

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



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PRESIDENT'S MALARIA INITIATIVE

ANGOLA

Malaria Operational Plan FY 2017

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ABBREVIATIONS and ACRONYMS

ACT	Artemisinin-based combination therapy
ADECOS	<i>Agentes de Desenvolvimento Comunitário e de Saúde</i> (community health workers)
AL	Artemether-lumefantrine
ANC	Antenatal care
AS-AQ	Artesunate-amodiaquine
CDC	Centers for Disease Control and Prevention
CDCS	Country Development Cooperation Strategy
CECOMA	<i>Central de Compras de Medicamentos e Meios Medicos de Angola</i> (Central Unit for Procurement and Provision of Medicines and Medical Supplies)
CI	Confidence interval
DHS	Demographic and Health Survey
DP	Dihydroartemisinin-piperazine
DPS	<i>Direcção Provincial da Saúde</i> (Provincial Health Directorate)
DNME	<i>Direcção Nacional de Medicamentos e Equipamentos</i> (National Directorate of Medicines and Equipment)
EPI	Expanded Program for Immunization
EUV	End-use verification
FELTP	Field Epidemiology and Laboratory Training Program
FSN	Foreign service national
FY	Fiscal year
GAVI	Global Alliance for Vaccines and Immunizations
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GRA	Government of the Republic of Angola
HMIS	Health Management Information System
IBEP	<i>Inquérito Integrado sobre o Bem Estar da População</i> (People's Wellbeing Inquiry)
iCCM	Integrated community case management
IM	Intramuscular
INE	<i>Instituto Nacional de Estatística</i> (National Institute of Statistics of Angola)
IPC	Interpersonal communication
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
IV	Intravenous
JICA	Japan International Cooperation Agency
LLIN	Long-lasting insecticidal net
M&E	Monitoring and Evaluation
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MoH	Ministry of Health
NGO	Non-governmental organization
MOP	Malaria Operational Plan
MOU	Memorandum of Understanding
NMCP	National Malaria Control Program
OPPM	<i>Oficial Provincial do Programa da Malária</i>
OR	Operational research
PARMA	PMI Antimalarial Resistance Monitoring in Africa

PCR	Polymerase chain reaction
PMI	President's Malaria Initiative
PNDS	<i>Plano Nacional de Desenvolvimento Sanitário</i> (National Health Development Plan)
PSC	Pyrethrum spray catches
PSI	Population Services International
RBM	Roll Back Malaria
RA	Resident advisor
RDT	Rapid diagnostic test
SBCC	Social and behavior change communication
SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine-pyrimethamine
TA	Technical assistance
TES	Therapeutic efficacy study
UC	Universal Coverage
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USP	United States Pharmacopoeia
WHO	World Health Organization
WHOPES	WHO Pesticide Evaluation Scheme

I. EXECUTIVE SUMMARY

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

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

Angola was selected as a PMI focus country in 2005 and activities were carried out throughout the country until 2016. Given the limited progress made in malaria prevention and control to date, PMI decided to transition to a subnational program—starting in fiscal year (FY) 2016. Except for very targeted national interventions, this new approach will concentrate PMI resources on six hyper-endemic provinces (combining for a total population of 3.9 million) which together represent 28% of all malaria cases.

The PMI/Angola program has faced a number of challenges in recent years. To address these critical challenges, PMI has initiated a bilateral dialogue with the Government of the Republic of Angola (GRA) with action-oriented expectations and benchmarks, which is laid out in a draft Memorandum of Understanding (MOU), to be met by September 30th, 2017. To facilitate the accomplishment of these benchmarks, PMI leadership and the U.S. Ambassador agreed to the formulation of a streamlined set of activities for the FY 2017 Malaria Operational Plan (MOP). The main emphasis for FY 2017 will be on implementing a universal ITN distribution campaign and on supply chain improvements. Case management activities will be continued, but will also be streamlined.

This FY 2017 MOP presents an implementation plan for Angola, based on the strategies of PMI and the National Malaria Control Program (NMCP). It was developed in consultation with the NMCP and with the participation of national and international partners involved in malaria prevention and control in the country. The streamlined set of activities that PMI is proposing to support aligns well with the NMCP's strategic plan and builds on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) grants. This document briefly reviews the current status of malaria control policies and interventions in Angola, describes progress to date, identifies challenges and unmet needs to achieving the targets of the NMCP and PMI, and provides a description of activities that are planned with FY 2017 funding.

