

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 2015 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



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Malawi

Malaria Operational Plan FY 2015

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS	3
I. EXECUTIVE SUMMARY	5
II. STRATEGY	10
1. Introduction.....	10
2. Malaria Situation in Malawi	11
3. Health System Delivery Structure and Ministry of Health Organization	13
4. Updates in MOP Strategy Section	14
5. Malaria Control Strategy in Malawi	14
6. Integration, Collaboration, and Coordination	16
7. PMI Goals, Targets, and Indicators	18
8. Progress on Indicators to Date	18
9. Other Relevant Evidence on Progress.....	19
10. Challenges, Opportunities, and Threats	20
11. PMI Support Strategy	22
III. OPERATIONAL PLAN	23
1. Insecticide-Treated Nets	23
2. Indoor Residual Spraying	27
3. Malaria in Pregnancy	29
4. Case Management	32
5. Monitoring and Evaluation, and Surveillance	43
6. Operational Research	49
7. Social and Behavior Change Communication (SBCC)	52
8. Health Systems Strengthening and NMCP Capacity Building.....	55
9. Staffing and Administration.....	57
Table 1	59
Table 2	60

ABBREVIATIONS AND ACRONYMS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
BCC	Behavior change communication
BEST	Best practices at scale in the home, community, and facilities
CBO	Community-based organizations
CCM	Community case management
CDC	Centers for Disease Control and Prevention
CHAI	Clinton Health Access Initiative
CHAM	Christian Health Association of Malawi
CMED	Central Monitoring and Evaluation Department
CMS	Central Medical Stores Trust
DDT	Dichloro-diphenyl-trichloroethane
DFID	United Kingdom Department for International Development
DHS	Demographic and Health Survey
DHIS	District Health Information System
DHIS2	District Health Information System Two
DOT	Directly observed therapy
EHP	Essential health package
EMR	Electronic medical record
EPI	Expanded Program on Immunization
EUV	End-use verification
FSN	Foreign service national
FY	Fiscal year
G2G	Government-to-government
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GoM	Government of Malawi
HIV/AIDS	Human immunodeficiency virus/acquired immune deficiency syndrome
HMIS	Health management information system
HRH	Human resources for health
HSA	Health surveillance assistant
HSSP	Health Sector Strategic Plan
HTSS	Health Technical Support Services
IDSR	Integrated Disease Surveillance and Response
IPTp	Intermittent preventive treatment in pregnancy
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
IVM	Integrated vector management
LLIN	Long-lasting insecticide-treated net
LMIS	Logistics management information system
M&E	Monitoring and evaluation

MAC	Malaria Alert Centre
MIP	Malaria in pregnancy
MICS	Multiple Indicator Cluster Survey
MIS	Malaria Indicator Survey
MMV	Medicines for Malaria Venture
MOP	Malaria Operational Plan
MoH	Ministry of Health
NGO	Non-governmental organization
NMCP	Malawi National Malaria Control Program
OR	Operational research
OTSS	Outreach training and support supervision
PBI	Performance Based Incentives
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PFM	Public Financial Management
PMI	President's Malaria Initiative
QA/QC	Quality assurance/quality control
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
RHU	Reproductive Health Unit
SBCC	Social and behavior change communication
SP	Sulfadoxine-pyrimethamine
SSDI	Support for Service Delivery Integration
SWAp	Sector-wide approach
TDY	Temporary duty
TES	Therapeutic efficacy study
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
USG	United States Government
VHC	Village health clinic
WHO	World Health Organization

I. EXECUTIVE SUMMARY

Malaria prevention and control are major foreign assistance objectives of the U.S. Government (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a six-year, comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world, with a focus on women and girls. The President's Malaria Initiative (PMI) is a core component of the GHI, along with HIV/AIDS and tuberculosis. PMI was launched in June 2005 as a five-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, funding for PMI has now been extended and, as part of the GHI, the goal of PMI has been adjusted to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. This will be achieved by continuing to scale up coverage of the most vulnerable groups — children under five years of age and pregnant women — with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS).

Malawi became a PMI focus country in 2006. It was one of eight countries selected in FY 2011 as a “GHI Plus” country, and receives additional technical and management assistance to rapidly implement GHI's approach. The Ministry of Health's (MoH) National Malaria Control Program (NMCP), with support from PMI and other partners, has been able to scale up the distribution of ACTs, IPTp using sulfadoxine-pyrimethamine (SP), and ITNs, despite a weak health infrastructure. The 2012 Malaria Indicator Survey (MIS) found that 54% of pregnant women reported taking two or more doses of SP for IPTp, which is higher than in many African countries. Additionally, household ITN ownership has increased from 38% in 2006 (Multiple Indicator Cluster Survey, MICS) to 55% in 2012. Similarly, children under five and pregnant women who reported sleeping under an ITN the night prior increased from 25% and 8% in 2006, respectively, to 56% and 51% in 2012.

The 2010 and 2012 MIS also documented a reduction in parasitemia among children under five from 43% to 28%; however, little or no improvement was noted for most of the other key indicators of progress (ITN ownership, ITN use, and antimalarial treatment) and IPTp uptake decreased from 60% in 2010 to 54% in 2012. As the 2012 MIS was completed prior to the 2012 ITN mass distribution campaign, 2012 MIS indicators for ITN ownership and use do not reflect the outcome of this campaign.

Despite the advances made since the initiation of PMI in Malawi, the MoH estimates that malaria still accounts for over a third of all outpatient visits; more than 4 million suspected cases were reported in 2012 (MoH, 2012). Malaria also is the number one cause of hospital admissions among children under five, being responsible for about 40% of all hospitalizations in this age group (MOH, 2009). Approximately 98% of malaria cases are due to *Plasmodium falciparum*.

Other than PMI, the majority of the funding for malaria activities in Malawi comes from the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) and donor and government funds pooled through the health sector-wide approach (SWAp). The existing Global Fund grants focus on commodity procurement and distribution, including ITNs for routine and mass distribution and rapid diagnostic tests (RDTs) and ACTs for case management at the facility level; pooled donor and government funds contribute to the remaining malaria control activities.

The Malawi malaria program was identified as an “interim applicant” during the Global Fund’s transition to its new funding model, and it intends to purchase injectable and rectal artesunate and second-line ACTs.

This FY 2015 PMI Malaria Operational Plan (MOP) for Malawi was developed during a planning visit in June 2014 by representatives from the United States Agency for International Development (USAID), the U.S. Centers for Disease Control and Prevention (CDC) and the Malawi NMCP. The proposed activities are aligned with Malawi’s 2011-2015 Malaria National Strategic Plan. The Fiscal Year (FY) 2015 MOP has been developed in close consultation with national and international partners and fills funding gaps from other major donors while taking into account progress made to date. In addition to supporting efforts to control malaria, the team sought to increase integration with other GHI programs and continue efforts to strengthen Malawi’s health system. Based on these discussions and further meetings with the NMCP, the Plan proposes to support the activities outlined below. The total amount of PMI funding requested for Malawi in FY 2015 is \$22,000,000.

Insecticide-Treated Nets: Malawi conducted its first nationwide long-lasting insecticide-treated net (LLIN) mass distribution campaign between February and June 2012. The campaign complemented several years of consistent LLIN distribution through routine systems (i.e., pregnant women at ANC visits and children less than five years old at their first immunization visit).

During the last 12 months, PMI distributed approximately 500,000 LLINs through ANC and EPI clinics, complementing the quantity of ITNs procured through the Global Fund to provide complete coverage for the routine systems. An integrated behavior change communication (BCC) program promoted universal ITN use throughout the year, along with promotion of care and repair of nets to extend their lifespan. With FY 2014 and FY 2015 funding, PMI will procure approximately 2,900,000 ITNs for distribution through the routine channels, provide technical assistance and limited operational support for the planning of the 2015 mass distribution campaign, support BCC to promote appropriate ITN use and net care and repair, and initiate LLIN durability monitoring following the 2015 mass campaign.

Indoor Residual Spraying: In the first five years of PMI, Malawi expanded its IRS program from a pilot in part of Nkhosakota District to two full districts. Based on the success of the initial pilot, the MoH funded IRS activities in five additional districts in 2010. Nevertheless, Malawi’s IRS activities have faced substantial challenges, including the emergence of pyrethroid and carbamate resistance and technical problems that resulted in missed targets during the 2010 spray campaign. In FY 2012, PMI suspended direct support to IRS activities because the increased cost (up to 15% of PMI budget) to protect just 3% of the population could not be justified within the existing budget envelope without seriously jeopardizing other intervention areas of the PMI Malawi program. PMI did, however, continue to provide technical assistance to the Government of Malawi (GoM) in 2012-2014 for IRS activities and ongoing entomological monitoring.

With FY 2013 funds, PMI is supporting the development of an evidenced-based integrated vector management strategy to determine the way forward for the IRS program; this is expected to be completed by September 2014. PMI has suspended support to IRS activities until the

evidenced-based strategy is completed; PMI will continue to support entomological monitoring, including mosquito resistance monitoring.

Malaria in Pregnancy: Historically, Malawi has played an important role in the development of IPTp policy and continues to be one of the countries with the highest rate of IPTp coverage. PMI, in collaboration with the NMCP, has helped achieve high rates of coverage nationally by strengthening focused antenatal care at the district and health facility level, procuring SP, maintaining routine distribution of LLINs at ANC and delivery units, and funding BCC efforts to encourage early and repeated ANC attendance. In line with World Health Organization guidance, PMI supported NMCP and the Reproductive Health Unit to update the MoH policy to encourage the administration of SP at each scheduled ANC visit. Unfortunately, progress appears to have stalled and may have even reversed in recent years. The 2012 MIS found that more than half (54%) of pregnant women received at least two doses of SP with at least one received during an antenatal care visit. According to staff at NMCP and the Reproductive Health Unit, some women are actively discouraged from presenting for ANC before their pregnancy is apparent, which may contribute to delays in first ANC visit and reduced overall number of visits. In addition, the intensity of *P. falciparum* resistance to SP is putting the effectiveness of the current IPTp strategy at risk and creating an urgent need to evaluate new drugs and approaches to reduce the burden of malaria in pregnancy.

In the coming year PMI will support a repeat evaluation of SP effectiveness for IPTp and continue tracking the prevalence of SP resistance markers, as well as undertake a new intervention study to improve early and complete ANC attendance. Based on the Roll Back Malaria Partnership gap analysis, PMI and NMCP anticipate a surplus of SP for IPTp in 2015 and no unmet need in 2016. With FY 2015 funding, PMI will promote the revised IPTp guidance through continued supportive supervision of ANC services, and provide supplies to support directly observed treatment for IPTp.

Case Management: The 2011-2015 National Malaria Strategic Plan recommends diagnostic testing and treatment for all age groups at the community and facility levels. To achieve this goal, the NMCP has completed the roll-out of RDTs to the facility level and is currently piloting RDT use at the community level. PMI has provided substantial support to this RDT roll-out as well as purchased over 12 million RDTs as of September 2013. PMI has also funded interventions to strengthen microscopy services.

In 2007, Malawi changed the first-line treatment for uncomplicated malaria from SP to artemether-lumefantrine (AL). To date, PMI has supported case management with AL at both the facility and community levels. In 2013, the NMCP updated the guidance for the treatment of severe malaria and now recommends use of parenteral artesunate at both hospital and health center levels. Rectal artesunate is recommended for pre-referral treatment at the community level. PMI is supporting the rollout of these new policies through the procurement of injectable and rectal artesunate and training of health workers.

Due to serious weaknesses within the Central Medical Stores (CMS), a temporary parallel supply chain was established in late 2010 to distribute USAID-procured health and Global Fund-procured malaria-specific commodities directly to service delivery points. Implementing this privately managed supply chain has increased distribution costs, but the security and reliability

of the system has greatly improved. The Global Fund is withdrawing its malaria-specific commodities in late 2014 and will consolidate all Global Fund-procured commodities into one supply chain; PMI will continue to maintain a separate supply chain for USAID-procured health and malaria specific commodities.

With FY 2015 funding, PMI plans to continue efforts to strengthen malaria case management at the facility and community levels, including the expansion of support for facility- and community-based case management activities to reach national coverage. PMI also plans to procure 2.9 million RDTs, 2.2 million ACTs, 550,000 ampoules of parenteral artesunate and 100,000 rectal artesunate suppositories to maintain prompt and effective management of malaria. PMI will continue to support the parallel supply chain and provide technical assistance to strengthen the public sector distribution network.

Monitoring and Evaluation: PMI's monitoring and evaluation activities are coordinated with the NMCP and other partners to share resources, ensure that critical gaps are being filled, and standardize data collection and reporting. PMI provided technical assistance to Malawi's third MIS in 2014. Additionally, PMI has provided funding for strengthening the national routine malaria information system; end-use verification surveys and service provision assessments; entomological monitoring; and health facility surveys to assess case management practices.

With FY 2014 funding, PMI will provide partial support for the 2015 Demographic Health Survey and full support for an external consultant to provide in-country technical support to improve coordination of the HMIS system and promote additional capacity building. PMI will also initiate LLIN durability monitoring following the planned 2015 mass campaign. With FY 2015 funding, PMI will support an MIS in 2016 and continue to strengthen routine data collection and HMIS function. PMI will also continue to support quarterly end-use verification surveys, entomologic monitoring and LLIN durability monitoring.

Operational Research: In Malawi, PMI-funded operational research has supported systematic data collection activities that provide important data for decision-making, including studies measuring the durability of long-lasting ITNs, the impact of IRS, the effectiveness of the IPTp strategy, the quality of health facility case management practices for uncomplicated and severe malaria, the ability of patients to complete recommended first-line treatment for malaria, the distribution of potentially drug-resistant parasites and insecticide-resistant mosquitoes, and the effectiveness of ITNs in an area with significant pyrethroid resistance. For FY 2015, the primary focus will be to initiate three operational research studies supported with FY 2014 funding: IPTp effectiveness monitoring in areas with high levels of resistance, SP drug resistance markers in pregnant women, and a pilot evaluation of enhancing the availability of services for first trimester ANC visits.

Behavior Change Communication: The National Malaria Strategic Plan calls for strengthening advocacy, communication, and social mobilization capacities to move towards universal coverage for all malaria interventions. The 2011-2014 Malaria Communication Strategy promotes an integrated approach to BCC to improve coverage of interventions targeting both health providers and community members. During 2013-2014, PMI BCC implementing partners disseminated integrated and malaria-specific messages through mass media campaigns

throughout the country, completed formative research to tailor messages and inform future campaigns, built in-country capacity through training health personnel, and conducted community outreach activities. In FY 2015, PMI plans to continue to support an integrated BCC approach at the national and community level for ITNs, IPTp, and case management. PMI will support malaria prevention activities targeting school-aged children as well as a small grants program for community-based organizations to support malaria prevention and control messaging. PMI will support the revision of the Malaria Communication Strategy to align it with the 2011-16 Health Sector Strategic Plan of the Ministry of Health.

Health Systems Strengthening and Capacity Building: In Malawi, PMI has increased its efforts to strengthen health systems while integrating with other USG programs to build capacity and improve outcomes. With FY 2015 funding, PMI will work with other USG health programs to enhance infrastructure, improve health information systems, and provide support to the NMCP. PMI will also work with the Peace Corps office in Malawi to identify two Peace Corps volunteers to coordinate the malaria activities of other volunteers and provide programmatic support to the NMCP. Finally, PMI will support a forum for the dissemination of programmatically relevant research findings and best practices in Malawi.

II. STRATEGY

1. Introduction

Global Health Initiative

Malaria prevention and control is a major foreign assistance objective of the U.S. Government (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a six-year, comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through the GHI, the United States will invest \$63 billion over six years to help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns, and children. The GHI is a global commitment to invest in healthy and productive lives, building upon and expanding the USG's successes in addressing specific diseases and issues.

The GHI aims to maximize the impact the United States achieves for every health dollar it invests, in a sustainable way. The GHI's business model is based on: implementing a woman- and girl-centered approach; increasing impact and efficiency through strategic coordination and programmatic integration; strengthening and leveraging key partnerships, multilateral organizations, and private contributions; encouraging country ownership and investing in country-led plans and health systems; improving metrics, monitoring and evaluation; and promoting research and innovation. The GHI will build on the USG's accomplishments in global health, accelerating progress in health delivery and investing in a more lasting and shared approach through the strengthening of health systems.

President's Malaria Initiative

The President's Malaria Initiative (PMI) is a core component of the GHI, along with HIV/AIDS and tuberculosis. PMI was launched in June 2005 as a five-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, funding for PMI was extended and, as part of the GHI, the goal of PMI was adjusted to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. This will be achieved by continuing to scale up coverage of the most vulnerable groups — children under five years of age and pregnant women — with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS).

Malawi was selected as a PMI country in FY 2006. Large-scale implementation of ACTs and IPTp began in 2007 and progressed rapidly with support from PMI and other partners. ACTs and sulfadoxine-pyrimethamine (SP) for IPTp are now available and being used in all public health facilities nationwide. More than three million long-lasting ITNs (LLINs) have been distributed through routine systems to pregnant women and children under one year of age in the last three years, and a further 5.6 million LLINs were distributed throughout the country in a mass distribution campaign in 2012.

