2019

Year	No. Districts Sprayed	Insecticide Used	No. Structures Sprayed	Coverage Rate	Population Protected
2015	8 (focal)	Pirimiphos-Methyl CS (OP)	66,497	95%	339,135
2016	8 (focal)	Pirimiphos-Methyl CS (OP)	27,644	95%	130,170
2017	8 (focal)	Pirimiphos-Methyl CS (OP)	38,884	95%	191,119
2018	8 (focal)	Pirimiphos-Methyl CS (OP)	67,450	95%	334,715
2019 ¹	8 (focal)	TBD – non-pyrethroid, long lasting insecticide	~40,000	~90%	~200,000
2020 ²	8 (focal)	TBD – non-pyrethroid, long lasting insecticide	~40,000	~90%	~180,000

1. PMI will support technical assistance and operational costs for IRS; Global Fund will procure the insecticide.
2. PMI will procure insecticide and provide technical and operation costs for IRS

Progress during the last 12-18 months

The IRS coverage in 2018 reached a total of 67,450 structures and protected over 330,000 people, a large increase over the 2017 coverage. The focal spraying targeted all villages (*shehias*) with a malaria incidence of more than 2.5 cases/1,000 population over the previous year.

Plans and justification for proposed activities with FY 2019 funding

Global Fund procured insecticide and PMI provide technical and operational support for IRS in 2017, 2018, and 2019. With FY 2019 funds PMI will both procure insecticide and provide technical and logistic assistance for the 2019/2020 IRS round. A MOU between the Zanzibar Ministry of Health and NgenIRS, valid for a period from 2017 to 2019, allowed Zanzibar, either through Global Fund or PMI, to procure subsidized insecticide for IRS during that three-year period.

PMI will provide support to ZAMEP to spray hot spots areas, covering about 40,000 structures and protecting about 180,000 people.

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

2. Malaria in pregnancy

NMCP/PMI objectives

In targets in the *Zanzibar Malaria Strategic Plan IV 2018 – 2022/23* ZAMEP are to increase the use of long-lasting ITNs among pregnant women from 68 percent in 2016 to 95 percent in 2022/23 through facility-level distribution of ITNs to pregnant women at their first ANC clinic visit. ZAMEP dropped the intermittent screen and treat strategy and plans to focus on strengthening malaria case management for pregnant women including screening for symptoms, timely diagnosis and treatment, and effective referral.

Progress since PMI was launched

Given the low prevalence of malaria in women at the time of delivery (0.8 percent), Zanzibar no longer implements IPTp and adopted a policy of screening pregnant women by mRDT at ANC visits and treating those testing positive according to national guidelines. Following the stakeholders' consultative meeting held in August 2016, ZAMEP dropped the intermittent screen and treat strategy and plans to focus on strengthening malaria case management for pregnant women including screening for symptoms, timely diagnosis and treatment, and effective referral. In efforts to ensure high ownership and use of ITNs, particularly among women of reproductive age, Zanzibar implemented continuous distribution in 2014 via ANC. This was part of an overall strategy that also includes routine ITN distribution during EPI visits and reactive case detection visits, and community-based distribution as needed. PMI will continue supporting Zanzibar to update the case management guidelines and facilitate the development of malaria case screening tools for ANC.

Progress during the last 12-18 months

Zanzibar continued with implementation of the ITN continuous distribution through EPI and ANC clinics (more details in ITNs section). PMI also supported ZAMEP to review the diagnostics and treatment guidelines to include an MIP chapter. The strategies in prevention of malaria in pregnancy are integrated in the overall ANC package for health. They include provision of prompt testing of suspected cases and treatment of malaria positive cases. The guidelines are expected to be finalized by the end of calendar year 2018. PMI will support the rollout of these new guidelines.

PMI supported an ongoing process of developing a Quality Improvement (QI) tool, based on the MSDQI described in the Case Management section to encourage supervisors and providers to monitor the quality of malaria services, including MIP. The MSDQI package is being adapted for Zanzibar and will be used to observe providers' diagnosis, treatment and ANC practices. Facilities will be selected as part of supportive supervision, with priority given to the low performers, identified from previous rounds of supervision data.

Table 29. Status of IPTp Policy in Zanzibar

Status of Training on Updated IPTp policy		Number and Proportion of HCW Trained on New Policy in the Last Year	Are Updated IPTp Guidelines Available at Facility Level?	ANC Register Updated to Capture Three Doses of IPTp-SP	HMIS/DHIS2 Updated to Capture Three Doses of IPTp-SP
Completed/Not Completed	Date				
N/A	N/A	N/A	N/A	N/A	N/A

Table 30. Status of ANC Guidelines in Zanzibar

Status of 2016 WHO ANC Guidelines Adoption		Number and Proportion of HCWs Trained in New ANC Guidelines in Last Year	Are Updated Adopted ANC Guidelines Available at Facility Level?	Additional IPTp Contact Added to ANC Schedule at 13 Weeks?	ANC Register Updated to Capture 8-9 ANC Contacts?	HMIS/DHIS2 Updated to Capture 8-9 ANC Contacts Started/Completed/Not Completed
Started/Completed/Not Completed	Date Completed (or expected)					
Not started	N/A	N/A	N/A	N/A	N/A	N/A

Commodity gap analysis

N/A

Plans and justification for proposed activities with FY 2019 funding

PMI will continue to support MIP efforts in Zanzibar including ANC supervisory visits by ministry staff using the modified MSDQI tool, which is expected to be finalized by mid-2018. The QI visits will ensure that pregnant women receive preventive services, accurate diagnostic testing and effective treatment. PMI, in collaboration with the case management technical working group will facilitate discussions with the Zanzibar Reproductive and Child Health unit and ZAMEP on inclusion of 2016 WHO recommendations that call for a minimum of eight contacts with a health provider. One contact during the first 12 weeks gestation, an extra contact at 13-16 weeks for the administration of IPTp1, and subsequent contacts at 20, 26, 30, 34, 36, 38, and 40 weeks gestation. Further, PMI will support the roll out of the revised national case management guidelines which include a MIP chapter, following the discontinuation of the IST strategy (more details and budget in case management section). PMI will continue support for the procurement and provision of long-lasting ITNs to pregnant women through continuous distribution at ANC (budget and more details in ITN section), and continue support for SBCC to increase ITN use and ANC attendance (see SBCC section).