The proposed FY 2017 PMI budget for Angola is \$24 million. PMI will support the following intervention areas with these funds:

Entomologic monitoring and insecticide resistance management: The NMCP's strategy for malaria prevention has three vector control components: ITNs, spraying (indoor and outdoor), and larviciding. Entomologic monitoring of IRS and ITNs and the effect on the vectors has been mostly implemented by PMI; representatives of the Government of Cuba provide some entomologic monitoring reflective of the larviciding program. PMI supported the construction of an entomology laboratory/insectary in 2014 to support entomologic monitoring and evaluation in Huambo Province; this was the first insectary in Angola since the end of the civil war. PMI has conducted longitudinal entomologic surveillance in former IRS areas, for vector species, abundance, resting behavior, and mosquito malaria infection rates at a total of six sentinel sites in Huambo and Huila provinces.

In light of continued lack of investment in vector control by the GRA at national and provincial levels, PMI has decided to suspend entomologic monitoring support for Angola in both FY 2016 and FY 2017 in order to prioritize funding for the nationwide mass bed net distribution campaign outlined in the ITN section. The planned FY 2015 activities should conclude at the end of 2016. Entomologic monitoring support by PMI will be suspended until the GRA has demonstrated buy-in and uptake of its vector control program. PMI will remain engaged in discussing how to strengthen the Angolan program and monitor progress of the NMCP in their efforts to develop their vector control program. The GRA will not be without entomological support as entomologists from Cuba and Portugal will continue to provide entomological assistance to the GRA.

Insecticide-treated nets (ITNs): The NMCP, with the support of PMI and the Global Fund, has its goal to ensure that 80% of households own at least one ITN, and that 80% of those that own an ITN will sleep under the ITN, particularly pregnant women and children under five years of age. The GRA strategy calls for two approaches for ITN distribution: mass campaign distribution to achieve universal coverage and routine distribution to maintain coverage. The first rolling mass distribution campaign, which started in 2013, is to be completed by the third quarter of 2016.

PMI has procured approximately six million ITNs and distributed approximately 1.8 million ITNs procured by other partners since 2006; however, little progress towards universal coverage has been documented. With FY 2017 funds, PMI will focus on a national universal coverage campaign. PMI will postpone utilizing routine distribution systems until the universal coverage campaign has been completed and the strategy to strengthen these routine channels is developed. A Malaria Indicator Survey (MIS) planned for 2018 will measure key ITN-related indicators with baselines taken from the 2011 MIS and 2015 Demographic and Health Survey + (DHS+).

Indoor residual spraying (IRS): PMI supported IRS in Angola with procurement, implementation, and technical assistance between 2005 and 2014. PMI has now transitioned out of implementation support for IRS; the MoH has not prioritized IRS at the national level and shifted the responsibility for IRS to the provinces and municipalities, where there has been interest but no financial commitment. PMI has focused its efforts to support the MoH with its ITN coverage in areas that previously had IRS and PMI has also collected entomologic indicators in these areas.

No IRS activities are planned with FY 2017 funds.

Malaria in pregnancy (MIP): The NMCP has a three-pronged approach to malaria prevention and control during pregnancy, including IPTp, ITN use, and diagnosis and treatment of clinical illness in line with WHO recommendations. However, the 2011 MIS revealed that only 17.5% of pregnant women reported having taken at least two doses of IPTp during their last pregnancy. In FY 2016, PMI shifted its geographic focus for improving clinical malaria services in Angola, and efforts to improve access to and quality of MIP services to six provinces: Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Uige, and Zaire. Emphasis was placed on mobilizing community health workers to encourage women to access antenatal care (ANC) services and IPTp, and on improving the quality of MIP services at the lowest level of health facilities in these provinces.

With FY 2017 funds, PMI will continue to sustain and build on increasing IPTp rates in Cuanza Norte, Malanje, Uige, and Zaire provinces, as well as adapting best practices experienced in those areas to begin training and capacity building efforts for MIP in Lunda Norte and Lunda Sul. PMI will support health facilities to continue to strengthen ANC services, maintain and expand support for training and supervision, and promote early and regular ANC attendance through community health workers. The 2018 MIS will measure key MIP-related indicators with baselines taken from the 2011 MIS and 2015 DHS+.