This FY 2015 Malaria Operational Plan (MOP) presents a detailed implementation plan for PMI in Malawi, based on the PMI Multi-Year Strategy and Plan and the National Malaria Control Program's (NMCP) 2011-2015 Malaria Strategic Plan. It was developed in consultation with the NMCP and with participation of national and international partners involved with malaria prevention and control in the country. The activities that PMI is proposing to support

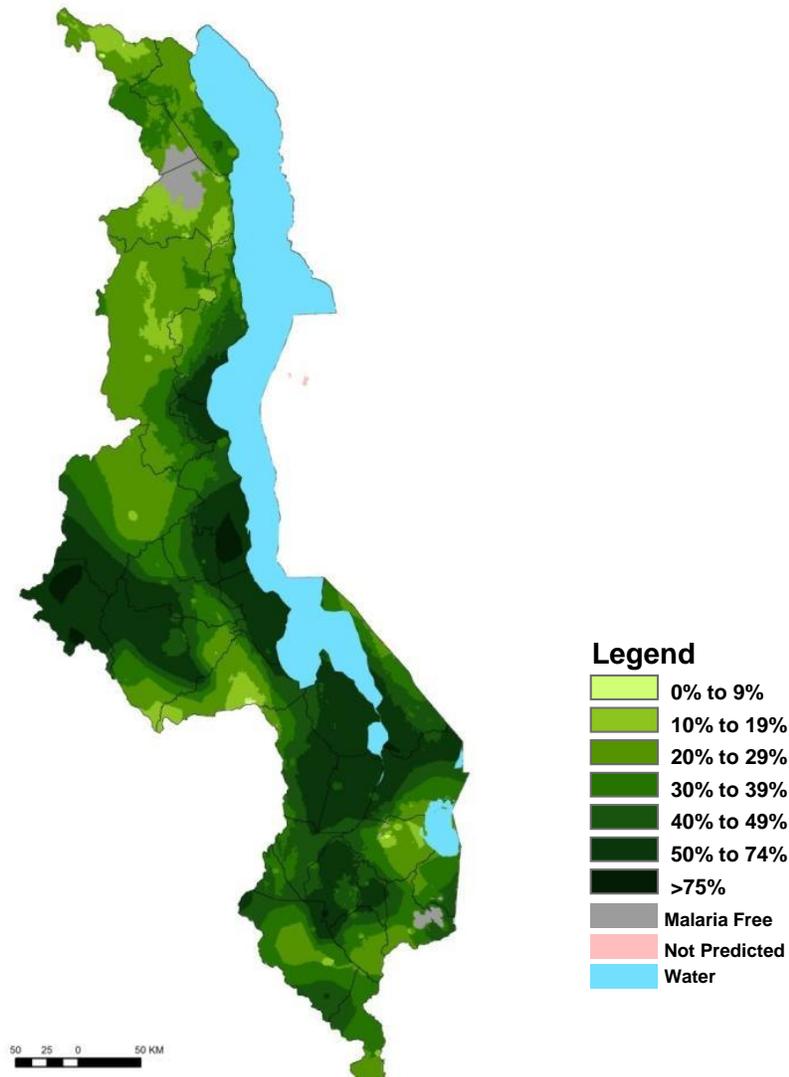
complement and sustain the National Malaria Strategic Plan and build on investments made by PMI and other partners to improve and expand malaria-related activities, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) malaria grants. This document briefly reviews the current status of malaria control policies and interventions in Malawi, describes progress to date, identifies challenges and unmet needs if the targets of the NMCP and PMI are to be achieved, and provides a description of planned FY 2015 activities.

2. Malaria Situation in Malawi

Malawi is a landlocked country bordered by Tanzania to the north, Zambia to the west, and Mozambique to the east and south. The population in 2015 is projected to be 16.3 million, comprised of approximately 51% women and 19% children less than five years old (National Statistical Office of Malawi).

Malaria is endemic in more than 95% of the country. Transmission is perennial in most parts of the country and peaks after the start of the annual rains that typically begin in November and last through April. The highest transmission areas are found along the hotter, wetter, and more humid low-lying areas (lakeshore, Shire River Valley, and central plain), while the lowest risk areas

Figure 1: Predicted population-weighted *Plasmodium falciparum* parasite prevalence in children two to ten years of age, Malawi 2010-2012^{1,2}



¹ Okiro EA, Noor AM, Malinga J, Mitto B, Mundia CW, Mathanga D, Mzilahowa T, Snow RW (2014). *An epidemiological profile of malaria and its control in Malawi*. A report prepared for the Ministry of Health, the Roll Back Malaria Partnership and the Department for International Development, UK. March, 2014

² Electronic and manual searches for published and unpublished reports were used to identify available malaria prevalence surveys (including the 2010 and 2012 Malawi Malaria Indicator Surveys). Age-corrected survey data (sample size and numbers positive) at known locations (longitude and latitude) and times (year) with a minimal set of conservative, long-term climate and human settlement covariates were used. Covariates statistically significant to the age-corrected infection prevalence were identified (in this case urbanization). Empirical data and spatially matched covariates were used within a Bayesian hierarchical space–time model to produce continuous maps of $PfPR_{2-10}$ for 2010-2012.

along the hotter, wetter, and more humid low-lying areas (lakeshore, Shire River Valley, and central plain), while the lowest risk areas fall along the highland areas of Rumphi, Mzimba, Chitipa, and Kirk Range (Kazembe, 2006; Okira et al, 2014). *Anopheles funestus* is considered to be the primary vector species; *An. gambiae* s.s. and *An. arabiensis* also are present and may predominate in some areas at certain times of the year. *Plasmodium falciparum* is the most common species of malaria, accounting for 98% of the infections and all severe disease and deaths.

Malaria continues to be a major public health problem. Malaria is responsible for approximately four million suspected cases annually, 40% of all hospitalizations of children less than five years old and 30% of all outpatient visits across all ages. Among children under five years, malaria parasite prevalence by microscopy was 28% nationally (2012 Malaria Indicator Survey, MIS).

Pregnant women and their fetuses are at high risk of the negative consequences of malaria. From 1996-2007, the incidence of placental malaria fell from 25% to 7% at the main referral hospital in Blantyre (Feng, 2010). Although this is a selected population with unusually easy access to the best medical services available in the public sector in Malawi, a similar low level of placental malaria (5%) was measured in a rural area in Machinga District that was evaluated as part of a study monitoring the continued effectiveness of SP (Gutman, 2013).

Resistance of anopheline vectors to insecticides has been documented extensively in Malawi. In 2002, bioassays demonstrated that *An. arabiensis* was susceptible to pyrethroids and organophosphates but exhibited reduced susceptibility to dichloro-diphenyl-trichloroethane (DDT) (Mzilahowa, 2008). In 2009, resistance of *An. funestus* to pyrethroids and the carbamate insecticide bendiocarb was reported in Nkhotakota District, where a pilot IRS program had been implemented (Mzilahowa, personal communication) and on Likoma Island, situated on Lake Malawi (Hunt, 2010). Pyrethroid IRS was stopped in Nkhotakota and replaced with an organophosphate, which was sprayed for two years. Since then, pyrethroid and carbamate resistance in both IRS and non-IRS districts has been documented, limiting the options for IRS and causing concern about the continued effectiveness of ITNs.

3. Health System Delivery Structure and Ministry of Health Organization

The Malawi health service delivery system is pyramidal, consisting of tertiary, secondary, primary, and community care levels. District and central hospitals provide secondary and tertiary care services, respectively. Primary care is delivered through clinics and health centers where curative, maternity, and preventive services are offered. Rural populations' access to health facilities is generally good. Accessibility within a five-kilometer radius is estimated at 54%. Malawi also has more than 3,500 village health clinics (VHCs) in hard-to-reach areas as part of the community case management program (CCM). The CCM program is implemented by community-based health care workers (health surveillance assistants [HSAs]) who are trained to assess, classify, and provide first-line treatment for selected childhood illnesses in addition to referral to the next level of care. Local community-based organizations (CBOs) also provide non-clinical malaria services such as behavior change communication (BCC) on key malaria messages, counseling, and net distribution. The Malawi health system is highly decentralized with many programming decisions made at the district level. The Christian Health Association of Malawi (CHAM) operates health facilities mainly in rural areas nationwide and provides approximately one-third of health services; fees are charged for the Essential Health Package (EHP) where service level agreements with the government have not been established.

The NMCP is located under the Ministry of Health's (MoH) Directorate of Preventive Health Services. The NMCP Program Manager is thus the Deputy Director of Preventive Health Services. In recent years, the program has expanded and now incorporates a core group of 12 technical officers, including a monitoring and evaluation (M&E) position. The NMCP sets policies, establishes strategies, coordinates activities, and provides technical guidance for the MoH with respect to malaria prevention and control interventions. The management structure is comprised of 29 district malaria coordinators to direct activities in each district, 29 ITN coordinators, and seven IRS coordinators in the seven districts where IRS has been conducted.

4. Updates in MOP Strategy Section

There have been four developments in the past 12 months that should be noted:

- The NMCP has undertaken a mid-term review of the 2011-2015 Malaria Strategic Plan; a revised plan is in draft form. No substantive changes are included, although the timeline for the plan has been extended until 2016 to align with the Malawi 2011-2016 Health Sector Strategic Plan (HSSP).
- A revised version of the *Guidelines for the Treatment of Malaria in Malawi* was approved in July 2013 to be in line with current WHO guidance, including the use of parenteral and rectal artesunate for the management of severe malaria; nationwide training on the revisions should be completed by the end of 2014.
- The MoH has updated the national policy on IPTp to reflect the new WHO guidelines. Pregnant women in the second and third trimesters with no signs of clinical malaria should now be given SP at each scheduled antenatal care visit at least four weeks apart and given as directly observed therapy. The NMCP's objective is for women to receive three or more doses of SP during pregnancy.
- A second Multiple Indicator Cluster Survey (MICS), with support primarily from UNICEF, and a third MIS, with support from the Global Fund and PMI, were completed in early 2014 and June 2014, respectively; results are pending.

5. Malaria Control Strategy in Malawi

The 2011-2015 National Malaria Strategic Plan, entitled "Towards Universal Access," builds on the successes achieved and lessons learned during implementation of the previous two strategic plans. The Malaria Strategic Plan was developed and approved by the MoH in early 2011; however, the NMCP is currently conducting a mid-term review that will temporally align the Malaria Strategic Plan with the GoM's 2011-2016 HSSP. Within the Malaria Strategic Plan, Malawi aims to move from targeting malaria control interventions to provision of universal access of proven interventions under which all Malawians at risk of malaria should have equitable access to malaria prevention, care and treatment. The NMCP activities are designed to be implemented within the HSSP and the health sector-wide approach (SWAp), including the provision of the essential health package. Specifically, the Malaria Strategic Plan objectives aim to ensure that the MoH, through the NMCP, is in a position to:

- Achieve universal coverage of all interventions by 2015 with an 80% utilization rate of the interventions;
- Strengthen advocacy, communication, and social mobilization capacities for malaria control by 2015 to improve use and adherence;

- Strengthen surveillance and M&E systems, including operational research for tracking progress in the implementation of malaria control activities by 2015;
- Strengthen capacity in program management to achieve malaria program objectives at all levels of health service delivery.

Within the Malaria Strategic Plan, six primary intervention areas are targeted: integrated vector management (IVM); case management; malaria in pregnancy; social mobilization and advocacy; surveillance, monitoring, evaluation and operations research; and program management.

IVM/ITNs: The NMCP ITN policy promotes free distribution of ITNs for children born in health facilities, children attending their first visit under the Expanded Program on Immunization (EPI) (if an ITN was not received at birth), and to pregnant women at their first visit to an antenatal care (ANC) clinic. The policy also supports time-limited, national, free distribution campaigns that are conducted every two to three years. Malawi aims to achieve universal coverage with ITNs, defined as one net for every two people, with the objective of increasing net ownership to 90% and net usage to 80% by 2015.

IVM/IRS: Within the Malaria Strategic Plan, Malawi intends to expand IRS to 12 highly endemic districts through public, private sector, and community partnerships by 2015. With the emergence and expansion of pyrethroid and carbamate resistance, the high cost of alternative insecticides, and the limited funding from the GoM, the NMCP plans to develop an evidence-based insecticide resistance management strategy to guide future vector control activities and entomologic monitoring.

Case management: The primary focus of the Malaria Strategic Plan includes expansion of parasitological confirmation of malaria through the use of microscopy in central and district hospitals, as well as in facilities with high patient loads, and the use of rapid diagnostic tests (RDTs) at all levels of the health system. The phased roll-out of RDTs to health facilities began in November 2011, with a goal of expansion to community levels towards the end of 2013. As of mid-2014, the roll out to the community level remained on hold, pending the results of an acceptability and feasibility study.

In 2006, the MoH selected artemether-lumefantrine (AL) as the first-line and artesunate-amodiaquine (ASAQ) as the second-line treatment for uncomplicated malaria, reserving parenteral quinine for the treatment of severe malaria and oral quinine for the management of malaria in the first trimester of pregnancy. In 2013, the MoH revised the guidelines for the management of severe malaria to recommend treatment with parenteral artesunate at health facility and hospital levels and rectal artesunate as pre-referral treatment at community level. The MoH is currently initiating training for health workers as part of the roll-out process for parenteral artesunate. The acceptability/feasibility of rectal artesunate use at the community level in Malawi is also being assessed as part of the study mentioned above. The NMCP plans to commence the roll-out of rectal artesunate on a similar timeline to that described for RDTs.

Malaria in pregnancy: As part of a comprehensive focused ANC (FANC) package, Malawi's policy on IPTp has been revised to be in line with WHO guidance. Malawi is finalizing guidelines and training manuals for the implementation of the policy, as well as alternative treatment for malaria in the first trimester of pregnancy, and prevention and management of anemia during pregnancy.

Social mobilization and advocacy: The Malaria Strategic Plan and the 2009-2014 Malaria Communication Strategy recommend social mobilization and advocacy strategies to increase the

use of all malaria interventions through increased efforts aimed at qualitative and quantitative research, prioritization for promotion of targeted positive behaviors, and capacity building. PMI is supporting NMCP efforts to update the Malaria Communication Strategy to be temporally in line with the 2011-2016 HSSP.

Surveillance, monitoring and evaluation, and operations research: The Malaria Strategic Plan aims to strengthen routine data systems, surveillance, and operations research, promoting use of information while strengthening capacities for data use at all levels. The NMCP has worked closely with Central Monitoring and Evaluation Department (CMED) to incorporate core malaria indicators into the district health information system (DHIS 2). The 2011-2015 Monitoring and Evaluation Plan outlines the strategic areas to emphasize and focuses on tracking progress and measuring results of the various malaria prevention and control interventions to better inform policy, planning, and decision making.

Program management: The Malaria Strategic Plan also emphasizes capacity strengthening in program management at all levels of health service delivery. This requires resource mobilization and strengthened coordination across partners. The NMCP has linked its management objectives to existing national and international development strategies to enhance its policy direction. The procurement and supply chain management system was highlighted as an area requiring significant strengthening for program progress.

6. Integration, Collaboration, and Coordination

Malawi was selected as one of a subset of countries for GHI's initial focus. To operationalize GHI, the USG health team in Malawi prioritizes close harmonization and communication internally across its agencies and disciplines, and externally with GoM and partners, both local and international. The State Department will coordinate this effort among in-country agencies including USAID, Health and Human Services/CDC, Department of Defense, and Peace Corps, as well as other USG agencies with potential contributions to GHI, but without in-country presence. Lessons learned from successful business models will improve efficiencies in coordination and implementation within USG, as well as with GoM and all partners. To ensure USG health programs are effectively aligned and coordinated with the priorities of Malawi's national health strategies and reports on health targets, the team strives to include Malawian leadership in the development and selection phase of various types of funding opportunities.

Malawi has identified three key areas where it focuses its GHI efforts:

- Enhancing leadership, governance, management, and accountability: In this area, the GoM identifies specific interventions to ensure demonstrable health leadership outcomes. Combinations of interventions are undertaken, including performance-based financing, professional academic and mentor-based training, leadership and management training, and technical support for organizational development in key government ministries. This multi-pronged approach improves the health programs developed at the central level, and the quality of those programs implemented at district and facility levels both in terms of the services that are provided and the commodities that are procured and distributed.
- Improving human resources for health: USG supports the MoH to provide sustained and sufficient human resources and the equitable distribution of these workers; increase access to community health services; produce highly motivated and skilled staff whose performance is improved; and develop and approve key government policies impacting

salaries, resources, and task-shifting. The strategic deployment of better-trained staff across districts and increased incentives for provision of quality services, in combination with strengthened quality improvement mechanisms, is expected to improve the community's confidence in the public health care system.

- **Addressing health infrastructure deficiencies:** Upgrades of facilities improve the accessibility of labor and delivery services in hard-to-reach communities and increase the accessibility of essential laboratory and other support services. Improved health information management allows clinics to better manage patient information and better layouts ensure integrated services are available at all facilities. These efforts are strengthened through renovations and maintenance of both ANC and labor and delivery settings to improve patient experiences and outcomes. The enhancements are expected to improve attendance and retention of staff in maternal and child health services.

In Malawi, the SWAp is the primary structure used to manage the health sector inputs. The SWAp is governed by a secretariat supported by technical working groups, which engage government and development partners to provide technical guidance and decision-making on key technical issues to the SWAp and ultimately the MoH. Development partners are also engaged in the SWAp governance structures through the Health Donor Group.

Prior to 2014, Malawi had three approved grants for malaria from the Global Fund, all of which designate the MoH as the Principal Recipient. In March 2014, the Global Fund launched the New Funding Model, which consolidated funding for Malawi's existing malaria grants and added approximately \$16.6 million in additional funding for a combined total of \$85.6 million for 2014-2017 (see table below).

The NMCP is in the process of developing its Concept Note for submission in October 2014. The Global Fund grant supports: 1) procurement and distribution of ITNs for routine and mass distribution, 2) RDTs and AL for case management at the facility and community levels, 3) ASAQ as second line treatment, 4) injectable artesunate and rectal artesunate, and 5) the 2014 MIS. A small amount of funding supports strengthening M&E systems.

Table 1: Global Fund New Funding Model Allocation for Malawi

Disease Component	Existing Funding (US\$)	Additional Funding (US\$)	Total Allocation as of 1 January 2014 (US\$)
HIV	195,733,230	275,577,868	471,311,098
Tuberculosis	8,923,782	3,927,168	12,850,950
Malaria	68,981,435	16,622,695	85,604,130
Health Systems Strengthening	4,576,777		4,576,777
Total	278,215,224	296,127,731	574,342,955

The NMCP also receives technical assistance from the United Nations Children’s Fund (UNICEF) to support programmatic management, malaria prevention and control efforts at the district level, including the procurement of ACTs for CCM, and development of BCC materials. The World Health Organization (WHO) provides assistance on a variety of technical issues.

Other key partners in Malawi include the United Kingdom Department for International Development (DFID), which provides funding for the procurement and distribution of essential medicines. The Clinton Health Access Initiative (CHAI) promotes the use of injectable artesunate as the first-line treatment for severe malaria and serves as the in-country implementer of the UNITAID grant to Medicines for Malaria Venture to purchase injectable artesunate. CHAI also supports community case management in four districts (Mzimba North, Ntcheu, Ntchisi and Dedza) and provides technical support to the NMCP on quantification and Global Fund issues.