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

3. Case management

ZAMEP/PMI objectives

The case management goal of the ZAMEP Malaria Strategic Plan IV 2018–2023 is to achieve universal access to high quality malaria diagnostic testing and treatment in all health facilities and the community. The target in Zanzibar is to ensure quality-assured diagnosis and appropriate case management in all health facilities and the community level to 100 percent by 2023. The *Zanzibar Malaria Diagnosis & Treatment Guidelines 2014* call for parasitological confirmation for all patients with signs or symptoms of malaria. Malaria microscopy and mRDT are the principle diagnostic tools used in both public and private health facilities. Microscopy is available at hospitals and larger health facilities and mRDTs are available in all public and most private health facilities. This has enabled the program to meet its objective of operating the MEEEDS; (see Surveillance, Monitoring and Evaluation section for more information).

mMQA/QC was established in 2005, and as of 2017 has been expanded to 94 public and private health facilities (57 in Unguja, 37 in Pemba). ZAMEP collects slides from health facilities on a monthly basis and 10 percent of negative and 100 percent of positive slides are re-examined in a blinded manner by the ZAMEP laboratory. In 2017, microscopy testing sensitivity and specificity was 99.8 percent and 99.9 percent, respectively. Malaria RDTs are being used in all 168 public facilities. ZAMEP maintains a system of quarterly mRDT QC which documented 98.7 percent achievement of key quality indices in 2017. ZAMEP conducts quarterly mRDT supervisory visits to all public district hospitals and health centers and holds semi-annual stakeholder meetings to provide feedback to the districts about both microscopy and mRDT performance. The ZAMEP target is to scale up malaria diagnosis QA/QC for private health facilities from 32 percent in 2016 to 100 percent by 2023.

ACTs were deployed in Zanzibar in 2003 and the current first-line treatment for uncomplicated malaria is AS/AQ, with artesunate as the drug of choice for severe malaria. Serial ZAMEP assessments have shown that ACTs are widely available in health facilities. The Zanzibar Malaria Diagnosis & Treatment Guidelines, 2014 include the WHO recommendation for the use of single low-dose (0.25 mg base/kg) primaquine for all patients with confirmed uncomplicated *P. falciparum* infection in areas pursuing elimination. The guidelines call for referral of patients with severe malaria from lower level facilities to the nearest health center after first giving the patient an intramuscular injection of artesunate. Intramuscular artemether or quinine can be used as second-line drugs if artesunate is not available. Use of pre-referral rectal artesunate at peripheral health facilities is also permitted if injection is not available yet in practice does not occur as rectal artesunate is not procured by either the GoZ or its partners.

Table 31. Status of Case Management Policy and Implementation in Zanzibar

Status of Case Management Policy in Zanzibar according to the National Guidelines for Diagnosis and Treatment of Malaria, 2014		Currently Being Implemented? Plans to Modify the Recommendations?
What is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria?	Artesunate-Amodiaquine (AS-AQ) + single dose primaquine	Yes
What is the second-line treatment for uncomplicated <i>P. falciparum</i> malaria?	Artemether-lumefantrine (AL) + single dose primaquine	Yes
What is the first-line treatment for severe malaria?	Injectable artesunate	Yes
In pregnancy, what is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria in the first trimester?	Oral quinine ^a	Yes
In pregnancy, what is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria in the second and third trimesters?	Artesunate-Amodiaquine (AS-AQ)	Yes
In pregnancy, what is the first-line treatment for severe malaria?	Injectable artesunate in all trimesters	Yes
Is pre-referral treatment of severe disease recommended at peripheral health facilities? If so, with what drug(s)?	Intramuscular artesunate. Rectal artesunate ^β if IM not available	Yes
Is pre-referral treatment of severe disease recommended for community health workers? If so, with what drug(s)?	NA	NA
If pre-referral rectal artesunate is recommended, for what age group? (note: current international guidelines do not recommend administering to those ≥ 6 years)	No age stipulation	NA

^a Oral quinine is procured by Government of Zanzibar (GoZ).

^β Use of pre-referral rectal artesunate at peripheral health facilities is permitted if injection is not available yet in practice does not occur as rectal artesunate is not procured by either the GoZ or its partners.

Progress since PMI was launched

The current Zanzibar Malaria Diagnosis & Treatment Guidelines were updated in April 2014, and PMI provided support to ZAMEP to disseminate the updated guidelines and conduct initial and refresher trainings across all districts.

Malaria microscopy QA/QC was established in 2005 at 23 public health facilities in Zanzibar and as of 2016 had been expanded to 88 (50 public, 17 private, 8 faith-based, 13 military health facilities). Significant quality improvement has been noted with microscopy testing sensitivity increasing from 89.8 percent in 2012 to 99.8 percent in 2016. By 2016, mRDTs were being used in all 157 public facilities (89 in Unguja, 68 in Pemba). To help improve performance, ZAMEP in conjunction with partners

instituted a system of quarterly mRDT QC which documented high levels (>94 percent) of achievement of key quality indices.

Progress during the last 12-18 months

In 2017, 94 health facility laboratories (55 public, 18 private, 8 faith-based, 13 military health facilities) were targeted and received malaria microscopy QA/QC supervision visits, an expansion of 5 additional public facilities and 1 private facility from 2016. A total of 61,500 slides were collected from health facilities for mMQAQC. In addition, 60 laboratorians were targeted and received training on mMQAQC and 170 were targeted and attended feedback meetings. Establishment of the ZAMEP slide bank was finalized.

Malaria RDT QC supervision visits were conducted in 168 health facilities, 600 HCWs were targeted and received mRDT training, and 240 HCWs were targeted and attended feedback meetings. The number of public health facilities enrolled in the mRDT QC program increased from 157 to 168.

Among the total 345,713 mRDT consumed in 2017, the proportions by setting was 319,198 (92 percent) at outpatient departments, 16,163 (five percent) with active case detection (ACD), 6,032 (two percent) through surveys, and 4,320 (one percent) with MCN.