Case management: PMI is helping the NMCP to achieve its objectives by 2020 that all suspected cases at health facilities and in the community will be tested for malaria prior to treatment. The NMCP is also committed to the expansion of access to ACTs, with the objective that all malaria cases seen in health facilities and the community be treated in accordance with national treatment guidelines by 2020. The NMCP has also been leading a process to develop a community approach using *Agentes de Desenvolvimento Comunitário e de Saúde* (ADECOS), or community health workers, as part of the health system. Since 2011, PMI conducted malaria case management training sessions for health workers and supported supervisory visits to health facilities in target provinces. PMI also supported therapeutic efficacy studies (TES) in Angola in 2013 and 2015 and plans to implement another in 2017.

With FY 2017 resources, PMI will procure RDTs, ACTs, and severe malaria drugs with the expectation that the GRA will contribute to filling the national gap in commodity requirements. PMI will also provide limited support for training and supervision for case management strengthening and laboratory diagnosis and quality control. In coordination with the Global Fund, PMI will expand support to the ADECOS initiative by supplying RDTs and ACTs. A portion of FY 2017 funds will also go towards the preparation of a 2019 TES.

Health systems strengthening and capacity building: In support of core area five from the PMI strategy, PMI supports the NMCP to strengthen health systems at all levels in order to improve the malaria program's performance and ensure sustainability of PMI's investments. PMI's overall approach

to health systems strengthening is through the provision of technical assistance to various levels of the government in the areas of budget and finance, health management information system (HMIS), human capacity building, and logistics and supply chain management, with a particular emphasis on strengthening provincial malaria program management.

With FY 2017 funding, PMI will continue work to build systems and human capacity for managing and monitoring malaria programs. An emphasis will be placed on strengthening the lower levels of the decentralized health system, to ensure that management improvements have a direct impact on the availability and quality of malaria services. Support will focus on building the capacity of municipal and provincial governments to plan, fund, monitor, and supervise malaria programs. PMI will also continue to support two students to participate in the Field Epidemiology and Laboratory Training Program (FELTP) to focus on malaria activities, and support the Malaria Partners' Forum to assist the NMCP and provinces to coordinate malaria partners.

Social and behavior change communication (SBCC): With the support of PMI, the NMCP is currently revising its strategy for SBCC, to provide a framework to guide and coordinate SBCC activities for malaria in Angola. The revised strategy's main goals are to: define roles and responsibilities of all key actors; identify priority issues and gaps; and provide a basis for multi- and bilateral assistance and intersectoral coordination. Overall, the strategy also addresses misconceptions about malaria in Angola and seeks to improve knowledge in key behaviors essential to achieve sustained malaria control. A national SBCC workshop was held in February 2016 with representatives from across the country to inform the development of the first draft of the national strategy, to be disseminated in mid-2016. A formal SBCC working group will be established to help guide, coordinate, and advocate for rigorous evaluation of SBCC activities. PMI has continued to support both mass and interpersonal communication (IPC) to improve knowledge and change behavior on malaria prevention and care-seeking. Activities included community outreach using face-to-face discussions, drama shows on malaria, and mobile videos; training of health and community workers; radio spots; and printed messages together with those that accompany packaged ITNs and ACTs.

With FY 2017 funds, PMI will fund an SBCC campaign to promote ITN use and care, which will be coordinated with the national universal coverage campaign. Additionally, funds will be used towards the training of ADECOS on malaria prevention at the community level in one focus province, as well as community SBCC to improve prevention of malaria in pregnancy through ANC attendance, promoting ITN use, and receiving at least three doses of IPTp.

Surveillance, monitoring and evaluation (SM&E): Strengthening surveillance, monitoring, and evaluation (SM&E) capacity and using SM&E information for data-based decision-making is a core area of strategic focus under PMI's strategy and a priority for the NMCP. PMI has supported two MIS' (2006/7 and 2011) and a DHS+ that was conducted in 2015. In 2014, together with the NMCP, PMI implemented an enhanced epidemiologic surveillance activity in nine health units in five municipalities across the three PMI-targeted provinces: Huambo and Bailundo (Huambo Province); Lubango, (Huila Province); and Kwanhama and Namacunde (Cunene Province). Findings of this activity demonstrated a lack of interest in surveillance by health facilities' directors, poor standard data collection, non-compliance with malaria testing, and stockouts of RDTs and ACTs.