Within the USG, Malawi is a President’s Emergency Plan for AIDS Relief (PEPFAR) focus country, receiving \$85 million in FY 2014, up \$10 million from FY 2013, for the prevention, care, and treatment of HIV/AIDS. PEPFAR and PMI share several implementation partners working on integrated or common platforms to support improved health outcomes in Malawi. The PMI team works closely with PEPFAR and the USAID health teams to coordinate activities.

7. PMI Goals, Targets, and Indicators

The goal of PMI is to reduce malaria-associated mortality by 70% compared to pre-initiative levels in the 15 original PMI countries by the end of 2015. PMI will also assist Malawi to achieve the following targets in populations at risk for malaria:

- >90% of households with a pregnant woman and/or children under five will own at least one ITN;
- 85% of children under five will have slept under an ITN the previous night;
- 85% of pregnant women will have slept under an ITN the previous night;
- 85% of houses in geographic areas targeted for IRS will have been sprayed;
- 85% of pregnant women and children under five will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the past six months;
- 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy;
- 85% of government health facilities have ACTs available for treatment of malaria; and
- 85% of children under five with suspected malaria will have received treatment with ACTs within 24 hours of onset of their symptoms.

8. Progress on Indicators to Date

The most up-to-date information comes from the 2012 MIS. The 2014 MICS and 2014 MIS were completed in early 2014 and June 2014, respectively; results are pending.

Table 2: Progress on Indicators to Date

Indicator	MICS 2006	MIS 2010	DHS 2010	MIS 2012
Percentage of households that own one or more ITNs	38	58	57	55
Percentage of children less than five years old who slept under an ITN the previous night	25	55	38	56
Percentage of pregnant women who slept under an ITN the previous night	8	49	35	51
Percentage of children less than five years old with fever in the last two weeks who received an appropriate antimalarial drug	24	31	43	33
Percentage of children less than five years old who took an antimalarial drug the same or next day	N/A	22	28	24
Percentage of pregnant women who took two or more doses of IPTp during their last pregnancy	48	60	55	54
Prevalence of malaria parasitemia by slide microscopy	N/A	43%	N/A	28%

9. Other Relevant Evidence on Progress

PMI Malawi has supported two national health facility surveys to assess the status of case management of malaria in public health facilities. The first was conducted in 2011 (prior to the national roll-out of RDTs to health facilities) and focused on the management of uncomplicated malaria. In total, 107 health facilities, 2,019 outpatients, and 135 health workers were surveyed. Key findings include:

- Only 42% of patients attended facilities with functional microscopy. The quality of facility microscopy was poor compared to expert microscopists (sensitivity = 47% and specificity = 84%).
- Thirty-four percent of all patients seeking curative care at outpatient departments during the high-transmission season had parasitologically-confirmed, uncomplicated malaria.
- Sixty-seven percent of patients with malaria confirmed by microscopy were correctly treated with an ACT; 95% were correctly dosed. The main cause of incorrect treatment was malaria cases missed by clinicians.
- Thirty-one percent of patients without malaria received an ACT.
- Most patients were seen by health workers (69%) explicitly trained on the malaria treatment guidelines.

The second national health facility survey was conducted in 2012 and focused on the management of severe malaria. In total, 200 health workers were surveyed at 36 hospitals that admit patients with severe malaria and 1,252 inpatient records were reviewed. Key findings include:

- Forty-two percent of all patients were given an admission diagnosis of malaria.
- RDTs were available in 97% of the facilities, but were out of stock at least once in the prior three months in 44% of facilities. Microscopy supplies were available in 89% of the facilities, but out of stock in 22% of facilities in the prior three months.
- Sixty-five percent of patients had parasitological confirmation of their diagnosis on admission.
- Quinine was available in 92% of the hospitals on the day of the survey, but 26% of facilities reported at least one stockout of all severe malaria treatments within the prior three months. Seventy-six percent of all severe malaria patients received intravenous quinine, the first-line medication for the treatment of severe malaria.
- On the job malaria training was reported by 57% of health workers, primarily on the use of RDTs. Only 5% reported malaria supervision in the prior six months.
- Health workers cited availability of treatment (58%), availability of diagnostic supplies (32%), and knowledge gaps (30%) as the main obstacles to malaria care.

With funding and support from PMI, Malawi and the Roll Back Malaria (RBM) partnership completed an impact evaluation of malaria control efforts between 2000 and 2010. The *Progress and Impact Series* report was launched in April 2013. Key findings included a 41% reduction in under-five mortality from 188 to 112 deaths per 1000 live births over the period 1996-2000 and 2006-2010, and modeling, which estimated that approximately 21,600 deaths among children under five-years of age were prevented by malaria control interventions.

The 2013-14 service provision assessment (SPA) was designed to be a census of all formal sector health facilities in Malawi. The assessment used health facility inventory, health provider and client exit interview questionnaires and observations protocols. Key findings include:

- Of basic services, curative care is available in 95% of facilities but antenatal care services are available in only 65% of facilities.
- Among all facilities offering outpatient curative care for sick children, less than 50% had guidelines or staff trained on integrated management of childhood illness.
- Among facilities offering ANC services, the percentage of hospitals and health centers with ITNs available was 46% and 62%, respectively. Availability of SP for IPTp, RDTs, and ACTs was greater than 95%.
- Among facilities offering malaria services, the availability of treatment guidelines and trained staff was approximately 70% or more in hospitals and health centers but only approximately 50% in dispensaries. First-line ACTs and parenteral quinine (for management of severe malaria) were available in greater than 95% of facilities; injectable artesunate was available in less than 10% of facilities.

10. Challenges, Opportunities, and Threats

Malawi's malaria program has reached a critical juncture with several threats to its success including: 1) continued supply chain problems; 2) delayed Global Fund disbursements for existing grants, related primarily to financial management issues within the GoM; 3) lack of an

evidence-based IVM strategy in the face of insecticide resistance, which threatens the IRS program and potentially the ITN program; 4) increased resistance to SP, which threatens the effectiveness of the IPTp program; 5) unreliable malaria data from the Health Management Information System (HMIS) resulting in program monitoring challenges; and 6) an under-trained and under-supervised health workforce.

Since PMI began work in Malawi, supply chain issues have plagued the program. Stockouts of antimalarials and other essential drugs have occurred regularly due to issues related to quantification of need, ordering, tendering, receipt, storage, and the logistics of distribution. In mid-2010, PMI became aware of significant thefts of PMI-procured antimalarial drugs from the Central Medical Stores (CMS), resulting in the USG withdrawing its funded commodities from CMS and establishing a temporary parallel supply chain for the distribution of PMI-procured health and family planning commodities directly to service delivery points. Improved implementation of this parallel system has resulted in less frequent stockouts of antimalarial commodities. However, an outdated logistics management information system (LMIS) and irregular procurements and deliveries of commodities continue to limit the ability of this system to accurately forecast commodity needs and ensure availability of the commodities at the point of service. PMI has shared costs for this parallel supply chain with the Global Fund over the last several years. Nevertheless, the Global Fund has recently contracted a new distributing agent, which will increase the costs of the PMI supply chain mechanism and further complicate an already challenging supply chain management system for malaria commodities.

Vector control faces its own challenges, primarily related to the emergence and expansion of insecticide resistance to pyrethroids and carbamates. This caused the PMI-supported IRS program change to a more expensive and short-acting organophosphate insecticide, which ultimately made the IRS program unsustainable within the PMI Malawi budget envelope. Currently, PMI is working with the MoH and other partners to create a stakeholder-driven, evidenced-based IVM strategy to determine the most appropriate way forward for Malawi's vector control efforts. The impact of pyrethroid resistance on the effectiveness of ITNs is not clear. PMI has supported research to help answer that question and evaluate third generation/combination ITNs that could mitigate the effects of resistance.

Results from recent studies in Malawi suggest increasing levels of SP resistance among pregnant women attending ANC and limited effects on birth outcomes among women receiving IPTp with SP. Given the current lack of a viable alternative to SP for IPTp, these findings represent a serious threat to the current and future effectiveness of the IPTp program in Malawi.

Routine monitoring of malaria indicators through the HMIS remains a challenge and poor data quality continues to limit the ability of the MoH to make evidenced-based programmatic decisions. Although in its infancy in Malawi, the use of electronic medical record systems holds promise for the future.

Finally, the country overall has been plagued with major human resource issues that have resulted in a reliance upon health workers with lower levels of training for the performance of key malaria prevention and case management activities. Providing adequate support for training and supervision for this cadre of the health workforce has proved challenging, as much of the PMI support for case management activities (training and supervision) has been channeled through an integrated service delivery platform targeted to only 15 of the 29 districts. This has left a gap in support in the remaining districts that has been filled only partially by other development partners and agencies. In addition, health worker boycotts of trainings over the

recently changed donor daily subsistence allowance rates have limited the NMCP's ability to implement essential training activities in all implementation areas.

11. PMI Support Strategy

PMI's strategy is to support the NMCP's malaria control and prevention efforts. PMI is committed to ensuring high net ownership and use by continuing to support the procurement and distribution of ITNs through routine systems at ANC and EPI clinics, in addition to providing logistical support for universal coverage campaigns. Following the universal coverage campaign in 2015, PMI will support a survey to understand the campaign's reach and impact by evaluating net ownership and use. PMI will explore other channels to provide ITNs on a continuous basis to provide more opportunities to increase the number of nets in each household.

Although PMI recognizes IRS as a key malaria prevention strategy, the documented pyrethroid resistance and high cost of alternative insecticides have made challenging the implementation of an effective, affordable IRS program. PMI is working with the NMCP to design an evidence-based IVM strategy to guide future vector control activities and entomologic monitoring. PMI support for the IRS program will be re-evaluated once this strategy is completed.

IPTp is one of the hallmarks of reducing the impact of malaria in Malawi. In addition to providing funding for the strengthening of IPTp services through ANC, PMI is developing a protocol to monitor *P. falciparum* resistance to SP in pregnant women in Malawi in response to evidence that SP is becoming less effective within the IPTp program. Biomarker monitoring for SP resistance will help to inform IPTp policy. Finally, PMI will support an evaluation of interventions designed to increase attendance at ANC by pregnant mothers. PMI will undertake these operations research studies with FY 2014 funding.

At the facility and community levels, PMI is committed to ensuring that there is access to high quality malaria case management. PMI will maintain support to the parallel supply chain while providing technical assistance to improve the capacity of the CMS at the central level and strengthening the LMIS at the district level. PMI will continue to provide supportive supervision and training for the management of uncomplicated malaria in its focus districts as part of a broader maternal and child health effort. Additionally, PMI will support the NMCP's efforts to implement a new treatment policy for the management of severe malaria with parenteral artesunate in health facilities. At the community level, PMI will continue to work in the 15 designated districts to support HSAs providing CCM with training, commodities, and oversight for the use of RDTs and ACTs. Looking forward, PMI will continue to work with the NMCP to expand the CCM program to include pre-referral rectal artesunate and RDTs. PMI will also continue to strengthen quality assurance for diagnostics, for both microscopy and RDTs, at the facility and community level. Finally, PMI will continue to fund therapeutic efficacy studies for the first and second-line agents for treatment of uncomplicated malaria.

All of these activities will be grounded in a strong monitoring and evaluation framework that includes both population-based surveys, operations research, review of HMIS data and other relevant activities. PMI will support the implementation of DHS every five years with an MIS survey in the intermediate years to determine progress against PMI and NMCP targets. This will be complemented by regular monitoring of HMIS data by the NMCP, commodity consumption data, entomological data, and other surveys such as health facility surveys and targeted operations research supported by PMI and other groups.

III. OPERATIONAL PLAN

1. Insecticide-Treated Nets

NMCP/PMI Objectives

The 2011-15 Malaria Strategic Plan calls for universal coverage with ITNs (defined as one net for every two individuals), and outlines specific targets to be reached by 2016, including ownership of at least one ITN by 90% of households and 90% ITN use among children less than five years of age and pregnant women.³ In 2007, Malawi revised its ITN policy to focus on LLIN distribution through the three channels: 1) free routine distribution to pregnant women and children less than one year of age through ANC and EPI clinics,⁴ 2) time-limited, intermittent distribution to the general population through mass campaigns, and 3) sale of subsidized ITNs through the private sector.

Progress since PMI was launched

PMI has consistently supported NMCP efforts through the procurement and distribution of LLINs for continuous distribution to pregnant women and young children (over 4.3 million nets through September, 2013) and the provision of technical support for routine and mass distribution mechanisms. In addition, PMI has funded behavior change communication and community mobilization efforts to improve the uptake and utilization of ITNs.

Malawi conducted its first nationwide mass distribution of free LLINs in 2012 with support provided primarily by the Global Fund. Due to logistical and programmatic challenges, this LLIN mass distribution campaign was delayed nearly 9 months and did not begin until May 2012. PMI procured and distributed LLINs for the Lilongwe Rural district and provided technical assistance for overall campaign planning and operations. In total, 5.6 million LLINs were distributed by all partners. Due to the delayed start to the 2012 mass campaign, the 2012 MIS did not capture the impact of the campaign on ITN coverage. The NMCP planned to conduct a nationwide assessment within three months of the completion of distribution activities; however, the assessment was never initiated.

Although not reflective of the mass campaign, the 2012 MIS does give an indication of the prior progress made through PMI-funded continuous distribution, smaller mass distributions supported by other donors, and the sale of subsidized ITNs. Between 2006 and 2010, household ownership of at least one ITN had increased from 38% to 58% (MICS 2006, MIS 2010). By 2012, this trend stalled and ownership decreased slightly to 55% (MIS 2012). Reported ITN utilization in the 2012 MIS remained stable among children less than five years of age and pregnant women (56% and 51%, respectively). In households where at least one ITN was available, 84% of children less than five years old, 79% of pregnant women, and 70% of the general population slept under an ITN the night before the survey (MIS 2012). Among all age and risk groups, usage was higher in households owning at least one ITN.

³ The NMCP has undertaken a mid-term review of the 2011-2015 Malaria Strategic Plan and plans to revise and extend the timeline to align with the Malawi 2011-2016 Health Sector Strategic Plan. The revised plan is in draft form at time of writing this report.

⁴ Following the 2012 mass distribution campaign, the NMCP shifted the target population for continuous ITN distribution from children less than five years of age to children less than one year of age. This change is reflected in the draft, revised 2011-2016 Malaria Strategic Plan.

Progress in the last 12 months

PMI funded the procurement and distribution of approximately 500,000 LLINs to pregnant women and children less than one year of age through continuous distribution channels. PMI also supported technical assistance to the NMCP for LLIN quantification and distribution planning, monitoring of LLIN distribution through spot checks, supportive supervision of ANC and EPI staff, and the development of an online data collection system for distribution monitoring. With support from the Global Fund and technical assistance from PMI, the NMCP conducted a 2014 MIS, which will provide estimates of ITN ownership and use. Preliminary survey results are expected to be available by September, 2014.

Despite these efforts, there is conflicting evidence regarding the adequacy of ITN supplies at service delivery points in Malawi. According to the PMI-supported distribution partner, stock-out rates appear to be relatively low (e.g. approximately 10% of facilities reporting stock-outs on the day of spot check survey between October and December 2013). However, preliminary data from the 2014 SPA suggest that ITN availability at ANC clinics is lower (i.e. 39% of hospitals and 56% of health facilities report stockouts on the day of the survey).⁵ Investigation and appropriate follow-up will be needed to ensure that ITNs supplies are available at all facilities in Malawi. Other issues, such as healthcare worker understanding of and compliance with ITN distribution guidelines, poor record keeping and reporting practices, and restricted access to ITN storage areas by ANC staff, pose continued challenges.

PMI continued to work with the NMCP to strengthen partnerships that exist between the NMCP and stakeholders around ITN procurement and distribution, including support for the quarterly meetings of the National Malaria Vector Control Sub-Technical Working Group. PMI also worked closely with the NMCP to address concerns that net shape preference was affecting use and retention of ITNs. Data from the 2012 MIS suggested that Malawians who did not own an ITN, particularly those who live in urban areas, may prefer conical to rectangular-shaped nets currently being distributed by the MoH. To further assess, PMI and partners included specific questions on net shape preference in the 2014 MIS.

PMI continued to fund national mass media and print media campaigns to emphasize nightly ITN use by all household members, as well as proper care and repair of nets. In addition, PMI funded CBOs and local non-governmental organizations (NGOs) through sub-grants to increase awareness, promote correct and consistent ITN use, and proper ITN care and repair.

To better assess the impact of increasing pyrethroid resistance in Malawi and provide data for NMCP decision-making, the Malaria Alert Centre (MAC) completed PMI-funded studies to evaluate the effectiveness of pyrethroid-treated nets in an area of high pyrethroid resistance. Preliminary results from these studies suggest that despite documented resistance, use of an ITN was associated with a 30% reduction in the incidence of malaria in children 6-59 months old. In addition, MAC completed a field study to assess the effectiveness of combination pyrethroid-synergist LLINs compared to pyrethroid-only LLINs for the control of pyrethroid resistant *Anopheles funestus* populations; results are pending. Finally, preliminary data from a PMI-funded ITN durability study suggest that, in at least one geographic area (Chikhwawa), a high proportion of nets were lost to damage or were retained by the household but were considered to

⁵ It is important to note that depending on the responsibilities of the individual's surveyed during the SPA, nets may be available without that individual's knowledge. Additionally, figures for the PMI-supported facilities include only public facilities, while those for the Service Provision Assessment include both public and private facilities.

be heavily damaged and in need of replacement. Two net brands, including the one most commonly used in Malawi, had median survival times of less than 3 years based on attrition and physical integrity.⁶ If generalizable to Malawi as a whole, this would present a significant threat to the maintenance of high ITN coverage in the interim years between mass distribution campaigns in Malawi.