The *Zanzibar Malaria Diagnosis & Treatment Guidelines 2014* call for single low dose administration of primaquine along with ACT. Primaquine distribution began in October 2016, and by the end of 2017 all health facilities were stocked. Availability of primaquine at private health facilities is limited due to various bureaucratic and logistical constraints. Lack of infant formulation remains a challenge to prescribing in younger age groups.

In 2017, PMI supported the development and completion of the ZAMEP Malaria Strategic Plan IV 2018-2023. In the first quarter of 2018, ZAMEP initiated the development of a case management OTSS tool modeled after the MSDQI tool used in mainland Tanzania through support from PMI.

Therapeutic efficacy studies (TES) in Zanzibar are supported by the Global Fund, Karolinska Institute, Uppsala University, and Zanzibar MoH.

ZAMEP conducted TES in 2017 with an overall aim to assess the therapeutic efficacy and safety of ASAQ combined with a single low dose of primaquine (0.25 mg/kg) for the treatment of uncomplicated *P. falciparum* malaria patients in Zanzibar. The study was implemented in three health facilities located in three districts covering both Unguja and Pemba Islands, i.e. Bububu Military Hospital (West District, Unguja), Uzini Primary Health Care Unit (Central district, Unguja), and Micheweni Primary Health Care Center (Micheweni district, Pemba). These facilities were responsible for the final screening of patient's eligibility, enrollment, treatment, and follow-up. There were also 10 selected primary health care facilities (satellite facilities) used to pre-screen patients with symptoms and signs compatible with uncomplicated malaria using mRDT. Those patients who showed potential study eligibility were transferred to the nearby study site indicated above. The satellite facilities were Tumbe, Shumba viamboni (Micheweni District); Chukwani, Kizimbani, Shakani, Kombeni, Bububu, Selem, Magogoni (West District); and Mwera, Miwani, Machui (Central District). A total of 146 patients were enrolled. Preliminary data indicates that the crude efficacy of the first-line treatment of uncomplicated *P. falciparum* malaria in Zanzibar was 97 percent (142/146); PCR is pending.

The next Zanzibar TES is scheduled for 2019.

Table 32. PMI-funded Therapeutic Efficacy Studies (TES)

Completed TESs			
Year	Site Name	Treatment Arm(s)	Plans for k13 Genotyping
2017	Bububu	artesunate + amodiaquine + primaquine	Pending
2017	Micheweni	artesunate + amodiaquine + primaquine	Pending
2017	Uzini	artesunate + amodiaquine + primaquine	Pending
Ongoing TESs			
N/A			
Planned TESs (funded with previous or current MOP)*			
N/A			

*PMI has not previously funded TES in Zanzibar.

Commodity gap analysis

Table 33: RDT Gap Analysis

Calendar Year	2018	2019	2020
RDT Needs			
Total country population	1,613,262	1,656,820	1,700,378
Population at risk for malaria	1,613,262	1,656,820	1,700,378
PMI-targeted at-risk population	1,613,262	1,656,820	1,700,378
Total number of projected fever cases	258,889	310,581	362,273
Active Case Detection (ACD)	174,450	226,142	277,834
Percent of fever cases tested with an RDT	90 percent	90 percent	90 percent
Total RDT Needs	444,120	551,176	658,232
Partner Contributions (to PMI target population if not entire area at risk)			
RDTs carried over from previous year	135,507	180,276	0
RDTs from Government	0	0	0
RDTs from Global Fund	0	232,952	239,474
RDTs from other donors	0	0	0
RDTs planned with PMI funding	488,889	0	0
Total RDTs Available	624,396	413,228	239,474
Total RDT Surplus (Gap)	180,276	-137,948	-418,758

Footnotes:

1. Fever cases are expected to increase due to the following reasons:
 - Expansion of Malaria Case Notification (MCN) and household screenings
 - Involvement of private sector in MEEDs will contribute to increased case detection
 - Involvement of special institutions, health facilities, and specialized hospitals such as military hospitals
2. Total mRDTs account for other testing activities such as training
3. ACD figures were calculated based on estimates of previous years' screening results at shehia level. Approximately four people are screened for suspected malaria by mRDT at household level following cases investigated through reactive case detection (MCN), averaging ~18,000 annually. The ZAMEP strategic plan supports additional ACD at community level in areas with increased reporting of confirmed malaria cases through passive and reactive surveillance. ACD is expected to be a routine activity in all areas with high reported malaria cases. PMI has previously only supported testing of people with suspected malaria during care at facilities and through reactive case detection (MCN); however, PMI no longer procures the multi-species mRDTs requested by ZAMEP and is therefore not planning to procure mRDTs with FY 2019 funds. PMI will work closely with ZAMEP, Global Fund, and partners to ensure there are no mRDT gaps for appropriate testing strategies.

PMI has not procured ACTs for Zanzibar for several years. As in previous years, the Global Fund will supply the full ACT need for Zanzibar. ZAMEP estimates the need for the following quantities of treatments with ASAQ with low dose primaquine: 4,566 (2018), 3,881 (2019), and 3,520 (2020); AL: 457 (2018), 388 (2019), and 352 (2020).

Quantification of microscopes

Of 168 public health facilities, 94 (56 percent) use microscopy (57 Unguja and 37 Pemba) and are part of ZAMEP's mMQAQC program. For FY 2019, ZAMEP estimates approximately 197,304 blood slides will be read at health facilities, representing 48 percent of total suspected malaria cases in the public sector.

Quantification of IV artesunate/IM artemether

ZAMEP uses data on inpatient department admissions related to malaria available in HMIS/DHIS2 to estimate severe malaria cases. On average between 2015 and 2017, 2.5 percent of total confirmed malaria cases were admitted to inpatient department; however, ZAMEP quantifies injectable commodities assuming severe malaria cases represent 12 percent of total annual confirmed malaria cases. For MOP 2019, ZAMEP estimates the need for the following quantities of vials of injectable artesunate: 1,367. Injectable artemether is not routinely used at public health facilities in Zanzibar.

Quantification of rectal artesunate

Use of pre-referral rectal artesunate at peripheral health facilities is permitted if injection is not available yet in practice does not occur as rectal artesunate is not procured by either the GoZ or its partners.

Plans and justification for proposed activities with FY 2019 funding

Following pending approved orders, PMI will discontinue procurement of mRDTs for Zanzibar and all mRDT needs will be covered by the Global Fund.