The planned 2015 mass distribution campaign represents a very significant opportunity to increase ITN coverage and use in Malawi. However, this campaign faces several challenges including delays in disbursement of funding from the Global Fund, primarily due to issues related to GoM financial management systems, for campaign planning and LLIN procurement and distribution. In addition, several key issues identified during the 2012 mass campaign will need to be addressed to ensure adequate registration of beneficiaries, effective distribution, and avoid the need for a large-scale mop-up campaign. The PMI in-country team and PMI's primary ITN implementing partner are coordinating closely to provide technical assistance to the NMCP for the planning of 2015 LLIN mass distribution campaign. PMI also intends to fund operational support for the registration and verification of mass campaign beneficiaries using FY 2013 and FY 2014 funding.

⁶ These studies were financed with funding from years prior to the FY 13 MOP. However, research activities have continued during the last 12 months.

Gap analysis

Table 3: ITN gap analysis

Calendar year	2014	2015	2016
Total targeted population	15,805,240	16,310,430	16,832,908
Continuous Distribution Needs			
Pregnant women during first ANC visit*	790,262	815,522	841,645
Children under one year of age [†]	790,262	815,522	841,645
Total need for continuous	1,580,524	1,631,043	1,683,291
Mass Distribution Needs			
2015 mass distribution campaign [∞]	0	9,061,350	0
Total need for campaigns	0	9,061,350	0
Total Need			
Total need for continuous and campaign	1,580,524	10,692,393	1,683,291
Partner Contributions			
PMI [‡]	900,000	800,000	1,200,000
Global Fund Round 2/7 Consolidated	1,479,666	0	0
Global Fund Round 9 Phase 2 [‡]	0	9,061,350	0
Total Partner Contributions	2,379,666	9,861,350	1,200,000
Surplus/Carried over ITNs from previous year	231,900	1,031,042	199,999
Total ITNs available in calendar year	2,611,566	10,892,392	1,399,999
Surplus/(Gap) for ITNs	1,031,042	199,999	(283,292)

[†]Estimated as 5% of the total population. Assumes 100% EPI attendance for one visit.

*Total number of pregnant women is estimated as 5% of the total population.

[∞]Estimated as targeted population divided by 1.8.

[‡]Primarily for distribution through routine channels.

[‡]Available for mass campaign, exact quantity dependent upon outcome of registration activities and procurements by other donors such as Against Malaria Foundation/Concern Universal.

Planned activities with FY 2015 funding and justification

PMI will continue to support the NMCP's efforts to ensure high coverage of pregnant women and children less than five through the procurement and distribution of LLINs through routine channels, training and supervision of health workers, and distribution monitoring. PMI will also provide support for LLIN durability monitoring following the planned 2015 mass campaign that will be initiated using prior year funding (please see the Monitoring and Evaluation section). BCC activities will be continued through national level communication and the community-based small grants program to promote ITN use among all household members and to enhance net care and repair (please see BCC section, pages 70-73).

Description and budget for proposed activities (\$5,610,000)

- Procurement of 1,200,000 ITNs targeting pregnant women and children under one through the ANC and EPI free distribution (\$4,300,000);

- Distribution of LLINs from the central level to the health facilities including customs clearing, warehousing, transport, distribution and ITN tracking (\$1,310,000);

2. Indoor Residual Spraying

NMCP/PMI objectives

The primary IRS objectives of the 2011-2015 Malaria Strategic Plan include: coverage of at least 85% of all targeted structures in 12 high-transmission districts by 2015 through public, private sector and community partnerships; advocacy for the removal of taxes and tariffs of IRS commodities and supplies; and advocacy for more resources for IRS from government and external funders. IRS activities include planning and training, operational work, comprehensive monitoring and evaluation of spraying activities, environmental compliance and entomological monitoring and surveillance.

Country progress since the launch of PMI

PMI initially supported IRS in part of one high transmission district of Malawi, eventually scaling up to cover two districts. However, in 2010, high levels of pyrethroid and carbamate resistance were observed in *An. funestus* in multiple sites in Malawi. These findings necessitated a shift to organophosphate insecticides beginning in late 2010. At that time, only a short acting OP was available and, given the high cost and short duration of residual efficacy, it was decided to suspend direct support for IRS in Malawi after the 2011 spray season. Despite the challenges, IRS has been supported by the GoM, initially in 2010 for five districts that were not covered under the PMI IRS program.

IRS in Malawi faces two important challenges. The first is the limited funding for IRS in Malawi. PMI initially was the only donor providing direct support for IRS in Malawi. Given the early success of the PMI IRS program, the GoM rapidly increased support for IRS in districts not supported by PMI. However, PMI has not provided direct funding for IRS in Malawi since 2012 and funding levels from the GoM have steadily declined. Without PMI funding, it is unlikely that Malawi will conduct IRS operations after 2014.

The second major challenge facing the IRS program in Malawi is the rise and spread of pyrethroid resistance in the malaria vector, *An. funestus* throughout much of the country. Pyrethroid resistance was first reported in 2011 in this species. Mortality rates to permethrin ranged from 58% to 85% in 2011 while mortality rates to deltamethrin ranged from 41% to 78% in the same year. All populations would be classified as resistant to both insecticides according to current WHO guidelines. Surprisingly, resistance to permethrin declined slightly in 2012 with mortality rates ranging from 67% to 93%. However, resistance to deltamethrin increased with mortality rates ranging from 21% to 49%. The only site with no pyrethroid resistance is Karonga District in the north, where the main malaria vector is *An. arabiensis*. However, data indicate this species is resistant to pyrethroids in some sites in southern Malawi where mortality rates as low as 56% were observed. *Anopheles funestus* is also resistant to carbamate insecticides. In 2011, populations in Mangochi were susceptible (mortality = 99%) while populations in Salima were suspected resistant (mortality = 96%). In all other sites, mortality was <90%, indicating resistance to bendiocarb. In 2012, resistance to bendiocarb was observed in all 10 populations tested. All populations tested against malathion were fully susceptible, while populations tested against DDT were classified as susceptible or suspected resistant. Due to less consistent rains in

2013, data were available in only three districts, but the data continue to indicate high levels of resistance among *Anopheles funestus* populations to pyrethroids (average mortality to permethrin = 47%; average mortality to deltamethrin = 21%) and the carbamate bendiocarb (average mortality = 29%). *An. funestus* remained fully susceptible to malathion. These data indicate organophosphates and possibly DDT are the only technically sound options for IRS in Malawi. However, DDT is currently not registered for Malawi due to environmental concerns and strong opposition from the agricultural sector, which fears that contamination of crops may result in the loss of export markets.

Anopheles funestus is still susceptible to organophosphate insecticides. However, the insecticide itself costs 10-15 times that of pyrethroid insecticides, which drastically increases the overall operational costs of IRS. The recent recommendation of a long-lasting formulation of Actellic CS (active ingredient = pirimiphos-methyl), which lasts up to 6 months or longer makes the re-introduction of IRS a possibility and may be a useful approach to the management of pyrethroid resistance as has been reported for neighboring Zambia. However, this will depend on the development of the insecticide resistance management strategy.

Country/PMI Progress in last 12 months

GoM funding for IRS operations has declined and, in 2013-2014, only one district was sprayed; GoM support for even this was not adequate. Spray operations funded by the GoM have experienced challenges due to the procurement of low quality insecticides and spray pumps. Furthermore, delays in disbursements of GoM funds have delayed the spraying until April/May of 2014. With reprogrammed money from FY 2012, PMI provided technical support to the NMCP.

Given the high levels of pyrethroid resistance observed in *An. funestus* and the recent recommendations of the WHO Global Plan for Insecticide Resistance Management, PMI provided support for the development of an evidence-based IVM strategy. A consultant has been identified who will review entomological and epidemiological evidence related to vector control and insecticide resistance and, in conjunction with other stakeholders in Malawi, develop an integrated IVM strategy for Malawi. The strategy is scheduled for completion by September 2014.

Commodity gap analysis

The current NMCP strategy calls for IRS to be scaled up in 12 districts. Given the declining support for IRS in Malawi, it is not certain that the GoM will continue to provide any funds for IRS. Should PMI reconsider IRS in Malawi, it is likely that PMI will be the only partner.

The NMCP would like more detailed information on insecticide resistance throughout Malawi and has proposed mapping of insecticide resistance with funding from Global Fund Round 9/Phase 2. However, the amount allocated was significantly lower than needed and the Global Fund disbursements have been delayed. It was proposed to rotate districts that are monitored with up to seven districts under monitoring each year. After three years, 21 of 29 districts would be covered.

Planned activities with FY 2015 funding and justification

The future of the IRS program in Malawi is uncertain due to the resource challenges being experienced in the country. The GoM is prioritizing the execution of its health activities and it is unknown if IRS will remain a high priority intervention given the emergence and expansion of pyrethroid resistance, the high cost of alternative insecticides (*i.e.*, organophosphates) and the recent LLIN mass distribution campaign. Future decisions on whether and where to implement IRS will be guided by the IVM strategy which is under development and the entomological monitoring funded through PMI. PMI will reconsider its support for IRS in Malawi based on the direction Malawi takes under the vector management strategy for IRS, as well as the availability of funding.

To assist the NMCP in implementing the anticipated IVM strategy, entomological monitoring will be conducted in one to two sites in each of seven districts. The entomological monitoring will include insecticide resistance monitoring, species distribution and abundance and mosquito behavior in relation to vector control interventions, which will allow for planning of vector control outlined in the IVM strategy.

Proposed activities

- Continued support for entomologic monitoring with routine surveys of vector density and insecticide resistance testing of mosquitoes collected from sentinel villages in three to seven districts, including any districts where the NMCP is conducting IRS (see M&E section).

3. Malaria in Pregnancy

NMCP/PMI objectives

The MoH has a three-pronged approach to reducing the burden of malaria in pregnancy: use of IPTp, LLINs, and effective case management of malarial illness and anemia. PMI supports this approach for malaria in pregnancy implemented through the ANC services delivery platform. The MoH has updated the national policy on IPTp to reflect the new WHO guidelines. The MoH's objective for IPTp is for at least 80% of pregnant women to receive at least three doses of SP during pregnancy. In addition, behavior change messages are communicated at ANC visits and at the community level to maintain and expand demand for IPTp. LLINs are provided to pregnant women at their first ANC visit and again at delivery.

For uncomplicated malaria, the treatment guidelines recommend that during the first trimester, quinine plus clindamycin be administered for seven days. In the second and third trimesters of pregnancy, AL is recommended. For the treatment of severe malaria during the first trimester of pregnancy, the treatment guidelines recommend parenteral quinine for at least 24 hours. When the patient is able to take oral medication, quinine and clindamycin are then given to complete the treatment. In the second and third trimesters of pregnancy, parenteral artesunate is recommended for at least 24 hours, followed by AL once the patient is able to take oral medication.

The malaria in pregnancy guidelines recommend the use of iron and folic acid supplementation for the treatment of anemia during pregnancy. Currently, the MoH procures 400 microgram folic acid tablets through the Reproductive Health Unit's (RHU) essential drug program.

Country progress since the launch of PMI

PMI, in conjunction with the NMCP and RHU, has worked to increase uptake of IPTp through training and supervision of providers and assistance with directly observed treatment, including supporting infrastructure improvements to assure clean water supply and provision of cups. Through CBOs and the small grants program, funds have been made available at the local level to increase demand for ANC and IPTp and encourage women to attend ANC early in their pregnancy in order to receive at least three doses of SP.

Nevertheless, despite almost 19 years of IPTp policy in Malawi, coverage goals have yet to be met. There are still systematic barriers to seeking ANC in the first trimester, which, in turn, constrains the numbers of women who can complete the recommended four ANC visits and three or more IPTp doses prior to delivery; the percent of women making 4+ visits to ANC has dropped steadily from 55% in 2000 (DHS 2000) to 44% in 2010 (DHS 2010). The 2012 MIS found that more than half (54%) of pregnant women received at least two doses of SP during the most recent pregnancy; this is a slight decline from the 2010 MIS (60%).

Increasing SP resistance represents another significant threat to IPTp in Malawi. In 2012, more than 94% of the malaria parasites in pregnant women with asymptomatic parasitemia presenting at an ANC visit at Machinga District Hospital had quintuple mutations for SP resistance, indicating that resistance is almost fixed in this population (Mwandama D, personal communication, 2012). A delivery cross-sectional survey at the same hospital found that two or more doses of IPTp with SP during pregnancy compared to zero or one dose was not associated with any reduction in placental malaria for any gravidity (Gutman J. et al., 2013). However, two or more doses of IPTp with SP were found to reduce the prevalence of a composite birth outcome among primigravidae (i.e., any of the following: small for gestational age, prematurity, or low birth weight). The conclusion from this study is that two or more doses of IPTp with SP currently provides some small benefit to neonates but does not show the same effect seen in studies conducted when SP was more efficacious in treating *P. falciparum*.

Recent studies from Tanzania and Malawi suggest that the presence of the sextuple mutation in the *P. falciparum* population can result in the failure of SP when given as IPTp. Currently, the presence of the sextuple mutant in Malawi is less than 10%. Given the effect of these mutations on the efficacy and safety of IPTp with SP, PMI will use FY 2014 funding to support monitoring of key *P. falciparum* resistance markers among pregnant women at ANC to identify increases in the prevalence and distribution of the sextuple mutant.

Awareness campaigns and provision of LLINs through ANC clinics support the use of LLINs during pregnancy. In the 2012 MIS, only 51% of pregnant women reported sleeping under an ITN the night before, however, this figure jumps to 79% when considering only pregnant women in household with at least one ITN. As access seems to be a significant factor in this low utilization, use of ITNs among pregnant women is expected to improve following the mass distribution campaign in 2015.

Country/PMI progress in the last 12 months

With support from PMI, the MoH updated the national policy on IPTp to reflect the new WHO guidelines targeted at improving the uptake of IPTp and allowing women visiting ANC later in their pregnancy to take three or more doses of SP (Please see *Malaria in Pregnancy: NMCP/PMI Objectives*).

PMI continued to support routine distribution of LLINs through ANC; please see ITN section, pages 31-35 for details. PMI also continued to support appropriate case management of malaria in pregnant women through the procurement of antimalarial drugs, outreach training and supportive supervision in health facilities, and behavior change communication for prompt care seeking through the integrated communication platform.

Commodity Gap analysis

Table 4: Sulfadoxine-pyrimethamine gap analysis

Calendar year	2014	2015	2016
Total population	15,805,240	16,310,430	16,832,908
SP needs			
Total number of potential pregnant women attending ANC*	790,262	815,522	841,645
Total SP doses needed[†]	2,370,786	2,446,565	2,524,936
Partner contributions			
MOH	0	0	0
PMI	2,070,333	0	0
Global Fund	0	0	0
UNICEF	1,068,333	0	0
Essential medicine program (DFID) [∞]	750,000	0	0
Total partner contributions	3,888,666	0	0
Carry over from prior year	3,082,633	4,600,513	2,153,949
Total SP available in calendar year	6,971,299	4,600,513	2,153,949
Surplus/(Gap) for SP	4,600,513	2,153,949	(370,987)[∞]

*Total number of pregnant women is estimated as 5% of the total population.

[†] NMCP bases SP needs on 3 doses for each pregnant woman attending ANC and plans based on 100% ANC attendance.

[∞] Although no pledge has yet been made, it is expected that SP will continue to be included in the Essential Medicine program in 2015 and 2016. As a result, the projected gap in 2016 should be covered and PMI does not plan to procure additional SP.

Planned activities with FY 2015 funding and justification

Despite high first attendance at ANC clinics (90%), IPTp goals in Malawi have not yet been met. Although the integration of IPTp into focused ANC services helps assure that SP for IPTp is available in all health centers and administered by trained personnel, there is potentially some dilution of impact, as IPTp is one among many services offered at ANC. PMI will continue to support training and supervision of ANC providers on the revised guidelines initiated with FY 2014 funding.

In consultation with representatives in the RHU and NMCP, it has been suggested that better equipping ANCs to meet the needs of clients presenting in the first trimester could enhance the reach of FANC to the recommended number of visits and improve complete IPTp coverage. PMI has reprogrammed FY 2014 funds to support an operational research (OR) study that will test this principle. A select number of ANC sites will be provided with the necessary equipment and supplies to serve first trimester clients: urine pregnancy test kits, hemoglobinometers and

reagents, blood pressure and fetal heart rate equipment, malaria RDTs, syphilis testing supplies, HIV counseling and testing materials, urine dipsticks, and LLINs. The proportions of women who present for first ANC, who complete four or more ANC visits, and who receive three or more IPTp doses of SP will be documented before and after the intervention.

With FY 2015 funding, PMI will continue integrated and malaria-specific behavior change communication activities in support of IPTp, case management and LLIN use at national and community levels (see BCC section). In addition, PMI will continue to provide free LLINs for routine distribution at ANC visits (see LLIN section). PMI will procure supplies to ensure directly observed therapy and improved IPTp uptake at ANCs. PMI will continue funding to support training and supervision activities for malaria in pregnancy interventions as part of the focused antenatal care package in 2016; the current integrated project will come to an end in FY 2015, so funding will be split between the current implementing partner and the new mechanism.

Description and budget for proposed activities (\$350,000)

- Continue to support BCC for malaria in pregnancy interventions: early case management, IPTp, and LLINs (see BCC section, below).
- Continue to support routine distribution of LLINs at first ANC visit and at delivery (see LLIN section, above).
- Procurement of ANC supplies (cups and water buckets to 700 health facilities) to improve IPTp uptake through directly observed treatment (\$50,000).
- Continued support for strengthening focused antenatal care programs nationwide through joint trainings with the RHU on IPTp and proper implementation of the new IPTp and malaria in pregnancy case management guidelines as well as quarterly, joint supervision visits and mentoring health providers (\$300,000; split equally between current and new mechanisms).

4. Case Management

Diagnostics

NMCP/PMI objectives

Increasing malaria diagnostic capacity to ensure prompt and effective case management and reduce the presumptive use of antimalarial medications is a key priority in Malawi's draft, revised 2011-2016 Malaria Strategic Plan. To achieve this increased capacity, the MoH is focusing its efforts in the following areas: 1) ensuring consistent availability of high-quality diagnostic supplies and commodities through proper quantification, procurement and distribution, 2) improving the quality of microscopy and RDT service provision, and 3) expanding access to diagnostic testing by rolling out RDTs to the community level.

A revised version of the *Guidelines for the Treatment of Malaria in Malawi* was approved in July 2013. In this guide, the MoH recommends that all suspected malaria cases should be tested using an RDT prior to initiating treatment. Microscopy is recommended for the following purposes: 1) to confirm malaria diagnosis in inpatients with suspected severe malaria; 2) to monitor treatment progress in severe malaria cases receiving parenteral treatment; and 3) to confirm first-line treatment failures.

Progress since PMI was launched

Until 2010, Malawi's national malaria policy recommended diagnostic testing prior to treatment only for individuals over five years of age. Presumptive treatment was recommended for children less than five years, due in part to the limited diagnostic capacity in-country. To increase this capacity, PMI supported the introduction of a quality assurance program in 2010 designed to improve Malawi's clinical and laboratory diagnostic services. This program focused on the provision of outreach training and supportive supervision (OTSS) to laboratory and clinical supervisors. The OTSS intervention provides on-site training and long-term, ongoing support to strengthen diagnostic services in health facilities. During scheduled visits, supervisors identify areas for improvement and provide immediate feedback to laboratory and clinical staff. Initially targeted to 16 districts, OTSS has since been expanded to all 29 health jurisdictions in Malawi.

In 2010, GoM shifted its policy to include the use of RDTs for malaria diagnosis for all suspected cases. To help ensure an effective transition from largely presumptive treatment to universal diagnostic testing, the MoH has adopted a phased approach for the roll-out of malaria RDTs. Phase one, which is now complete, focused on the distribution and use of malaria RDTs at health facilities, including those operated by the Christian Health Association of Malawi. PMI supported this phase of the roll-out, including technical assistance for guideline development, commodity procurement and distribution, and healthcare worker training.

As of September 2013, PMI had supported nine rounds of OTSS in Malawi, including visits to 325 health facilities and the supervision and training of 2,322 laboratory and 2,333 clinical health workers. In addition, PMI procured and distributed over 12 million RDTs. Phase two of the RDT roll-out, which is still in the planning stage, will focus on the provision of RDTs for use at the community level using lessons learned from the health facility phase.

Progress in the last 12 months

PMI continued to support the strengthening of diagnostic services through the OTSS program. During this past year, PMI supported the tenth round of OTSS, including visits to 273 health facilities in 29 districts and the supervision and training of nearly 1,000 health workers (as of March 2014). This most recent round, in combination with previous efforts, has resulted in improved healthcare worker performance in negative test adherence, RDT use and interpretation, and reporting of microscopy test results. Although substantial improvements have been noted, microscopists are still not reaching the 90% target set for accurate slide reading. With FY 2013 and FY 2014 funding, further rounds of OTSS will be undertaken with the goal of maintaining 100% coverage of health facilities with a laboratory and expanding coverage to additional facilities that lack microscopic capacity.

In addition to the OTSS program, PMI has supported additional key interventions to increase the scope and quality of malaria microscopy services, including: conducting malaria diagnostic refresher training for 20 laboratory technicians, funding participation for two national level laboratory technicians in the External Competence Assessment of Malaria Microscopists program, supporting the printing of 4,000 laboratory registers, procuring 200 microscopy maintenance kits, and drafting a protocol and roadmap for the creation of a national archive of malaria slides.

PMI has continued to support the NMCP's efforts to increase the use of RDTs prior to treatment through the procurement and distribution of RDTs, the training and supervision of facility-based

health workers, and the promotion of appropriate malaria care seeking behaviors among community members.

The main challenges to reaching the goal of universal diagnostic coverage continue to be inadequate diagnostic technical capacity (including human resources) and shortages of diagnostic supplies at health facilities. Currently, approximately 30% of health facilities have the capacity to provide malaria microscopy by trained and qualified laboratory staff. Expansion of microscopy services to additional facilities is limited by the lack of trained health workers, inconsistent electrical supply, and inadequate laboratory equipment and supplies. Even within facilities with trained and qualified staff, power supply interruptions and supply stockouts constrain microscope use.

The recent roll-out of RDTs to all health facilities has expanded diagnostic capacity, particularly for facilities that lack the capacity to perform malaria microscopy. Overall, this has reduced the reliance on presumptive diagnosis and moved Malawi closer to universal diagnostic coverage. However, ACT consumption continues to far outpace RDT consumption, with an estimated 9.2 million ACTs consumed in calendar year 2013, compared to approximately 4.3 million RDTs.

Although PMI has supported OTSS and other training and mentoring activities covering all 29 health districts, many health care workers have not received training or supervision on RDT use since the initial roll-out. To address this, NMCP has planned to conduct a nationwide health worker refresher training on RDT use as part of the national case management trainings. Unfortunately, a recent revision in the daily subsistence allowance levels by the Malawi Health Donor Group, including the U.S. Mission, resulted in health worker boycotts of these trainings and significant implementation delays. This revision was intended to help increase health worker accountability and drive civil service reforms within the Malawi health care system. PMI Malawi has liaised closely with the U.S. Mission, the implementing partners for this activity, the NMCP, and other donors to identify acceptable approaches and interpretations of the new allowance guidance. The trainings are now being implemented and it is hoped that they will be completed by early 2015.

Human resource shortages have resulted in task-shifting of RDT testing to lower-level cadres of facility-based healthcare workers (e.g. ward attendants) who were not included in the initial round of RDT trainings and will not be included in the parenteral artesunate trainings. The Ministry of Health has recently made a policy decision to train these cadres on RDT use, which should result in more effective implementation of RDTs at the health facility levels. Once documentation of this policy shift is received, PMI will move forward with support for the training of these cadres using prior year funding.

HSAs have been trained on the administration of ACTs for uncomplicated malaria and are currently providing presumptive treatment at the community level. The planned roll-out of RDTs to the community level is yet to commence, pending the results of a long-delayed feasibility and acceptability study. These results should be available in late 2014. The NMCP, with support from PMI, plans to initiate the training of HSAs in RDT use in early 2015 if the outcome of the study is favorable.

Commodity gap analysis

To date, RDTs have been procured primarily with support from PMI and the Global Fund consolidated Rounds 2 and 7 grant, which ended December 2013. No further funding for RDT

procurement is planned under the Global Fund Round 9 Phase 2 grant. However, the NMCP does plan to include RDT procurement and distribution in the Global Fund New Funding Model grant proposal, which is currently being drafted. Although in-country stocks are being maintained at suitable levels, slower than expected uptake of RDTs following the roll-out to health facilities and delays in roll-out through integrated community case management have resulted in significant quantities of RDTs in the procurement pipeline. These stocks, primarily from PMI, will cover the expected RDT needs through the beginning of 2016. PMI plans to procure approximately one-third of the RDT need for 2016, with the expectation that commodities from the Global Fund New Funding Model grant will cover the remaining gap for that year.

Table 5: RDT gap analysis

Calendar Year	2014	2015	2016
Total population	15,805,240	16,310,430	16,832,908
RDT needs			
Estimated suspected malaria cases*	12,482,571	12,844,565	13,217,057
Reduction in cases due to vector control interventions †	0	0	1,321,706
Reduction in RDT needs after accounting for RDT coverage [∞]	6,490,937	3,082,696	713,721
Total RDTs needed	5,991,634	9,761,869	11,181,630
Partner contributions			
MOH	0	0	0
PMI	4,000,000	3,300,000	2,900,000
Global Fund Round 2/7 Consolidated	1,850,850	0	0
Total partner contributions	5,850,850	3,300,000	2,900,000
Carry over from prior year	9,185,408	9,044,624	2,582,754
Total RDTs available	15,036,258	12,344,624	5,482,754
Surplus/(Gap) for RDTs	9,044,624	2,582,755	(5,698,876)

*Extrapolated from ACT consumption data.

†Assumes a 10% reduction in malaria cases in 2016 following the 2015 mass distribution campaign.

[∞]Assumptions: 80% of patients visit health facilities and 20% visit CCM, completion of RDT roll-out to health facilities in 2012 and partially to CCM by 2015, progressive increase in RDT coverage at facility level (i.e. 60% in 2014, 80% in 2015 and 95% in 2016) and CCM level (i.e. 40% in 2015 and 90% in 2016).

Planned activities with FY 2015 funding and justification

With FY 2015 funds, PMI will continue to focus its support in three areas: 1) maintaining diagnostic quality improvement; 2) procuring RDTs and ancillary supplies; and 3) training and supportive supervision of health workers.

Description and budget for proposed activities (\$2,350,000)

- Procure and distribute 2.9 million RDTs (\$1,450,000);
- Procure and distribute ancillary diagnostic supplies, specifically gloves and sharps containers (\$150,000);

- Strengthen microscopy and RDT use as part of larger laboratory strengthening effort, including the continued expansion of OTSS. In addition, PMI will support efforts to strengthen facility- and community-level case management in districts not currently covered by other partners, including training and supervision on the correct and consistent use of RDTs (\$750,000);
- Provide technical assistance and support for strengthening malaria case management at the health facility and community level through an integrated health systems strengthening program that includes malaria in pregnancy (MIP), diagnostic, and treatment components. Diagnostic-specific activities will focus on continued support for the phased RDT implementation, including training and supervision on the correct and consistent use of RDTs (funding included in the Treatment section).

Treatment

NMCP/PMI objectives

Malawi's 2011-2015 Malaria Strategic Plan calls for increased access to prompt and effective antimalarial treatment for all suspected and confirmed malaria cases. To achieve this goal, the MoH is prioritizing: 1) the consistent availability of high-quality malaria commodities through proper quantification, procurement and distribution; 2) the training and supervision of health workers on malaria case management at all levels of the health system; and 3) support for community case management in hard-to-reach areas.

The revised *Guidelines for the Treatment of Malaria in Malawi*, which were finalized in late 2013, present the most up-to-date treatment guidance. For the management of uncomplicated malaria, AL remains the first-line treatment and ASAQ the second-line treatment. Oral quinine plus clindamycin is recommended for the treatment of uncomplicated malaria in pregnant women in the first trimester and for children weighing less than five kilograms. For the management of patients with severe malaria, parenteral artesunate is recommended as the definitive treatment and as pre-referral treatment at health centers. At the community level, the NMCP recommends prompt initiation of pre-referral therapy with rectal artesunate and immediate referral.⁷

Progress since PMI was launched

In 2007, Malawi changed the first-line medication for uncomplicated malaria from SP to AL, with ASAQ as a second-line treatment. Quinine was reserved for treatment of severe malaria cases and for treatment of uncomplicated malaria in the first trimester of pregnancy. PMI has supported this policy through the procurement and distribution of AL (over 30 million courses through September, 2013), the training and supervision of health workers on the appropriate management of cases, and the promotion of appropriate care seeking and treatment adherence behaviors through national-level mass media and community mobilization channels.

In mid-2013, the MoH revised the national *Guidelines for the Treatment of Malaria in Malawi* to replace quinine with parenteral artesunate for the pre-referral and definitive treatment of severe malaria at the health facility level. MoH also added rectal artesunate for the pre-referral treatment of severe malaria at the community level. PMI provided technical guidance and funding for this policy change and the drafting and printing of the revised guidelines and associated training manuals. PMI also procured 485,000 ampoules of parenteral artesunate using FY 2012 funds to support the introduction this commodity, originally planned for the latter part of 2013.

Progress in the last 12 months

PMI continued efforts to strengthen malaria case management at the health facility and community levels in the 15 districts receiving support from PMI's integrated service delivery partner. At the facility level, PMI-supported activities focused on training and supervision of

⁷ At the time that this MOP was prepared, the rollout for parenteral and rectal artesunate had not been fully initiated. With the exception of several central hospitals where training for parenteral artesunate administration had been completed, these commodities were not yet available within the health system.

health workers in malaria case management, as well as monitoring for the consistent availability of antimalarial commodities. At the community level, PMI supported CCM implementation by equipping village health clinics and providing training, supervision, and monitoring to HSAs in the 15 PMI-supported districts. Of the 1,566 VHCs located in the 15 target districts, PMI currently provides support to 1,346 (86%). In addition, PMI supported community mobilization activities in these targeted districts to increase malaria prevention and care-seeking behaviors by community members.

Although PMI has supported nationwide case management activities through a separate implementing partner, the focus of these activities has been on the strengthening of diagnostic capacity. This has left a gap in support for other activities (e.g., training and supervision for facility and community-based case management) that has been filled only partially by other development partners and agencies. Over the past year, PMI has worked with this diagnostic partner to include a wider range of case management activities in the districts not currently supported by PMI's integrated case management partner. In the coming year, PMI plans to support training and ongoing supervision for case management activities in these districts.

Artemether-lumefantrine was provided with support from both PMI and the Global Fund consolidated Rounds 2 and 7 grants. PMI worked closely with the NMCP and the Global Fund to coordinate procurement and delivery schedules to ensure that appropriate central stock levels of AL were maintained. In total, PMI procured and distributed approximately 4.2 million ACTs through the PMI-Global Fund supply chain over the last year.

PMI has provided significant technical support, and plans to provide financial support, for the NMCP's roll-out of parenteral and rectal artesunate for the management of severe malaria. However, limited funding and healthcare worker boycotts of trainings over daily subsistence rates have resulted in significant delays. As a result, the PMI commodities procured with FY 2012 funding have not been distributed. To address this issue, PMI Malawi has requested that FY 2014 funds be reprogrammed to provide sufficient funding for this activity.

As in past years, PMI continued to fund quarterly end-use verification (EUV) surveys to assess the supplies and usage of malaria-related commodities at a sample of health facilities. These survey results are nationally representative when aggregated annually.

Although the continued implementation of a parallel supply chain system for malaria commodities has significantly reduced the frequency of stockouts, inconsistent supplies of antimalarial medications at the facility and community level still limit the ability of health workers to appropriately treat malaria patients. Overconsumption continues to complicate efforts to project the quantities needed and ensure adequate supplies at the service delivery level.

Commodity gap analysis

Artemether-lumefantrine is primarily procured with support from the Global Fund and PMI. Of note, AL categorized as carry-over represents funding for the equivalent amount of AL that was not purchased during the given year but will be used the following year. The significant carry over into 2014 is the product of a front-loading of the procurement pipeline in anticipation of a projected AL shortfall due to the end of the Global Fund consolidated Rounds 2 and 7 grant in December 2013. To help cover the projected gap at the end of calendar year 2015, PMI has requested reprogramming of FY 2014 funding to purchase of approximately 1 million AL treatment courses (not included in this gap analysis).

Table 6: Artemether-lumefantrine gap analysis

Calendar Year	2014	2015	2016
Total population	15,805,240	16,310,430	16,832,908
AL needs			
Estimated suspected malaria cases*	12,482,571	12,844,565	13,217,057
Reduction in cases due to negative parasitological diagnosis [†]	3,020,083	4,782,721	5,330,212
Reduction in cases due to vector control interventions [∞]	0	0	1,321,706
Total AL courses needed	9,462,488	8,061,814	6,565,139
Partner contributions			
MOH	0	0	0
PMI*	4,200,000	2,050,000	2,200,000
Global Fund Round 2/7 Consolidated	4,509,600	0	0
Global Fund Round 9 Phase 2	0	2,000,000	0
Total partner contributions	8,709,600	4,050,000	2,200,000
Carry over from prior year	4,680,774	3,927,886	0
Total AL available in calendar year	13,390,374	7,977,886	2,200,000
Surplus/(Gap) for AL courses	3,927,886	(83,928)	(4,365,139)

*Extrapolated from ACT consumption data, accounting for negative diagnoses.

[†]Assumptions: 80% of patients visit health facilities and 20% visit CCM, completion of RDT roll-out to health facilities in 2012 and partially to CCM by 2015, progressive increase in RDT coverage at facility level (i.e. 60% in 2014, 80% in 2015 and 95% in 2016) and CCM level (i.e. 40% in 2015 and 90% in 2016), a 59% test negativity rate, a progressive increase in compliance with RDT results (i.e. 85% in 2014 and 90% in 2015 and 2016).

[∞]Assumes a 10% reduction in malaria cases in 2016 following the planned 2015 mass distribution campaign.

The NMCP is currently adjusting its projections for the annual need for parenteral and rectal artesunate to reflect the delays in the roll-out.

Table 7: Parenteral artesunate gap analysis

Calendar Year	2014	2015	2016
Total population	15,805,240	16,310,430	16,832,908
PA needs			
Estimated severe malaria cases*	473,124	403,091	328,257
Estimated PA ampoules needed†	851,624	1,813,908	1,969,542
Partner contributions			
MOH			
PMI	485,000	375,000	500,000
Global Fund Round 7/TFM		1,542,500	
UNITAID/MMV (CHAI)	225,000	555,783	541,044
Total partner contributions	710,000	2,473,283	1,041,044
Carry over from prior year	153,000	11,376	66,115
Total PA available in calendar year	863,000	2,484,659	1,107,159
Surplus/(Gap) for PA vials	11,376	670,751	(862,383)[∞]

*Extrapolated from current and projected ACT consumption data (see Table 6), assuming 5% of total cases are severe.

†Assumptions: 80% of patients visit health facilities and 20% visit CCM; 75% of severe cases occur in children under five, children under 5 will require an average of 4 ampoules and individuals 5 and older will require 12 ampoules, progressive increase in parenteral artesunate coverage (i.e. 30% in 2014, 75% in 2015, and 100% in 2016).

[∞]NMCP intends to cover this gap using funding from the Global Fund NFM grant.

Table 8: Rectal artesunate gap analysis

Calendar Year	2014	2015	2016
Total population	15,805,240	16,310,430	16,832,908
Rectal artesunate needs			
Estimated severe malaria cases*	473,124	403,091	328,257
Estimated RA suppositories needed†	0	90,695	98,477
Partner contributions			
MOH	0	0	0
PMI	0	100,000	100,000
Global Fund	0	0	0
Total partner contributions	0	100,000	100,000
Carry over from prior year	0	0	9,305
Total RA available in calendar year	0	100,000	109,305
Surplus/(Gap) in RA suppositories	0	9,305	10,828

*Extrapolated from current and projected ACT consumption data (see Table #), assuming 5% of total cases are severe.

†Assumptions: 80% of patients visit health facilities and 20% visit CCM; 75% of severe cases occur in children under five, children under 5 will require an average of two 50 mg suppositories and individuals 5 and older will require two 200 mg suppositories, progressive increase in rectal artesunate coverage (i.e. 0% in 2014, 75% in 2015, and 100% in 2016).