Malaria diagnostic QA/QC is primarily performed via monthly (microscopy) or quarterly (mRDT) supportive supervision of health facility personnel. PMI will continue to support the maintenance of the mRDT and malaria microscopy QA/QC systems in public as well as private facilities in Zanzibar. While all public laboratories in Zanzibar participate in the malaria microscopy program only 32 of 80 private facilities do. PMI will therefore support ZAMEP to continue microscopy training and capacity building

for the public sector with invitations to participants in the private sector to expand the capacity of microscopy QA/QC to the remaining private facilities in both Pemba and Unguja. PMI support for microscopy will include provision of laboratory supplies needed at the ZAMEP reference laboratory and the maintenance of the Malaria Slide Bank. PMI will continue to support case management training and supervision with a particular emphasis on rational use of ACTs, implementation of primaquine including dosing for young children, and training on adverse event recognition and monitoring. Training will be expanded to include more private health facilities, which have not yet implemented primaquine. PMI will support ZAMEP to disseminate the updated Zanzibar Malaria Diagnosis & Treatment Guidelines and conduct initial or refresher training across all districts following their official release. PMI will support implementation of the new MSDQI-type package, currently being finalized by ZAMEP, in health facilities.

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

4. Cross-cutting and other health systems strengthening

In order to successfully implement the aforementioned activities, PMI Tanzania supports a suite of activities that cut across and benefit insecticide- and drug-based prevention and case management activities. For example, availability of high-quality commodities is necessary to ensure high ITN coverage and effective case management, and health-seeking behavior of individuals and communities is necessary to improve coverage of all interventions. In addition, the gains achieved in malaria control in Tanzania can only be sustained if there are strong health systems and local capacity. Hence, systems strengthening and capacity building are intrinsic in all PMI intervention-specific activities previously mentioned (e.g., training and supervision of health workers, technical assistance for planning and monitoring interventions, etc.). Non-intervention specific or cross-cutting health systems strengthening activities are described below.

a. Pharmaceutical management

ZAMEP/PMI objectives

The ZAMEP objective is to ensure availability and accessibility of antimalarial commodities at all levels. PMI will support ZAMEP to collect consumption and logistics data needed for annual quantification and procurement planning, strengthening the Zanzibar Integrated System that manage antimalarials and mRDTs to improve data quality; strengthen the LMU capacity in Zanzibar.

Progress since PMI was launched

PMI has co-funded the LMU's development of a Performance Monitoring Plan for key indicators including on-time delivery and order fill rate. Measuring these indicators and raising awareness of this performance will help the LMU and other stakeholders to hold the CMS accountable. On an annual basis, with support from PMI and other partners, ZAMEP, and CMS conduct a quantification of malaria commodities and monitor the supply plan for the whole country. Bi-annual reviews are conducted to update stock status tables and procurement plans. This exercise has assisted the MoH, ZAMEP, CMS, and the Pharmaceutical Services Section to manage the commodity pipeline for the country.

PMI also supported Zanzibar MoH to review the *Zanzibar Supply Chain Action Plan* which is a three-year action plan that defines key supply chain interventions so as to align supply chain stakeholders to their strategic plans and serve as a reference document to identify the status of completion of activities

listed in the *Zanzibar Supply Chain Action Plan*. PMI has continued to support LMU activities in Zanzibar after its development and initiation of activities since July 2015. The Zanzibar-specific eLMIS was also rolled out to all districts in 2014. Systems and capacity strengthening activities were cost-shared with PEPFAR and other USAID health funds.

Progress during the last 12-18 months

PMI provided support to ZAMEP in forecasting, quantification, and procurement planning for ACTs and mRDTs. PMI supported revising the Zanzibar Integrated System to support monthly distribution and monthly reporting by last mile health facilities. PMI also supported ZAMEP in identifying strategic priorities towards malaria elimination incorporated supply chain interventions in the new strategic plan (2018-2023).

Plans and justification for proposed activities with FY 2019 funding:

PMI will support ZAMEP to collect consumption and logistics data needed for annual quantification and procurement planning, and strengthen the quality of antimalarial and mRDT data in the Zanzibar Integrated System. Together, PMI support will contribute to improved quantification, transportation, storage, and record keeping for mRDTs and antimalarial drugs.

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

b. Social and behavior change communication

ZAMEP/PMI objectives

The ZAMEP's SBCC activities aim to promote positive human behaviors for malaria elimination in Zanzibar. The ZAMEP's *Communication Guide for Malaria Elimination Interventions 2013-2017* has expired. Currently ZAMEP is revising and updating their SBCC strategy, which will align with the *Zanzibar Malaria Strategic Plan 2018-2023*. PMI is supporting the ZAMEP to revise and update their SBCC strategy.

All malaria SBCC activities are coordinated by the ZAMEP SBCC Unit. The SBCC Unit holds bi-annual (and ad hoc) technical working group meetings at which all existing SBCC implementing partners review progress of activities and review and approve all new activities. Currently, PMI is the only development partner supporting malaria SBCC activities in Zanzibar.

The draft revised SBCC strategy has identified numerous priority behaviors, but PMI will continue to support SBCC activities to achieve the following behavioral and communication objectives related to correct and consistent ITN use, ITN care, ANC attendance, prompt care seeking, and adherence to national case management guidelines. In addition, the strategies are expected to continue promoting high level political advocacy and local government level advocacy for planning, budgeting, and coordination of malaria control and elimination interventions.

PMI is supporting the development of the *Malaria Elimination Communication Strategy (2018-2023)*. The behavioral and associated communication objectives below are still in draft stage and are subject to change pending additional review and ZAMEP approval. These objectives reflect the full scope of all malaria SBCC activities ZAMEP intends to implement in the coming five-year period. Baseline and targets are not yet provided for these objectives, as PMI is currently supporting data collection and

analysis to determine the appropriate baseline and target for each behavioral and communication objective.