Planned activities with FY 2015 funding and justification

PMI remains committed to supporting MoH efforts to provide prompt and effective malaria treatment. With FY 2015 funds, PMI proposes to procure approximately 30% of the estimated AL need. PMI will continue efforts to strengthen malaria case management at the facility and community levels through training and supportive supervision, including the expansion of support for case management activities in previously unsupported districts; the current integrated project will come to an end in FY 2015 so funding will be split between the current implementing partner and the new mechanism. Additional funding will target BCC interventions focused on appropriate care seeking behavior, medication adherence, and the management of severe malaria at the community level. Funding will also support supply system management and strengthening to ensure adequate and consistent supplies of antimalarials at the point of care.

Description and budget for proposed activities (\$4,650,000)

- Procure and distribute approximately 2,200,000 AL treatment courses (\$2,250,000), 500,000 ampoules of parenteral artesunate (\$1,550,000) and 100,000 rectal artesunate suppositories (\$50,000)
- Provide continued technical assistance and support for strengthening malaria case management at the health facility and community levels in 15 districts through an integrated health system strengthening program that includes diagnostic and treatment components. Treatment-specific activities will include: training, supervision and mentoring to ensure appropriate patient assessment and management; provision of supplies for CCM activities; and support for the implementation of rectal artesunate at the community level (\$400,000; split equally between current and new mechanisms);
- Expand technical assistance and support for strengthening malaria case management at the health facility and community levels in the 14 remaining districts through an integrated health system strengthening program that includes diagnostic and treatment components. Treatment-specific activities will include: training, supervision and mentoring to ensure appropriate patient assessment and management; provision of supplies for CCM activities; and support for the implementation of rectal artesunate at the community level (\$400,000);

Pharmaceutical and supply chain management

NMCP/PMI objectives

The 2011-2015 Malaria Strategic Plan calls for a reliable, secure, and accountable pharmaceutical and supply chain management system to ensure the availability of essential commodities and supplies for malaria control and prevention activities. To achieve this objective, the NMCP plans to conduct annual forecasting and quantification, strengthen the logistics management information systems in collaboration with Health Technical Support Services (HTSS), develop annual procurement plans in collaboration with partners, and support national and international efforts to strengthen the procurement and supply chain system.

Progress since the launch of PMI

Supply chain issues have been a key concern in Malawi. Due to issues of leakage and general mismanagement, a PMI-Global Fund supply chain was created in late 2010 to distribute all USG and Global Fund supported malaria commodities. In mid-2011, CMS reached the point of near-collapse when its procurement systems became de-capitalized due to continued non-payment of arrears by district governments. In response, the GoM submitted an emergency request for procurement support from health donors, which resulted in the creation of an 18-month multi-donor emergency essential drugs project.

In August 2012, representatives from the GoM, CMS, and several partners, including WHO, the Global Fund, DFID, and PMI, conducted a review of the supply chain management system and developed a *Joint Strategy for Supply Chain Integration in Malawi*. The roadmap included four distinct phases of integration, including CMS recapitalization and reform, management of essential drugs supply chain, warehousing and distribution, and procurement functions. Thirty-six specific performance benchmarks will be measured through ad hoc external assessments and a mid-term review of CMS's capabilities as pre-conditions for re-integration.

In addition to support for CMS reform, the USG has supported efforts to improve the overall supply chain through continued support to the MoH to strengthen planning and coordination centrally and improve commodity management and reporting at the district and facility levels. Support to the central level has included technical assistance to implement annual national quantification and forecasting of all essential medicines, conduct supply planning and commodity monitoring, and maintain Supply Chain Manager and the National Stock Status Database, and financial support to employ two technical assistants seconded to HTSS, which has supervisory authority over the CMS. Support to the district, health center, and community levels have included quarterly supervision and EUV surveys, expanded access to Supply Chain Manager for LMIS, and improved access to malaria commodities through CCM.

Progress in the last 12 months

The NMCP and PMI continue to focus on minimizing or eliminating stockouts of malaria commodities at service delivery points and strengthening supply planning and commodity management through planning, training and supportive supervision. PMI supported activities conducted in 2013 included monthly commodity distributions, integrative supportive supervision, LMIS reporting, two EUVs, and capacity building. Since June 2013, LMIS reporting continued to improve with reporting rates of over 80%. The percentage of facilities reporting stockouts of first line ACTs and RDTs remained less than ten percent each month (range: 2-10%). Although improvements in the LMIS may have contributed to the low number of facilities with stockouts, more than 55% of facilities also reported overstocks (i.e., greater than 3-months supply) of ACTs and RDTs (Malawi EUV, December 2013). Additionally, 95% of facilities reported having staff trained in stock management, which may be attributed to the drug store clerks that were trained and deployed with PMI FY13 funding.

Although PMI and the Global Fund have distributed malaria commodities through the PMI-Global Fund supply chain, the second Global Fund contract with the current supply chain partner recently ended. The subsequent, required competitive process resulted in the contracting of a new implementing partner for the distribution of Global Fund malaria-related commodities in Malawi. These commodities will now be consolidated with all other Global Fund-procured

commodities (i.e., HIV and TB) into a separate supply chain. PMI plans to continue to support a parallel supply chain that distributes USAID-procured health (e.g., family planning) and malaria specific commodities, though costs to operate it are expected to increase and coordination of malaria commodity distribution will be more challenging.

CMS has made limited progress on the roadmap for integration. The supply chain management technical working group in Malawi, which is chaired by HTSS and USAID, recently established a committee to oversee implementation of the *Joint Strategy for Supply Chain Integration*; however, the committee has not yet had an opportunity to meet. The U.S. Mission and other donors have been advocating strongly and the Malawi Health Sector Review Group has now mandated that an initial meeting must occur and a progress update on CMS reform must be circulated by September, 2014.

The CMS continues to face an uphill battle to re-establish its credibility and regain the trust of clients (districts and health facilities) as well as the donor community. Given the limited reforms to date, it is not clear when PMI will be able to transition the warehousing and distribution of malaria commodities to the CMS. The current expectation is that this will occur over a three to five year period, as originally stipulated in the *Joint Strategy for Supply Chain Integration*. PMI, through the U.S. Mission, will continue to advocate strongly for rapid and effective strengthening of the national supply chain system.

Planned activities and justification

PMI remains committed to supporting the operation of the PMI-USAID supply chain and MoH efforts to strengthen commodity management and planning at all levels of the system. PMI and the USG will need to continue to monitor and support the ongoing CMS reform and transition to determine when to reenter the CMS system.

Description and budget for proposed activities (\$2,200,000)

- Provide support for receipt, warehousing, management and oversight, and physical distribution of PMI-procured case management commodities through the PMI supply chain management system directly to the health facility level (\$1,400,000);
- Provide support for technical assistance for MoH pharmaceutical and supply chain management activities including building leadership and human capacity for supply chain management, strengthening district supply chains, supporting efforts to transition to an updated electronic LMIS, enabling appropriate oversight and quality assurance, and ensuring strong coordination between key stakeholders (\$800,000).

5. Monitoring and Evaluation, and Surveillance

NMCP/PMI objectives

The 2011-2015 Malaria Strategic Plan calls for strengthening of surveillance, monitoring and evaluation systems through routine health management information systems, malaria-specific surveillance and special surveys to gather entomologic, epidemiologic, and coverage indicator data. This plan follows the principles of the RBM monitoring and evaluation guidance to provide a comprehensive framework for obtaining reliable and consistent data to assess progress toward

the achievement of universal coverage of malaria interventions and the reduction of disease burden.

Progress since the launch of PMI

National household surveys

The MICS completed in 2006 by UNICEF provides the baseline data for PMI's program. Although it provided information on net ownership and usage, as well as IPTp uptake, it did not include any biomarker data. The NMCP, with assistance from the Malaria Control and Evaluation Partnership in Africa, completed Malawi's first Malaria Indicator Survey in April 2010. The results documented increases in household net ownership, net usage in vulnerable groups, and uptake of IPTp. Nevertheless, high parasitemia (~43%) was noted. PMI provided support to the 2010 Demographic and Health Survey, which provided district-level estimates of under-five mortality and malaria indicators. With FY 2012 funding, PMI supported the second MIS in Malawi. Please see *Strategy, section 8: Progress on indicators to date, page 23* to compare results of these national household surveys.

Health facility and other surveys

Health facility surveys: With FY 2010 and FY 2011 funding, PMI supported nationally representative health facility surveys to assess the quality of case management of uncomplicated malaria in outpatient facilities and severe malaria in tertiary care facilities. Results from the outpatient facility evaluation showed that nearly one-third of patients with uncomplicated malaria confirmed by microscopy were not appropriately treated for malaria, primarily due to missed diagnoses. Results from the tertiary care facility evaluation identified limited availability of medications and diagnostic supplies and knowledge gaps among health workers as key obstacles to providing quality care to patients with severe malaria.

End-use verification surveys: PMI began supporting end-use verification surveys with FY 2011 funds. Initial surveys identified high percentages of facilities reporting stockouts — 38%-55% of facilities with stockouts of three or more days across each AL presentation and approximately 75% of facilities with stockouts of SP. As reporting through the logistics management information system was incomplete and inconsistent, the end-use verification surveys have been an essential tool to help guide and improve inventory management at the health facility level.

Malaria surveillance and routine systems

Health facility surveillance: PMI initially supported health facility surveillance via sentinel sites in Malawi from FY 2007 through FY 2010. However, PMI discontinued support for sentinel sites in FY 2011, based on an evaluation that found a key indicator for data quality — the proportion of suspect malaria cases that were laboratory confirmed — continued to remain low.

The primary system for monitoring the implementation of services for the MoH is the HMIS. The HMIS collects and reports data on 74 core indicators, including outpatient suspected malaria cases and inpatient malaria deaths. However, reporting of malaria cases has been incomplete and inconsistent and has often lacked parasitological confirmation. In an attempt to improve system performance, the HMIS began to transition the information system from DHIS to DHIS 2 in 2009. The DHIS 2 is a web-based system for capturing data at district level; HMIS relies on paper-based reporting at health facility level. While the MoH was overhauling the HMIS, the NMCP was granted authority to develop a parallel reporting system for malaria surveillance in 2011. PMI supported this activity through training of district health management teams in the

parallel system surveillance forms and mentoring visits from the NMCP monitoring and evaluation (M&E) officers.

With support from PMI and other partners, the NMCP worked with the CMED to ensure that appropriate malaria indicators (including commodity indicators) were included in the DHIS 2 malaria-specific platform, thereby reintegrating the malaria parallel surveillance system with HMIS.

With one-time FY 2013 funding, PMI is also supporting the incorporation of malaria-specific data fields into a newly developed electronic medical records system, which would link patient records with laboratory results.

Therapeutic

In vivo efficacy testing: Malawi has monitored the efficacy of its first- (AL) and second-line (ASAQ) antimalarial drugs through *in-vivo* drug efficacy studies. PMI first supported studies in one location (Machinga District Hospital) with FY 2010 funding that also included dihydroartemisinin-piperaquine, a potential future drug for Malawi. Results from this therapeutic efficacy study (TES) have taken longer than expected, due delays in trial initiation secondary to the requirement for trial insurance to receive regulatory approval to use of dihydroartemisinin-piperaquine, and in data analysis due to staffing turnover.

Entomological

Please see the IRS section, pages 35-37, for details of entomological monitoring.

Other data sources

With funding and support from PMI, Malawi and the RBM partnership completed the *Progress and Impact Series* report, which was launched in April 2013. Key findings include a 41% reduction in under-five mortality from 188 to 112 deaths per 1000 live births over the period 1996-2000 and 2006-2010, and modeling, which estimated that approximately 21,600 deaths among children under five years of age were prevented by malaria control interventions.

Table 9: Monitoring and Evaluation Activity Summary Table

Data source	Survey activities	Year										
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Household surveys	Multiple indicator cluster survey	X*†								X*		
	Demographic and Health Survey					X§					X	
	Malaria Indicator Survey					X¶		X¶		X¶		X
	Subnational anemia and parasitemia survey	X	X	X								
Health facility and other surveys	Health facility and related surveys				X**		X††	X††				
	Service provision assessment								X§§			
	End-use verification survey						X	X	X	X	X	X
Malaria surveillance and routine system support	Sentinel surveillance		X	X	X	X						
	Support to malaria surveillance system						X	X	X	X¶¶		
	Support to HMIS		X	X	X	X	X	X	X	X	X	X
Therapeutic	In vivo efficacy testing						X			X		
Entomology	Entomological surveillance and resistance monitoring		X	X	X	X	X	X	X	X	X	X
Other data sources	Malaria impact evaluation								X			

* Not PMI funded

† MICS conducted by UNICEF. Report for 2006 available at

http://www.childinfo.org/files/MICS3_Malawi_FinalReport_2006_eng.pdf. Report for 2014 pending.

§ DHS available at <http://www.measuredhs.com/what-we-do/survey/survey-display-333.cfm>

¶ 2010 MIS conducted with technical assistance from the Malaria Control and Evaluation Partnership in Africa (MACEPA), report available at http://www.givewell.org/files/DWDA%202009/AMF/Malawi_MIS_2010_Final.pdf. 2012 MIS conducted by ICF-MACRO, data and report available at <http://www.measuredhs.com/what-we-do/survey/survey-display-432.cfm>. 2014 MIS supported by the Global Fund with technical assistance provided by PMI and ICF-MACRO.

** Evaluation of IMCI program

†† The health facility survey in 2011 focused on the management of uncomplicated malaria. The subsequent health facility survey in 2012 focused on the management of severe malaria.

§§ SPA was conducted during the last two quarters of 2013 and first half of 2014

¶¶ Additional funding provided for one-time support to develop and incorporate malaria-specific indicators into an electronic medical records data management system.

Progress in the last 12 months

National household surveys

With FY 2013 funding, PMI provided partial support and technical assistance to the third MIS in Malawi. The 2014 MIS was conducted during May-June 2014 and preliminary results are pending at time of writing this report. A second MICS was conducted during the first half of 2014 with support from UNICEF. At time of writing, data are being cleaned and analyzed.

Malaria surveillance and routine systems

PMI continues to support improved data collection at the health facility level and data entry into HMIS using DHIS 2 at the district level. Although the quality of the data and timeliness of reporting have improved, efforts to improve capacity and build sustainability have been limited primarily due to a lack of human resources. System improvements remain dependent on PMI support, which is being provided in 15 of 29 districts.

Health facility and other surveys

Service provision assessment

The 2013-14 SPA was a census of all formal sector health facilities in Malawi. Please see *Strategy, section 9: Other relevant evidence on progress, page 25*.

End-use verification surveys

In collaboration with the NMCP, two rounds of end-use verification survey field visits were completed (Note: the four planned EUVs were reduced to two because of the SPA). The percentage of facilities reporting stockouts of three or more days of first line ACTs and RDTs remained less than ten percent each month (range: 2-10%). Although improving, more than 55% of facilities still are overstocked (i.e., greater than 3-months supply) with ACTs and RDTs (Malawi EUV, December 2013). Additionally, 95% of facilities reported having staff trained in stock management, which may be attributed to the drug store clerks that were trained and deployed with PMI FY13 funding.

Therapeutic: *Antimalarial therapeutic efficacy testing*

With FY 2013 funding, PMI supported a second efficacy study, which will be conducted during May-September 2014.

Entomological: *Entomologic and insecticide resistance monitoring*

The NMCP with support from PMI and input from stakeholders is reviewing the entomological monitoring data to develop an evidenced-based vector control strategy that will guide future entomological monitoring.

Plan and justification

National household surveys

The frequency of national household surveys in Malawi is a concern. Since 2010, there have been five national surveys (2010 DHS, 2010 MIS, 2012 MIS, 2014 MICS, 2014 MIS). In the next two years, there are plans to conduct at least two (2014-2015 AIDS Indicator Survey, 2015 DHS) and possibly three (2016 or 2017 MIS) more. The factors leading to this situation are multiple and complex, and include poor coordination between implementation of program activities and survey timing (e.g., 2012 LLIN mass distribution campaign delayed and effect on ITN ownership not captured in 2012 MIS), various programs requiring information not captured in a planned national survey (e.g., NMCP desiring wet season parasitemia value not captured in

2010 DHS), and poor coordination between programs (e.g., 2014 MICS planned the year before 2015 DHS). PMI continues to discuss this concern with the MoH, NMCP, USAID Mission in Malawi, and other donor partners.

Specific to malaria, the NMCP, PMI and other partners are in a difficult situation. Because ITN ownership and usage were not assessed after the 2012 LLIN mass distribution campaign, it is critical to assess these indicators after the 2015 LLIN mass distribution campaign. PMI will provide partial support to the 2015 DHS; the primary indicators needed from this survey are ITN ownership and usage. Nevertheless, the planned 2015 LLIN mass distribution campaign likely will not occur until at least part way through the 2015 DHS and likely after, based on delays already being experienced with the mass campaign planning, which would make the 2015 DHS results of minimal use for malaria programming. PMI staff discussed with relevant stakeholders the possibility of combining the AIDS Indicator Survey and DHS or delaying the DHS by one year but neither is likely feasible because of the needs of other programs. It would be possible to conduct a post-campaign assessment, likely in March-May of calendar year 2016; however, Malawi also is scheduled to have its fifth MIS in calendar year 2017. Therefore, unless stakeholders choose to delay the 2015 DHS or the LLIN mass campaign occurs without any delay, the NMCP, PMI and stakeholders will need to reconcile plans for a post-campaign assessment and subsequent 2017 MIS. At this point in time, PMI believes the best way forward is to plan for one survey, an MIS in 2016, which would collect ITN ownership and usage and wet season parasitemia values, while continuing to engage in discussions with the NMCP and other partners regarding the timing of other national household surveys.

Health facility and other surveys

There are no plans for additional health facility surveys or SPA at this time. PMI plans to continue to support to quarterly EUV surveys. Additionally, the Malawi USAID Mission integrated platform activity is ending in 2015 and an evaluation is being planned.

Malaria surveillance and routine systems

PMI has been providing support to oversee data collection at the health facility level and data entry into DHIS 2. As data quality at the health facility and district level improves, the HMIS continues to experience issues at the central level. PMI currently provides some technical assistance to health information systems at the central level, although these efforts are focused primarily in 15 districts and national coordination efforts are limited. With FY 2014 funding, PMI will be supporting an outside consultant to provide in-country technical support to review previous system assessments, improve coordination of the HMIS system, and promote additional capacity building.