Table 34. Behavioral and Communication Objectives Included in the ZAMEP’s Draft Revised SBCC Strategy

Behavioral Objective	Baseline*	Target⁺
People recognize possible cases of malaria quickly based on accurate knowledge of signs and symptoms	TBD	TBD
Communication Objectives	Baseline	Target
To maintain and increase the proportion of people who have accurate knowledge of the signs and symptoms of malaria	TBD	TBD
To promote the belief that malaria is still a risk in Zanzibar year-round	TBD	TBD
Behavioral Objective	Baseline	Target
People go to a health facility to access care within 24 hours of onset of fever or other malaria signs/symptoms	TBD	TBD
Communication Objective	Baseline	Target
To increase the proportion of people who believe that malaria is a serious illness, which requires prompt treatment from a health care worker	TBD	TBD
Behavioral Objective	Baseline	Target
People are tested for malaria prior to taking malaria treatment	TBD	TBD
Communication Objectives	Baseline	Target
To increase the proportion of patients who believe it is important to test before using a malaria medication	TBD	TBD
To increase the proportion of patients who trust their malaria test results	TBD	TBD
To increase the proportion of travelers who are aware that it is important to be tested for malaria at the point of entry	TBD	TBD
To increase the proportion of providers who believe it is important to test for malaria before providing treatment, because not every fever is malaria (<i>provider focus</i>)	TBD	TBD
To promote the attitude that following guidelines for malaria testing and treatment will help providers serve their clients better (<i>provider focus</i>)	TBD	TBD

Behavioral Objective	Baseline	Target
Patients with confirmed malaria take the full required dose of ACT as prescribed	TBD	TBD
Communication Objectives	Baseline	Target
To increase the proportion of patients who believe it is important to complete the required doses of ACT, even if they feel better	TBD	TBD
To increase providers' efficacy in communicating with clients on malaria treatment	TBD	TBD
Behavioral Objective	Baseline	Target
All members of the household sleep under an ITN/LLIN every night in all seasons	TBD	TBD
Communication Objectives	Baseline	Target
To increase the proportion of people who believe that ITN/LLINs are effective at preventing malaria when used consistently and correctly	TBD	TBD
To increase the proportion of people who believe that ITN/LLINs should be used consistently every night in all seasons	TBD	TBD
To increase knowledge amongst travelers that ITN/LLINs should be used every night in Zanzibar	TBD	TBD
To increase knowledge amongst Zanzibaris that they should use ITN/LLINs every night when traveling to malaria endemic areas	TBD	TBD
To increase the proportion of people who know it is important to replace their ITN/LLINs when damaged	TBD	TBD
To increase the proportion of people who believe that ITN/LLINs should only be used for preventing malaria	TBD	TBD
Behavioral Objective	Baseline	Target
Prepare your buildings for IRS and allow sprayers inside structures/open your house for spraying	TBD	TBD
Communication Objective (s)	Baseline	Target
To increase supportive attitudes toward IRS operations amongst community members	TBD	TBD
To increase community members' knowledge that the insecticide used in IRS is safe	TBD	TBD

Behavioral Objective	Baseline	Target
Community members accept and support larval source management (LSM) activities in their community	TBD	TBD
Communication Objective(s)	Baseline	Target
To increase community members' awareness of LSM as a new strategy for malaria prevention	TBD	TBD
To increase community members' knowledge related to LSM	TBD	TBD
To increase supportive attitudes toward LSM activities within targeted communities	TBD	TBD
To increase the proportion of community members who feel able to implement environmental management activities around their home	TBD	TBD
Behavioral Objective	Baseline	Target
Community members accept, support and comply with malaria surveillance activities	TBD	TBD
Communication Objective (s)	Baseline	Target
To increase community members' awareness of malaria surveillance as an important strategy for malaria elimination	TBD	TBD
To increase community members' knowledge related to the purpose and process of active case detection (ACD)	TBD	TBD
To promote supportive attitudes toward ACD	TBD	TBD
To increase the efficacy of health care workers and others involved in surveillance in explaining surveillance activities to community members (<i>provider focus</i>)	TBD	TBD
Behavioral Objective	Baseline	Target
Community members accept, support and comply with entomological surveillance activities	TBD	TBD
Communication Objective (s)	Baseline	Target
To increase community members' awareness of entomological surveillance as an important strategy for malaria elimination	TBD	TBD
To increase the efficacy of surveillance teams in explaining surveillance activities to community members (<i>provider focus</i>)	TBD	TBD
To increase community members' supportive attitudes toward entomological surveillance activities	TBD	TBD

Behavioral Objective	Baseline	Target
Leaders at all levels demonstrate commitment to malaria elimination activities	TBD	TBD
Communication Objective(s)	Baseline	Target
To increase awareness of malaria elimination as a priority amongst leaders at all levels	TBD	TBD
To promote the belief that everyone is responsible for malaria elimination	TBD	TBD
To improve the efficacy of leaders at all levels to advocate for malaria elimination activities in their communities	TBD	TBD
Behavioral Objective	Baseline	Target
Take part in your community's multi-sectoral malaria elimination committee	TBD	TBD
Communication Objective (s)	Baseline	Target
To create awareness of the need for malaria elimination committees in communities where they do not yet exist	TBD	TBD
To increase the number of people in non-health sectors who believe they should participate in multi-sectoral malaria committees	TBD	TBD
To create awareness of the need for public private partnerships for malaria elimination	TBD	TBD
Notes	<p>* PMI is currently supporting ongoing data collection and analysis to determine the baseline for each behavioral and communication objective.</p> <p>+ PMI is currently supporting effort to establish targets for each behavioral and communication objective.</p>	

Progress since PMI was launched

PMI-supported SBCC activities have evolved since PMI was launched: from initially supporting campaigns and activities to increase malaria-related knowledge to currently supporting the development of evidence-informed, theory-driven campaigns, and activities targeting specific behaviors and their associated determinants. To date, in Zanzibar, PMI has supported the incorporation of SBCC activities into active case detection activities, the implementation of SBCC activities targeting travelers, and the development of a School Health Club program.

SBCC activities have focused on social and behavior change in the context of changing malaria epidemiology in Zanzibar. Primarily, PMI-supported SBCC activities in Zanzibar have focused on the continued risk of malaria despite reductions in prevalence and the need to be vigilant about malaria prevention and control activities. PMI has also supported broad SBCC activities to address imported malaria cases in Zanzibar. The PMI-supported *Maliza Malaria* Campaign (Eliminate Malaria Campaign) contributed to important and significant positive results.