Therapeutic: Antimalarial therapeutic efficacy testing

Currently, Malawi conducts a TES in three to four sites approximately every two years.⁸ To better utilize existing resources and maintain a cadre of experienced professionals, PMI and the NMCP are discussing the possibility of conducting future TESs in only one to two sites each annually.

Project evaluation:

USAID Malawi plans to conduct an end of project evaluation of the integrated service delivery implementing platform (SSDI) to provide information on the effectiveness of this programmatic

⁸ Malawi policy is to conduct a TES every two years. However, there was a three year interval between the most recent studies conducted in 2011 and 2014.

model and to guide decision-making regarding future service delivery platforms in Malawi. PMI will contribute to this evaluation, along with the other USAID health programs.

Proposed activities with FY 2015 funding (\$2,550,000)

PMI plans to continue to support strengthening of routine health management information systems and malaria-specific surveillance and special surveys to gather entomologic, epidemiologic, and coverage indicator data. The current integrated project will come to an end in FY 2015 so funding will be split between the current partner and the new mechanism. PMI will also provide continued support for LLIN durability monitoring following the 2015 mass campaign, as described in the Insecticide-Treated Nets section.

Specifically, with FY 2015 funding, PMI will:

- Provide complete support for a fourth MIS in 2016 (\$1,100,000);
- Support quarterly EUVs to assess the availability of malaria commodities at health facilities (\$200,000);
- Continue efforts to strengthen routine data collection through training and supervision at health facility level and implementation of DHIS 2 in 15 districts (\$100,000; equally split between current and new mechanisms);
- Expand efforts to strengthen routine data collection through training and supervision at health facility level and implementation of DHIS 2 in remaining 14 districts (\$100,000);
- Continue to support central level aspects of routine HMIS system (e.g., internet connectivity, coordinate activities with CMED) (\$300,000; equally split between current and new mechanisms);
- Continue support for entomologic monitoring with routine surveys of vector density and insecticide resistance testing of mosquitoes in at least three districts (\$350,000);
- Support therapeutic *in vivo* efficacy studies to monitor for the development of antimalarial drug resistance (\$150,000); Support end of project evaluation of the integrated SSDI platform (\$150,000).
- Support LLIN durability monitoring following the 2015 mass distribution campaign (\$100,000).

6. Operational Research

NMCP/PMI objectives

The 2011-2015 Malaria Strategic Plan includes objectives related to operational research through the support of local capacity building. Strong links between NMCP and academic research institutions ensure that results can influence policy and enable researchers to identify program relevant projects. PMI-funded OR has supported systematic data collection activities that provide important data for decision-making, including studies measuring the durability of long-lasting ITNs, the impact of IRS, the effectiveness of the IPTp strategy, the quality of health facility case management practices for uncomplicated and severe malaria, the ability of patients to complete recommended first-line treatment for malaria, the distribution of potentially drug-resistant parasites and mosquitoes and the effectiveness of ITNs in an area with significant pyrethroid resistance.

Table 10: Operational Research supported by PMI Malawi

Completed OR Studies			
Title	Start Date	End Date	Funding Level (US\$)
IPTp effectiveness monitoring	2008	2012	40,000
SP drug resistance markers in pregnant women	2008	2012	0
Health facility surveys: management of uncomplicated and severe malaria	2008	2012	330,000
Pilot study of intermittent preventative treatments for infants	2008	?	150,000
Patient adherence to first-line treatment of malaria	2009	2011	140,000
Pilot study of community ACT use through HSAs	2010	?	200,000
Ongoing and Planned OR Studies			
Title	Start Date	End Date	Funding Level (US\$)
IPTp effectiveness monitoring in areas with high levels of resistance	2015	2017	275,000
SP drug resistance markers in pregnant women	2015	2017	75,000
Evaluation of mobile-telephone text messaging intervention to improve health worker performance	2014	2016	520,000
Pilot evaluation of enhancing the availability of services for first trimester ANC visits	2015	2017	250,000

Progress since the launch of PMI

Since PMI began, OR investments in Malawi have produced important findings that have shaped NMCP and PMI policy and programs, including continued use and monitoring of SP for IPTp in areas with resistance, health facility surveys that informed revision of case management guidelines, and ITN durability that contributed evidence in support of LLIN durability monitoring. The peer-reviewed publications from PMI-supported OR in partnership with the NMCP include:

- LC Steinhardt, J Chinkhumba, A Wolkon, M Luka, M Luhanga, J Sande, J Oyugi, D Ali, DP Mathanga, J Skarbinski (2014). Patient-, health worker-, and health facility-level determinants of correct malaria case management at publicly funded health facilities in Malawi: results from a nationally representative health facility survey. *Malaria Journal* 13:64e.
- LC Steinhardt, J Chinkhumba, A Wolkon, M Luka, M Luhanga, J Sande, J Oyugi, D Ali, DP Mathanga, J Skarbinski (2014). Quality of malaria case management in Malawi: results from a nationally representative health facility survey. *PLoS One* 9(2):e89050.
- J Gutman, D Mwandama, RE Wiegand, D Ali, DP Mathanga, J Skarbinski (2013). Effectiveness of intermittent preventive treatment with sulfadoxine-pyrimethamine during pregnancy on maternal and birth outcomes in Machinga District, Malawi. *Journal of Infectious Diseases* 208(6):907-16.

- C Hershey, D Ali, L Florey, A Bennett, M Luhanga, J Oyugi, Y Ye, G Jenda, C Nielsen, SR Salgado, DP Mathanga, A Bhattarai (2013). Secondary analysis of national and subnational survey data to evaluate the impact of the scale up of malaria control interventions in Malawi, 2000--2010 [meeting abstract]. *Lancet* 381(S2):S60.
- J Skarbinski, D Mwandama, A Wolkon, M Luka, J Jafali, A Smith, T Mzilahowa, J Gimnig, C Campbell, J Chiphwanya, D Ali, DP Mathanga (2012). Impact of indoor residual spraying with lambda-cyhalothrin on malaria parasitemia and anemia prevalence among children less than five years of age in an area of intense, year-round transmission in Malawi. *American Journal of Tropical Medicine and Hygiene* 86(6):997-1004.
- J Chinkhumba, M Nyanda, J Skarbinski, DP Mathanga (2012). Performance of two malaria rapid diagnostic tests in febrile adult patients with and without human immunodeficiency virus-1 infection in Blantyre, Malawi. *American Journal of Tropical Medicine and Hygiene* 86(2):199-201.
- PS Larson, DP Mathanga, CH Campbell Jr, ML Wilson (2012). Distance to health services influences insecticide-treated net possession and use among 6 to 59 month-old children in Malawi. *Malaria Journal* 11:18e.
- KE Mace, D Mwandama, J Jafali, M Luka, SJ Filler, J Sande, D Ali, SP Kachur, DP Mathanga, J Skarbinski (2011). Adherence to treatment with artemether-lumefantrine for uncomplicated malaria in rural Malawi. *Clinical Infectious Diseases* 53(8):772-9.
- J Skarbinski, D Mwandama, M Luka, J Jafali, A Wolkon, D Townes, C Campbell, J Zoya, D Ali, DP Mathanga (2011). Impact of health facility-based insecticide treated bednet distribution in Malawi: progress and challenges towards achieving universal coverage. *PLoS One* 6(7):e21995.
- J Chinkhumba, J Skarbinski, B Chilima, C Campbell, V Ewing, M San Joaquin, M Sande, D Ali, D Mathanga (2010). Comparative field performance and adherence to test results of four malaria rapid diagnostic tests among febrile patients more than five years of age in Blantyre, Malawi. *Malaria Journal* 9:209e.
- DP Mathanga, CH Campbell Jr, J Vanden Eng, A Wolkon, RN Bronzan, GJ Malenga, D Ali, M Desai (2010). Comparison of anaemia and parasitaemia as indicators of malaria control in household and EPI-health facility surveys. *Malaria Journal* 9:107e.
- AI Chibwana, DP Mathanga, J Chinkhumba, CH Campbell Jr (2009). Socio-cultural predictors of health-seeking behavior for febrile under-five children in Mwanza-Neno District, Malawi. *Malaria Journal* 8:219e.
- DP Mathanga, ET Luman, CH Campbell Jr, C Silwimba, G Malenga (2009). Integration of insecticide-treated net distribution into routine immunization services in Malawi: a pilot study. *Tropical Medicine and International Health* 14(7):792-801.

Progress in the last 12 months

PMI and CDC funded a study of the effectiveness of ITNs in a part of the country, Machinga District, with high levels of pyrethroid resistance among *An. funestus* and *An. gambiae s.l.* The first year of the study concluded in mid-2013. The second part of the study, continuing to monitor ITN effectiveness as they age, concluded in December 2013; results of this study are pending but are expected by the end of the calendar year

The primary OR study planned to start in 2014 is the evaluation of mobile-telephone text messaging intervention to improve health worker performance. The start of this study has been

delayed due to delays in a planned NMCP nationwide case management training. Because health worker performance would be expected to improve after such training, the study has been postponed until the trainings are completed.

Plan and justification

The primary focus will be to initiate three OR studies supported with FY 2014 funding: IPTp effectiveness monitoring in areas with high levels of resistance, SP drug resistance markers in pregnant women, and a pilot evaluation of enhancing the availability of services for first trimester ANC visits. In addition, with FY 2014 funding, PMI is providing support to the NMCP to develop a research agenda and data dissemination platform to better coordinate and share research among partners in Malawi (please see Health Systems Strengthening and Capacity Building section for FY 2015 funding for the continuation of this activity).

7. Social and Behavior Change Communication (SBCC)

NMCP/PMI Objectives

The 2011-2015 National Malaria Strategic Plan calls for strengthening advocacy, communication, and social mobilization capacities to move towards optimal coverage for all malaria interventions. As such, the 2011-2015 Malaria Communication Strategy's SBCC goal is to improve community mobilization interventions through advocacy and social mobilization. Advocacy is targeted at the national level to mobilize political commitment and resources for malaria prevention and control efforts, stimulate increased responsibility on the part of community members to adopt malaria control behaviors, and encourage clinicians to adhere to case management and malaria in pregnancy guidelines.

A technical committee was established by the NMCP to support and guide the implementation of the Malaria Communication Strategy. This committee is comprised of key malaria and SBCC stakeholders, including PMI. During major events and/or onetime interventions such as universal LLIN campaigns, task forces under the tutelage of this committee spearhead community mobilization on specific aspects of the intervention being carried out (e.g. logistics, resource mobilization, community engagement, technical direction)

Progress since the launch of PMI

PMI has supported an integrated approach to SBCC focused on ITNs, MIP, and case management since it began its work in Malawi. SBCC activities have focused on national campaigns and door-to-door visits to promote year-round universal LLIN use, large-scale campaigns to emphasize ANC attendance to improve IPTp uptake, and community-based campaigns that emphasized ITN utilization, as well as improved case management through the promotion of earlier care-seeking behaviors.

Although it is difficult to establish a causal link and quantify the contribution of BCC interventions to increased uptake of malaria prevention and control interventions, results from the 2012 MIS suggest that these efforts have been effective in conveying information that led to appropriate health behavior. For example, LLIN utilization among children under the age of five years was 1.5 times higher in 2012 than in 2010 among children that slept in households that own at least one ITN (MIS 2012).

Behavior change communication strategies have been employed from the national to the community level to target policy makers, health care providers, and community members. In

promoting these interventions, PMI has utilized a variety of BCC approaches, including educational meetings, mass media, print media, community drama, and interpersonal communication activities. The small grants program has remained a central component of the BCC strategy to ensure good coverage and reach of BCC activities at household level in all districts where PMI's implementing partners work.

At the national level, PMI has been implementing social BCC activities through an integrated social BCC mechanism at Mission level. The objectives of this project are in line with the NMCP's strategic plan to build capacity of key national institutional partners, strengthen national and community level planning and coordination, develop and produce evidence-based social BCC packages under a multi-level media campaign, and identify and implement best practices. At the community level, teams consisting of HSAs and community health extension workers collaborate with the communities to identify key health issues. The teams then provide solutions to address these issues in an effort to bring about appropriate behavior for improved health outcomes. At the household and village level, communications teams have also concentrated on interpersonal communication activities to promote prevention behaviors including early and frequent ANC attendance, appropriate and prompt health-seeking behaviors and LLIN use.

Progress during the last 12 months

PMI funded activities helped strengthen national-level and targeted district-level SBCC planning and coordination on Essential Health Package priorities. Specific activities included support for: inclusion of SBCC in health sector District Implementation Plans; Health Promotion and Communication technical working group meetings; and the development of a national Health Promotion Policy.

PMI funding also supported the Ministry of Health's efforts to develop and produce evidence-based SBCC packages under a multi-level media campaign to ensure effective, integrated SBCC implementation through mass media and facility and community level. The integrated project developed SBCC strategies and tools like the Social and Behavior Change Communication Strategy and the Community Mobilization Strategy. The following key mass media activities were conducted:

- i) **Malaria-specific messaging:** Four radio spots, which were produced in collaboration with the NMCP and the Health Education Section, promoting use of LLINs, prompt care seeking, and RDTs for diagnosis were broadcast in the most widely spoken languages 3,877 times on the three leading and community radio stations; the radio spots reached an estimated one-quarter of the entire population.⁹ As part of the project's ongoing partnership with United Against Malaria and the Football Association of Malawi, the campaign also featured endorsements by a Malawian soccer star and "around-the pitch" advertising boards during international soccer matches.
- ii) **Cheni Cheni Ncheti (CCN) Radio Program:** Literally translated as "which is which?" CCN is a community-driven reality radio program focusing on key health issues in the community. Broadcasted on 13 radio stations, CCN has gained tremendous followership among rural communities, with 34% of the population listening to it twice a week¹⁰ and community members regularly participating through SMS messages. Malaria issues

⁹ Based on SSDI baseline estimates through Zodiak, MBC 1 and MBC 2 radios only in the 15 SSDI districts

¹⁰ 34 percent listen to it twice a week, SSDI-Communication baseline, 2012

accounted for about 40% of the issues raised and discussed by the community member participants.

- iii) **Moyo ndi Mpamba Campaign:** Informed and guided by the SBCC strategy that was developed during the previous year, SSDI designed a central, integrated BCC campaign platform — *Moyo ndi Mpamba, Usamalireni*, “Life is Precious, Take care of it”. The campaign provides a platform to tie together messages from the six key health topics that SSDI is focusing on (malaria; HIV/AIDS; maternal, neonatal and child health; family planning; water, sanitation, and hygiene; and nutrition). The MoH adopted the campaign as the brand identity for its health communication integration efforts.
- iv) **Community Mobilization Support:** With PMI support, partners trained 120 staff from 15 malaria sub-grantees on Community Action Cycle and provided technical support to Community Mobilization Teams on how to implement the Community Action Cycle. These malaria sub-grantees trained 7,281 community health workers and volunteers in malaria treatment and prevention and reached 1,788,946 men and women with malaria prevention and treatment messages. Roadshows and community drama were also conducted, and BCC-Support Materials (e.g. posters and Family Health Booklet) were distributed to over 600,000 households covering over 80% of the households in the 15 districts.

The integrated project continues to build the capacity of key national-level institutional partners and district-level partners in 15 districts to ensure effective SBCC strategic planning and delivery through on-going technical assistance and monitoring. The media is a crucial partner in promoting malaria prevention and control efforts and can provide a strong platform for advocacy with decision makers, as well as for changing attitudes and norms in the general population. However, airtime and print space are expensive and difficult to sustain in Malawi. *Media for Life* is an innovation for forging a mutually beneficial partnership between the health sector and the media with no or very minimal costs to the MoH and the media partners.

The challenge of meeting both PMI and NMCP targets for malaria prevention and control remains. The 2012 MIS shows that malaria prevention behaviors (e.g., IPTp2, prompt care seeking) remain sub-optimal. This represents an opportunity to intensify community and health provider messaging to improve uptake these intervention.

The GoM has also recently changed its policy for treatment of severe malaria cases at community level. Diagnoses with rapid diagnostic tests as well as pre-referral treatment with rectal artesunate are new concepts at community-level for case management. For optimal policy implementation, PMI BCC activities have been planned to bring about an understanding of acceptability and using that information to foster increased utilization and demand of the new interventions.

Planned activities with FY 2015 funding and justification

PMI plans to continue support for an integrated BCC approach at the national and community level for ITN, IPTp, and case management specific messaging. National level efforts will focus on advocacy, mass media communication, and materials development while community level efforts will focus on interpersonal and small group communication. The integrated project will come to an end in FY 2015. Hence, an evaluation of BCC activities will be conducted and funding has been split between the current partner and the TBD mechanism.

Description and budget for proposed activities (\$1,650,000)

- Integrated national-level BCC activities to improve LLIN use and retention, MIP service uptake, case management (including early care-seeking behavior and treatment adherence) using multi-media approach (\$250,000; equally split between current and new mechanisms)
- Malaria-specific national-level BCC activities to improve LLIN use and retention, MIP service uptake, case management (including early care-seeking behavior and treatment adherence) using multi-media approach. Technical assistance for malaria-specific community-based BCC activities (\$450,000; equally split between current and new mechanisms)
- Community-based BCC activities to improve demand for services and uptake of core malaria prevention and control interventions. Support for small grants to NGOs to improve LLIN use and retention, MIP service uptake, case management (including awareness of RDT testing, early care-seeking behavior and treatment adherence) (\$800,000; \$300,000 to the current mechanism and \$500,000 to the new mechanism)
- Malaria contribution to an evaluation of the effects of integrated BCC messages (\$150,000)

8. Health Systems Strengthening and NMCP Capacity Building

NMCP/PMI objectives

The 2011-2015 Malaria Strategic Plan calls for strengthening capacity in program management at all levels of health service delivery by providing policy direction and leadership, building human resource capacity, mobilizing and utilizing resources more effectively, improving coordination, and strengthening procurement and supply chain management. The NMCP plans to achieve these goals through strong leadership, creation of a supportive environment, improved infrastructure, equipment and supplies, and effective collaboration with partners.