According to preliminary 2017 MIS, use of ITNs among children under five years of age the night before the survey was reported at 63.6 percent in Unguja and 72 percent in Pemba. Similarly, 57.5

percent of pregnant women in Unguja and 70.8 percent in Pemba reported sleeping under an ITN the night before the survey. The 2017 MIS also indicates that people in Unguja and Pemba have positive care-seeking behavior for fever for children under five years of age. Treatment of advice was sought for 90 percent of children under five years of age with fever in Unguja (compared to 79.7 percent in 2015-2016, according to the DHS) and 77.9 percent of children under five with fever in Pemba (compared to 79.7 percent in 2015-2016, according to the DHS).

In addition to supporting SBCC activities to promote individual, community, and social behavior change, PMI supports ZAMEP to conduct high level political advocacy to encourage local government planning and budgeting for malaria control and elimination interventions.

Progress during the last 12-18 months

In Zanzibar, PMI has supported the SBCC Unit of the ZAMEP to operationalize the current national malaria SBCC strategy which expires in June 2018.

PMI successfully supported the ZAMEP to incorporate SBCC into active case detection activities. When District Malaria Surveillance Officers follow up on a case reported to a health facility, they conduct SBCC activities focused on promoting malaria prevention and treatment with the index house as well as the surrounding households to help decrease further malaria transmission.

PMI continued to support the design and implementation of SBCC activities to address imported malaria cases. TV spots were aired at the airport as well as at the sea port and print materials were placed at all points of entry and exit in Zanzibar. Key messages that are communicated include the declining prevalence of malaria in Zanzibar, the significance of a traveler's travel history, the importance of sleeping under an ITN every night, and the importance of being tested for malaria after feeling malaria symptoms.

Finally, Zanzibar's School Health Club activity began in late 2016. The primary purpose of the activity is to provide health education to school children as key agents for change in the community. To complement this activity, ZAMEP continued to roll out malaria prevention and treatment training and materials to teachers and School Health Clubs in both Unguja and Pemba.

Plans and justification for proposed activities with FY 2019 funding

PMI will continue to support the ZAMEP SBCC Unit to design, implement, monitor, and evaluate SBCC activities that target and address the factors that influence the practice of key malaria-related behaviors. Specifically, in line with the aforementioned behavioral objectives, PMI will support SBCC activities to combat imported malaria cases by travelers, promote continuous distribution of ITNs, promote correct and consistent use of ITNs, promote preventative and curative malaria-related behaviors during active case detection activities, promote prompt care seeking upon onset of sign and symptoms of malaria. SBCC activities to promote correct and consistent ITN use and ITN care and to promote the continuous distribution strategy will continue to be implemented with a focus on promotion of ITN use in low transmission and elimination zones. PMI will continue to strengthen the capacity of the ZAMEP SBCC unit to work with the active case detection team to ensure SBCC activities are implemented well. SBCC activities during active case detection response will aim to engage and empower households with suspected malaria to take the steps necessary to protect the household, to seek care within 24 hours of onset of fever, and to ensure testing is conducted when there is a fever.

It is expected that by the end of August 2018 the revised *Malaria Elimination Communication Strategy (2018-2023)* will be approved. The strategy will provide guidance on strengthening and identifying the appropriate SBCC activities for elimination areas and sustaining the existing success.

In Zanzibar, PMI will continue to support SBCC monitoring and evaluation activities including formative research and knowledge, attitude, and practices to inform the design of PMI-supported SBCC activities, annual sentinel surveys focused on priority health behaviors, and triangulation of behavioral data with health service delivery data. Given the gaps in knowledge and practice, PMI will support enhanced ZAMEP strategies and SBCC activities to address and monitor factors that influence key malaria-related behaviors.

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

c. Surveillance, monitoring and evaluation

ZAMEP/PMI objectives

The SM&E priority objective in the ZAMEP Malaria Strategic Plan IV 2018–2023 is to expand malaria surveillance capacity to actively detect and investigate 100 percent of confirmed malaria cases by 2018. This objective is aligned with PMI technical guidance which states that one of the surveillance system requirements for elimination is a data collection system able to identify new cases of malaria and trigger investigation and response measures. In support of this, ZAMEP and PMI continue to focus attention and resources to strengthen malaria case surveillance and reactive case detection through the MEEDS and MCN system.

MEEDS includes a strategy to collect daily data for three key indicators (total visits, confirmed malaria-positive cases, confirmed malaria-negative cases) among outpatients from all Zanzibar facilities (public and private). Weekly aggregated data are transmitted from each health facility using a customized cell phone menu. Text messages with weekly data summary are sent to cell phones of key ZAMEP staff and District Medical Officers; and 2) longitudinal weekly data is made available for viewing over a secure web site. MEEDS is a demonstration of PMI's continued commitment to developing and sustaining the effective malaria surveillance system required for elimination as outlined in PMI technical guidance. The longevity of the MEEDS program is dependent on two factors: the timeline/goal for elimination and the capacity of the HMIS system. The malaria elimination in Zanzibar feasibility study strongly recommends "keeping the MEEDS as a separate system until the HMIS is deemed strong enough and/or elimination has been achieved."

Zanzibar, with PMI support, continues to strengthen the MCN system with the aim of conducting a household investigation of every confirmed case of malaria infection within 24 hours of notification. In this system, the DMSO travels to the case household to interview and test household members and occasionally those of neighboring households when specific hotspots are identified and investigated. While there, the DMSOs provide SBCC materials on the need for early malaria testing and adherence to anti-malarial treatment. DMSOs ascertain ITN use and provide coupons for a free ITN as needed as well as identify visible mosquito larval sources and provide information on environmental management.

Table 35. Surveillance, Monitoring, and Evaluation Data Sources

Data Source	Survey Activities	Year										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
National-level Household surveys	Demographic Health Survey (TDHS)						X	X				X
	Malaria Indicator Survey (MIS)		X				X		X	X		X
Health Facility and Other Surveys	SPA Survey			X					X			
	EUV Survey					X	X	X				
Malaria Surveillance and Routine System Support	MEEDS		X	X	X	X	X	X	X	X	X	
	District Health Information Software 2 (DHIS2)					X	X	X	X	X	X	X
Therapeutic Efficacy monitoring*	<i>In vivo</i> Efficacy Testing	X	X	X	X	X	X	X	X	X	X	X
Other Data Sources	Malaria Impact Evaluation	X				X						
	ITN Efficacy and Physical Durability Monitoring							X	X	X	X	X

Progress since PMI was launched

PMI has been supporting surveillance activities in Zanzibar such as the MEEDS which is passive facility-based surveillance, and the MCN system of active malaria case notification and follow-up. MEEDS, which was first implemented in 2007, is designed to identify and enable a rapid response to increases in malaria transmission. The MCN system was implemented at the end of 2011 with the aim of conducting a household investigation of every confirmed case of malaria infection within 24 hours of notification from the health facility where the case was first detected. Because of very low rates (five percent) of asymptomatic parasitemia detected during large-scale screening conducted as part of reactive case investigations, the ZAMEP revised their epidemic response guidelines to focus reactive case detection efforts. Screening for malaria is currently conducted among family/household members of notified cases (conduct household screening and treatment), villages where cases detected within a week are ≥ 5 (Highly focal; conduct screening and treatment for the entire village) and *shehias* where cases detected within a week are ≥ 10 (Focal: conduct screening and testing for the entire *shehia*).

During 2016, PMI through implementing partners, provided technical assistance to ZAMEP which identified and addressed bottlenecks in case notification including SIM card issues. PMI also supported training for ZAMEP staff on the Coconut surveillance system to improve data management and use. In addition, PMI supported the development and dissemination of MEEDS and MCN field manuals for health facilities which contain tools for recording malaria case data. The field manuals were distributed to all 243 health care facilities in Zanzibar.

An impact evaluation was conducted in Zanzibar and the full report is pending release. Currently, a trend analysis for population based impact and outcome indicators based on the DHS 2015 is being completed and will be included in the full report. The preliminary results in Zanzibar show that the scale-up and maintenance of high vector control coverage and availability of antimalarial treatments have contributed to keeping malaria parasite prevalence below one percent between 2007 and 2012 and contributed to the eight-fold decline in confirmed malaria incidence in children under five years of age between 2005 and 2010. Likewise, hospital admissions for malaria have fallen from 30-50 percent of all admissions in 2000 to about five percent in 2012. Malaria-attributed deaths accounted for approximately half of all hospital deaths in 2000, but no confirmed malaria-attributed deaths have been reported since 2009. These achievements in malaria control are enabling Zanzibar to move towards malaria elimination.

In addition, the routinely collected surveillance data through the MEEDS and MCN systems are regularly used on a daily (MCN) to weekly (MEEDS) basis, and complement that of survey data, to assess the impact of interventions and to guide the use of resources. MEEDS/MCN data have also been used to periodically evaluate malaria interventions through operational research and assessments.

Progress during the last 12-18 months

Currently, all of the 243 health facilities in Zanzibar report through MEED and MCN systems. This includes 166 public and 77 private health facilities. In addition, all malaria surveillance officers in all 10 districts in Zanzibar use the system as well. A data quality assessment showed that >80 percent of reports are being submitted within the same reporting week. The ZAMEP recommends additional DMSO's to specific districts such as West, Central, and North B which tend to have larger numbers of cases particularly during peak transmission seasons.

The overall functioning of the MEEDS and MCN is good and is showing improvement in some parameters. The proportion of cases followed-up at the household level within 48 hours of notification increased from 54 percent in 2014 and 2015 to 67 percent in 2016. ZAMEP disseminates information about the functioning of the MEEDS and MCN to the districts via quarterly reports. In 2017, 98 percent of those quarterly reports were disseminated on time (within the first two weeks of the following quarter). Using data from the MCN, the ZAMEP completes village mapping to highlight foci of transmission (hotspots) in relation to implementation of various interventions.

In 2017, ZAMEP initiated a working group to explore service options and develop a workplan for the integration of MEEDS with routine HMIS, including linking MEEDS data within the DHIS2 platform. The working group includes ZAMEP, the HMIS section of the MoH, PMI, and implementing partners. The current options include 1) continuing MEEDS and routine HMIS as separate but parallel systems for the collection and reporting of malaria surveillance data, 2) linking the MEEDS so data is available through DHIS2 but maintaining MEEDS and routine HMIS separately, or 3) transitioning from MEEDS to the routine HMIS. The decision on which course of action to take and a timeline is pending additional assessments of the impact on the availability of timely and quality malaria-related data to meet

ZAMEP's programmatic needs. ZAMEP hopes to make a decision and begin the transition process in 2018.

In 2015, a review of travel history reported by malaria cases to DMSOs during MCN case investigations revealed that 54 percent of malaria cases reported travel outside Zanzibar within the previous month. Based on these 2015 findings and following recommendations from WHO, in 2017 ZAMEP added questions to enhance the MCN case investigation to capture additional information to permit the classification of individual malaria cases and their associated foci according to definitions in the WHO Framework for Malaria Elimination. Between January 2017 and February 2018, a total of 774 cases were reported from 78 facilities, with 76 foci investigated and classified. During case investigation, 68.9 percent of cases were classified as imported, 27.4 percent cases as indigenous, 2.7 percent cases as introduced, 0.8 percent cases as relapsed, and 0.3 percent cases as induced. During foci investigation, 55.2 percent foci were classified as residual active and 44.8 percent foci were classified as residual non-active. Geographically, 13 foci were identified in Pemba, 46.2 percent of which were in Micheweni district, and 53.8 percent in Chake chake district. In Unguja, 29 residual active foci were identified; 62.1 percent foci in North B, 20.7 percent foci in West, and 17.2 percent foci in Urban. The results indicate that a substantial number of infections might be acquired outside of Zanzibar. ZAMEP is exploring interventions focusing on screening travelers and monitoring imported cases, alongside other interventions for residual active foci.

In 2017, the MCN software system was upgraded, requiring the web browsing system to be updated and for the new MCN software system to be downloaded on the DMSO tablets. The process to complete these upgrades for all DMSO's took several months, and since the installment of the new MCN software system, there have continued to be recurring information technology (IT) failures in the system that have caused significant gaps in the ability of DMSO's to capture data electronically during case investigations, including geolocation. In October 2017, ZAMEP renewed an unfunded MOU with RTI International, a previous PMI implementing partner that developed the MCN software, to continue a limited time of IT support for the operation of the software.