Progress since the launch of PMI

One of the key principles of the GHI is building sustainability through health systems strengthening. Under the Malawi GHI strategy, the USG targets efficient and synergistic improvements across the health sector have been targeted through efforts to train and retain health care workers; incentivize health workers to deliver higher quality services; build capacity of the MoH to effectively utilize the LMIS and improve coordination of donor drug procurement; increase use of affordable and locally sustainable technologies; expand health information systems and link these systems across health programs; and provide broad-based support to the national laboratory system. The USG also has supported the development of leadership and management systems at the ministry and district levels, including systems for human resources, monitoring and evaluation, and finance management.

The 2011-2016 National Health Sector Strategic Plan built upon the sustained gains made under the 2004-2010 Program of Work. Considerable improvements in the delivery of an Essential Health Package have been registered in reducing infant and child mortality rates, pneumonia case fatality and maternal mortality, and in maintaining high immunization coverage, among other areas.

USAID leverages and creates synergies with many other partners and private sector actors. The USG agencies have served as chairs on the Education and Agriculture Donor Groups and the Health Donor Group.

Progress in the last 12 months

In 2014, the GoM and collaborating partners undertook a mid-term review of HSSP to: 1) assess the progress in achieving the outcomes and indicators of the HSSP and related health program's strategic plans in delivery of the Essential Health Package, including working relations with other entities in government and with private providers in the health sector, and 2) measure progress in meeting output targets and indicators as formulated in annual plans and reviews. The HSSP puts an emphasis on primary health care. While overall curative services are improving, services are not yet spread equitably over the country and health promotion and prevention activities are less developed. In the areas of HIV/AIDS, tuberculosis, malaria, and the EPI, high treatment and immunization coverage have been achieved but preventive activities lag behind. Utilization of ANC and postnatal care is not increasing as planned, and quality and availability of essential obstetric care is limited by shortages of skilled human resources, equipment, and transport. In the absence of donor funding, the resources for general health services are minimal and the technical capacities of personnel are limited. Health centers and hospitals are struggling with shortages of medicines and supplies.

In the area of monitoring and evaluation, progress is even slower; systems have been developed, but data quality and analysis remain weak even though several disease control programs implement parallel surveillance systems. In principle, available systems are capable of producing reliable and timely data, but the limited capacity at the facility and district level hinder successful implementation. The M&E system in MoH is not robust enough to handle the multitude of indicators in various programs and CMED does not have the capacity to perform thorough analysis of progress in the health sector, beyond data compilation.

USAID supported the GoM in designing a pilot performance-based incentives project. The performance-based incentives pilot aims to increase the quality and quantity of service delivery by rewarding improved facility performance with facility renovations and other incentives. Implementation of the pilot was delayed until June 2014 and the scope of the planned evaluation was reduced. As such, a portion of the FY 2013 and FY 2014 funding for this activity was reprogrammed.

The Public Financial Management (PFM) reform program will improve the GoM's ability to budget, allocate, expend, track, and report on funding for key health programs, including malaria. After the reforms, the strengthened PFM will enhance donor confidence and help to unlock Global Fund grants — including malaria grants and other donor resources — for implementation of the Health Sector Strategic Plan, which includes malaria prevention and control. The budget for the PFM reform project is \$40 million over 5 years and will be supported by a number of groups within the USAID Mission and several outside donors and administered by the World Bank. Disbursements for PFM reforms are performance driven. The World Bank will lead an annual review to evaluate the achievements of the program against benchmarks established under the M&E framework.

Planned activities

Working closely with other USG programs in Malawi, PMI will contribute to the GHI activities that support the Health Sector Strategic Plan's implementation and lie specifically under USG stewardship. Though PMI continues to address malaria-specific challenges, real and documented progress will require increased attention to strengthening the health system with in-country partners. With FY 2014 funding, PMI will be supporting an outside consultant to provide in

country technical support to review previous system assessments, improve coordination of the HMIS system, and promote additional capacity building. PMI will work with other USG health programs to enhance infrastructure through small-scale improvements, improve health information systems through technical assistance and capacity building, and provide operational and logistical support to the NMCP. To improve commodity security at the health facility level, PEPFAR is providing support to improve storage conditions at select health facilities in Malawi. The improvements are targeted to better utilize and organize existing storage space, increase physical security (e.g., better locks) and account for pharmaceuticals. PMI plans to complement this PEPFAR infrastructure initiative by strengthening commodity tracking and stores management at these selected facilities through expanded supportive supervision and mentoring of pharmacy technicians, pharmacy assistants and health facility in-charges. Finally, PMI plans to provide ongoing support for an operational research and best practices dissemination forum. This forum will also provide an opportunity to revisit and, if necessary, revise the Malawi operational research agenda to be developed using FY 2014 funding.

Description and budget for proposed activities (\$700,000)

- Continue support to an independent consultant to provide technical assistance and build capacity for the HMIS (\$100,000);
- Support to the NMCP for logistical and operational support, including technical working group meetings and basic operations (\$250,000; equally split between current and new mechanisms);
- Provide additional support to PEPFAR contributions to improve commodity security at the health facility level (\$300,000).
- Provide continued support for an operational research and best practices dissemination forum (\$50,000)

9. Staffing and Administration

Two health professionals serve as Resident Advisors to oversee PMI in Malawi, one representing CDC and one representing USAID. In addition, two Foreign Service Nationals work as part of the PMI team as Program Management Specialists in support of the management and administration of PMI activities. All PMI staff members are part of a single inter-agency team led by the USAID Mission Director or his 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 Resident Advisor 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 professional staff works 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, and reporting of results and providing guidance to PMI partners.

The PMI lead in-country is the USAID Mission Director. The two PMI Advisors, one from USAID and one from CDC, report to the Senior USAID Health Officer for day-to-day leadership, and work together as a part of a single interagency team. The technical expertise housed in Atlanta and Washington guides PMI programmatic efforts and thus overall technical guidance for both Resident Advisors falls to the PMI staff in Atlanta and Washington. Since

CDC resident advisors are CDC employees (CDC USDD – 38), responsibility for completing official performance reviews lies with the CDC Country Director, who is expected to rely upon input from PMI staff across the two agencies that work closely day in day out with the CDC Resident Advisor and thus are best positioned to comment on the Resident Advisor’s performance.

The two PMI resident advisors are both based within the USAID health office and are expected to spend approximately half their time sitting with and providing technical support to the national malaria programs and partners.

Locally-hired staff to 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 USG Global Malaria Coordinator.

Planned activities with FY 2015 funding and justification (\$1,940,000)

- Support to CDC for staffing (\$600,000);
- Support to USAID for staffing (\$800,000);
- Support to USAID for administration and technical oversight (\$440,000);
- Support to CDC for eight temporary duty assignments (TDY), including four TDYs to oversee operational research, two for entomological monitoring, one for vector control strategy, and one for M&E to monitor improvements in malaria surveillance and integration of malaria laboratory data in the electronic records system (\$100,000).

Table 1
President's Malaria Initiative - Malawi
Budget Breakdown by Partner - FY 2015

Partner	Geographical Area	Activity	Budget (\$)	%
TBD - Supply Chain	Nationwide	Procurement of LLINs, RDTs, ancillary supplies, ACTs, parenteral artesunate, and rectal artesunate; support PMI supply chain, technical assistance to national supply chain system, and end-use verification surveys	12,450,000	57%
PSI	Nationwide	LLIN distribution, LLIN durability monitoring	\$0	0%
TBD-LLIN	Nationwide	LLIN distribution, LLIN durability monitoring	\$1,410,000	6%
SSDI-Services	Selected Districts	Procurement of ANC ancillary supplies; strengthening of case management services, malaria in pregnancy services (through support for FANC) and routine monitoring and evaluation through HMIS	\$750,000	3%
TBD-Services	Selected Districts	Strengthening case management services, malaria in pregnancy services (through support for FANC) and routine monitoring and evaluation through HMIS	\$900,000	4%
SSDI-Systems	Selected Districts	Strengthening HMIS at the central and district level; provide logistical and operational support to the NMCP; support NMCP attendance at short courses and international meetings; support leadership and management strengthening within NMCP	\$275,000	1%
TBD-Systems	Selected Districts	Strengthening HMIS at the central and district level; provide logistical and operational support to the NMCP; support NMCP attendance at short courses and international meetings; support leadership and management strengthening within NMCP	\$275,000	1%
SSDI-Communications	Selected Districts	Integrated and malaria-specific national-level BCC to improve LLIN use and retention, as well as MIP and case management service uptake; technical assistance for malaria-specific community-based BCC activities; evaluation of BCC activities	\$500,000	2%
TBD-Communications	Selected Districts	Integrated and malaria-specific national-level BCC to improve LLIN use and retention, as well as MIP and case management service uptake; technical assistance for malaria-specific community-based BCC activities	\$350,000	2%
MalariaCare	Nationwide	Strengthening diagnostic services, including microscopy and RDTs, strengthening overall case management and monitoring and evaluation services in non-SSDI districts	\$1,250,000	6%
CDC/Malaria Alert Centre	Nationwide	Entomological monitoring, operations research activities and CDC staffing	\$1,200,000	5%
USAID	Nationwide	USAID staffing and programmatic costs	\$1,240,000	6%
TBD	Selected Districts	Evaluation of SSDI integrated platform	\$150,000	1%
TBD	Nationwide	2016 Malaria Indicator Survey	\$1,100,000	5%
TBD	Nationwide	Assessment of routine malaria disease surveillance system	\$100,000	>1%
TBD	Nationwide	Research and best practices dissemination forum	\$50,000	>1%
Total			\$22,000,000	100%

Table 2
President's Malaria Initiative - Malawi
Planned Obligations for FY 2015

Proposed Activity	Mechanism	Budget		Geographical area	Description
		Total \$	Commodity \$		
PREVENTIVE ACTIVITIES					
Insecticide Treated Nets					
Procurement of LLINs for routine distribution	TBD - Supply Chain	4,300,000	4,300,000	Nationwide	Procure approximately 1,200,000 ITNs for continuous distribution through routine channels
Continuous distribution of LLIN through routine systems	TBD-LLIN	1,310,000		Nationwide	Distribute 1,200,000 ITNs to health facilities through routine distribution systems
SUBTOTAL ITNs		5,610,000	4,300,000		
Indoor Residual Spraying					
		0			
SUBTOTAL IRS		0	0		
Malaria in Pregnancy					
Procurement of supplies for directly observed therapy for IPTp	SSDI-Services	50,000	50,000	Nationwide	Procure ANC supplies (cups and water buckets) to help improve IPTp uptake
Strengthening malaria in pregnancy services through support for focused antenatal care	SSDI-Services	150,000		Selected Districts	Support for the strengthening of the focused antenatal care program and proper implementation of IPTp and LLIN distribution by healthcare workers
Strengthening malaria in pregnancy services through support for focused antenatal care	TBD - Services	150,000		Selected Districts	Support for the strengthening of the focused antenatal care program and proper implementation of IPTp and LLIN distribution by healthcare workers

SUBTOTAL MIP		350,000	50,000		
SUBTOTAL PREVENTIVE		5,960,000	4,350,000		
Case Management					
Diagnosis					
Procurement of rapid diagnostic tests	TBD - Supply Chain	1,450,000	1,450,000	Nationwide	Procure 2,900,000 RDTs for distribution to health facilities and village health clinics
Procurement of ancillary diagnostic supplies	TBD - Supply Chain	150,000	150,000	Nationwide	Procure sufficient ancillary supplies for RDT implementation
Strengthen diagnostic services	MalariaCare	750,000		Nationwide	Support strengthening of diagnostic services to ensure appropriate use of RDTs and microscopy and adherence to test results, including outreach training and support supervision at health facility and community levels
SUBTOTAL -- Diagnosis		2,350,000	1,600,000		
Treatment & Pharmaceutical Management					
Procurement of ACTs	TBD - Supply Chain	2,250,000	2,250,000	Nationwide	Procure approximately 2,200,000 courses of the first-line ACT for use in health facilities and village health clinics
Procurement of parenteral artesunate	TBD - Supply Chain	1,550,000	1,550,000	Nationwide	Procure approximately 550,000 ampoules of parenteral artesunate for the management of severe malaria cases
Procurement of rectal artesunate	TBD - Supply Chain	50,000	50,000	Nationwide	Procure approximately 100,000 rectal artesunate suppositories for the management of severe malaria cases
Strengthen facility and community-based case management services	SSDI-Services	200,000		Selected Districts	Technical assistance for improving case management systems at facility and community level
Strengthen facility and community-based case management services	TBD-Services	200,000		Selected Districts	Technical assistance for improving case management systems at facility and community level

Strengthen facility and community-based case management services	MalariaCare	400,000		Non-SSDI Districts	Technical assistance for improving case management systems at facility and community level
Support for PMI supply chain	TBD - Supply Chain	1,400,000		Nationwide	Support management, oversight and distribution of PMI-procured case management commodities
Technical assistance to strengthen the national supply chain system	TBD - Supply Chain	800,000		Nationwide	Support technical assistance for strengthening the national supply chain system
SUBTOTAL - Treatment & Pharmaceutical Management		6,850,000	3,850,000		
SUBTOTAL CASE MANAGEMENT		9,200,000	5,450,000		
Monitoring and Evaluation					
Malaria Indicator Survey	TBD	1,100,000		Nationwide	Support for 2016 Malaria Indicator Survey
End use verification surveys	TBD - Supply Chain	200,000		Nationwide	Support for quarterly monitoring of PMI-procured commodities at health facility level
Strengthen the routine Health Management Information System	SSDI-Services	50,000		Selected Districts	Support for routine HMIS to improve quality, timeliness, and completeness of data for decision-making.
Strengthen the routine Health Management Information System	TBD-Services	50,000		Selected Districts	Support for routine HMIS to improve quality, timeliness, and completeness of data for decision-making.
Strengthen the routine Health Management Information System	MalariaCare	100,000		Non-SSDI Districts	Support for routine HMIS to improve quality, timeliness, and completeness of data for decision-making.
Strengthen the routine Health Management Information System	SSDI-Systems	150,000		Nationwide	Support for central level aspects of routine HMIS system (support for internet connectivity, coordinate malaria program surveillance activities with CMED, etc.)

Strengthen the routine Health Management Information System	TBD-Systems	150,000		Nationwide	Support for central level aspects of routine HMIS system (support for internet connectivity, coordinate malaria programme surveillance activities with CMED, etc.)
Entomological monitoring	CDC/MAC	350,000		Selected Districts	Continue support to entomologic monitoring
Therapeutic drug efficacy evaluation	CDC/MAC	150,000		Selected Districts	Support an evaluation of therapeutic drug efficacy to evaluate the first-line anti-malarial agent for the treatment of uncomplicated malaria
End of project evaluation for SSDI platform	TBD	150,000		Selected Districts	Support end of project evaluation of integrated SSDI platform
LLIN durability monitoring	TBD-LLIN	100,000		Nationwide	Monitor LLIN durability following the 2015 mass campaign
SUBTOTAL M&E		2,550,000	0		
Operational Research					
SUBTOTAL OR		0	0		
Behavior Change Communication					
Integrated nation-wide BCC activities	SSDI-Communications	125,000		Nationwide	Support for integrated national-level BCC to improve LLIN use and retention, MIP service uptake, case management (including early care-seeking behavior and treatment adherence) using multi-media approach
Integrated nation-wide BCC activities	TBD-Communications	125,000		Nationwide	Support for integrated national-level BCC to improve LLIN use and retention, MIP service uptake, case management (including early care-seeking behavior and treatment adherence) using multi-media approach

Malaria-specific nation-wide BCC activities	SSDI-Communications	225,000		Nationwide	Support for malaria-specific national-level BCC to improve LLIN use and retention, MIP service uptake, case management (including early care-seeking behavior and treatment adherence) using multi-media approach. Technical assistance for malaria-specific community-based BCC activities
Malaria-specific nation-wide BCC activities	TBD-Communications	225,000		Nationwide	Support for malaria-specific national-level BCC to improve LLIN use and retention, MIP service uptake, case management (including early care-seeking behavior and treatment adherence) using multi-media approach. Technical assistance for malaria-specific community-based BCC activities
Community-based BCC activities to improve demand for services and uptake of core malaria prevention and control interventions	SSDI-Services	300,000		Selected Districts	Support for small grants to NGOs to improve LLIN use and retention, MIP service uptake, case management (including awareness of RDT testing, early care-seeking behavior and treatment adherence)
Community-based BCC activities to improve demand for services and uptake of core malaria prevention and control interventions	TBD-Services	500,000		Selected Districts	Support for small grants to NGOs to improve LLIN use and retention, MIP service uptake, case management (including awareness of RDT testing, early care-seeking behavior and treatment adherence)
Evaluation of BCC messaging	SSDI-Communications	150,000		Nationwide	Malaria contribution to an evaluation of the effects of BCC messages
SUBTOTAL -BCC		1,650,000	0		
Health System Strengthening/Capacity Building					
Support for strengthening of monitoring and evaluation platform	TBD	100,000		Nationwide	Continued support to an independent consultant to provide technical assistance and build capacity for the HMIS
Logistical and operational support to NMCP	SSDI-Systems	125,000		Nationwide	Support to NMCP to hold technical working group meetings and support basic operations

Logistical and operational support to NMCP	TBD-Systems	125,000		Nationwide	Support to NMCP to hold technical working group meetings and support basic operations
Strengthening pharmaceutical management at health facility level	TBD - Supply Chain	300,000		Nationwide	Support for strengthening pharmaceutical management at the health facility level
Support for regular research and best practices dissemination forum	TBD	50,000		Nationwide	Continued support for research and best practice dissemination forum
SUBTOTAL - HSS/Capacity Building		700,000	0		
In-country Staffing and Administration					
CDC staffing	CDC	600,000			Support in-country CDC staffing
USAID staffing	USAID	800,000			Support in-country USAID staffing
Administration and oversight (technical)	USAID	440,000			Support USAID programmatic costs
CDC TDY	CDC	100,000			Support eight TDYs assignments including the annual MOP meeting and provide technical assistance for entomology and operational research activities
SUBTOTAL - In-Country Staffing		1,940,000	0		
GRAND TOTAL		22,000,000	9,800,000		