Plans and justification for proposed activities with FY 2019 funding:

PMI will support the maintenance of MEEDS at all government and private health facilities until such time its determined MEEDS will be transitioned to routine HMIS. If, and when, MEEDS is transitioned to routine HMIS, PMI will support the strengthening of malaria-related surveillance data collection and analysis within HMIS. Refresher training and supportive supervision visits for diagnostics and surveillance will be increased. PMI will continue to support and strengthen, including solve system failures, MCN and reactive case detection among household and neighborhood contacts of confirmed cases. Epidemic confirmation procedures will be maintained and response systems further strengthened to allow the ZAMEP to deploy a small cadre of trained staff to investigate all suspected epidemics.

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

d. Operational research

ZAMEP/PMI objectives

The *Zanzibar Malaria Strategic Plan III, 2013/14-2017/18*, sets a major objective to conduct relevant operational research to evaluate and optimize ongoing activities and monitor resistance to anti-malarials and insecticides up to 2018. ZAMEP, with PMI support, is currently conducting several operational research activities.

Progress during the last 12-18 months

Investigating the magnitude and drivers of residual malaria transmission in Tanzania

Changes have been reported in malaria vector biting exposure on the islands of Pemba and Unguja in recent years such that most *Anopheles* biting now occurs outdoors in both islands. This study will investigate the magnitude of residual transmission and characterize it on the basis of where and when it occurs, and what its main anthropological determinants are in Zanzibar. Data collection began in December 2016 and periodic data collections continued through December 2017. Entomological field work for this study has been completed. Preliminary analysis of structured household observation and survey data for the human behavioral component of the study provides insights into household and community-level nighttime activities, sleeping patterns, and malaria prevention practices.

OR to increase the effectiveness of the malaria surveillance and response system in Zanzibar

This study began in April 2017 with a focus on systems effectiveness, the processes and data of all components of the surveillance systems on Zanzibar will be reviewed. The study will address the effective coverage of the surveillance-response system (MEEDS and MCN) in place in Zanzibar in terms of the proportion of the intended target population actually covered by the intervention; identify modifications to the system which could improve performance especially in regards to the probability of infection detection; and estimate the cost and cost-effectiveness of the surveillance-response system approach utilized in Zanzibar, as well as the marginal cost of adding additional households.

This study received approval from the OR committee for an extension with a modification of the end date to October 2018. Preliminary results have shown mRDT prevalence was 2.5 percent among index household members and 0.4 percent among members of neighboring households. Logistic regression analyses on current data showed that the odds of being mRDT-positive as a member of an index household were 6.3 times that of those in surrounding households ($p < 0.0001$; 95 percent CI: 3.9–10.3). These heightened odds of infection reflect evidence in support of visiting the index household for the detection of new cases, and demonstrates much lower marginal return to expanding searches beyond the index household. This study will continue in 2018 with a final analysis and report in early 2019. The extension will provide an opportunity to recruit the enrollment targets needed to achieve the statistical power set for this study. Results to date indicate, among other things, that the MEEDS/MCN system in Zanzibar achieves a high coverage of case notifications through public health facilities, but the timeliness of follow-up to the household level by the DMSOs presents a challenge.

Table 36. PMI-funded Operational Research Studies, Zanzibar

Completed OR Studies			
Title	Start Date	End Date	Budget (\$)
Placental parasitemia among women who have not had IPTp for malaria in Zanzibar	08/2011	12/2013	122,150
Ongoing OR Studies			
	Start Date	End Date	Budget (\$)
Investigating the magnitude and drivers of residual malaria transmission in Tanzania	08/2016	09/2018	249,000
OR to increase effectiveness of the malaria surveillance and response system in Zanzibar	04/2017	10/2018	577,828
Planned OR Studies FY 2019			
N/A			

Plans and justification

N/A

Proposed activities with FY 2019 funding:

N/A

e. Other health systems strengthening

ZAMEP/PMI objectives

PMI and other malaria control partners support the Zanzibar Ministry of Health and ZAMEP to build and strengthen health systems to ensure malaria control efforts are sustainable, country owned, and integrated into the health system. By supporting health systems interventions, PMI, ZAMEP, and malaria partners aim to sustain malaria control gains as Zanzibar moves towards elimination.

Progress since PMI was launched

PMI support for health systems strengthening has focused on activities closely linked to malaria control, such as routine information systems strengthening for supply chain and institutional strengthening of planning and management capabilities of the ZAMEP.

Progress during the last 12-18 months

Capacity building for the ZAMEP

In the past 12 months, the ZAMEP has engaged in various activities to increase capacity of staff in various areas, including participation in international and national level trainings in accounting, monitoring and evaluation, malaria diagnostics, entomology, SBCC, and computer skills. Representatives from ZAMEP also participated in international meetings, such as the annual American Society of Tropical Medicine and Hygiene meetings, Roll Back Malaria Technical Working Group meetings (both Vector Control and Social and Behavior Change Communication working groups), and regional medical and vector-borne diseases conferences. At the 2017 American Society of Tropical Medicine and Hygiene meeting, ZAMEP staff presented on results on: insecticide resistance among *An. gambiae s.l.* over the past ten years; the 2016 ITN mass distribution campaign; and Zanzibar malaria microscopy quality assurance system.

Zanzibar Malaria Elimination Advisory Committee

PMI supported the development of terms of reference for an independent malaria elimination advisory committee in line with WHO guidance. This was approved by the Zanzibar Ministry of Health and the first meeting is planned for August 2018.

Proposed activities with FY 2019 funding:

Reaching and sustaining malaria control and elimination goals requires effective and efficient local systems. Accordingly, PMI funds will be used to address key health system challenges to reaching and maintaining malaria results. In addition, PMI Tanzania will continue to support capacity-building for the ZAMEP.

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

5. Staffing and administration

Two health professionals serve as RAs to oversee PMI in Tanzania, one representing CDC and one representing USAID. In addition, three FSNs work as part of the PMI team, two Program Management Specialists and one Monitoring and Evaluation Specialist. 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.

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