With FY 2017 funding, PMI will continue to support malaria SM&E within the framework of the National Malaria M&E Plan described in the new National Strategic Plan for Malaria Control (2016-2020). Available funding will be targeted towards improving the country's M&E capacity, data quality

assurance, and using data for decision-making. This will include providing funds for an MIS in 2018 to collect malaria control indicators, continuing end-use verification (EUV) and monitoring of commodity availability and use at the health facility level, and funding a seconded staff member within the NMCP to strengthen SM&E capacity.

Operational research (OR): As part of Angola's national strategic plan through the PNDS, there is a priority list in that guides decisions on operational research (OR). However, to date, only one OR study has been approved by PMI (a study that assesses malaria health-seeking behavior and prevention practices in Southeast Asian migrant worker populations). There are no plans to fund additional OR studies with FY2017 funds, given the new streamlined funding strategy.

II. STRATEGY

1. Introduction

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

In 2015, PMI launched its current six-year strategy, setting forth a bold and ambitious goal and objectives. The PMI Strategy 2015-2020 takes into account the progress over the past decade and the new challenges that have arisen. Malaria prevention and control remains a major U.S. foreign assistance objective and PMI's Strategy fully aligns with the U.S. Government's vision of ending preventable child and maternal deaths and ending extreme poverty. It is also in line with the goals articulated in the draft Roll Back Malaria (RBM) Partnership's *Action and Investment to Defeat Malaria, 2016-2030* and WHO's *Global Technical Strategy: for Malaria 2016-2030*. Under the PMI Strategy 2015-2020, the U.S. Government's goal is to work with PMI-supported countries and partners to further reduce malaria deaths and substantially decrease malaria morbidity, towards the long-term goal of elimination. Angola was selected as a PMI focus country in 2005 and activities were carried out in targeted areas throughout the country until 2016. Given the limited progress made in malaria prevention and control to date, PMI decided to transition to a subnational program—starting in fiscal year (FY) 2016. Except for very targeted national interventions, this new approach concentrates PMI resources on six hyper-endemic provinces (combining for a total population of 3.9 million) which together represent 28% of all malaria cases.

With the recent drop in the petroleum prices, national revenue has fallen and the Government of the Republic of Angola (GRA) has reduced its overall health budget by 25%, which included reductions in support for malaria prevention and control efforts. This situation was further exacerbated by the suspension of the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) malaria grant in March 2015 for financial improprieties.

Over the past 12-18 months, the PMI/Angola team has taken stock of its continued support of malaria control in Angola. After discussion with leadership of the MoH, a Memorandum of Understanding was developed that requires the GRA to meet a series of benchmarks over the next year. Further PMI support to Angola will be contingent on these benchmarks being achieved. To facilitate the accomplishment of these benchmarks, PMI leadership and the U.S. Ambassador to Angola agreed to the formulation of a streamlined set of activities to be supported by PMI for the FY 2017 Malaria Operational Plan (MOP).

The main emphasis with FY 2017 funds will be to implement a universal coverage ITN campaign and support supply chain improvement. Case management activities also will be streamlined.

This FY 2017 MOP presents a detailed implementation plan for Angola, based on the strategies of PMI and the National Malaria Control Program (NMCP). It was developed in consultation with the NMCP and with the participation of national and international partners involved in malaria prevention and control in the country. The streamlined set of activities that PMI is proposing to support fit in well with the national malaria control strategy and plan and build on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund malaria grants recently awarded after the imposed suspension was lifted. This document briefly reviews the current status of malaria control policies and interventions in Angola, describes progress to date, identifies challenges and unmet needs to achieving the targets of the NMCP and PMI, and provides a description of activities that are planned with FY 2017 funding.

2. Malaria situation in Angola

According to the final results from the 2014 population census conducted by the *Instituto Nacional de Estatística* (INE) (National Institute of Statistics of Angola), Angola has an estimated population of 25,789,024, of which 52% are women and 48% are men. The majority of the population (62%) is urban. The country is divided into 18 provinces, 162 municipalities, and 559 communes.

Significant progress has been made in the fight against malaria in Angola, and data from the 2011 Malaria Indicator Survey (MIS) show an almost 40% decline in parasitemia among children under five years of age from the 2006/7 MIS (from 21% to 13.5%). According to the 2011 MIS, the mortality rate for children under five years of age had fallen by 23% over five years, and it is currently estimated at 91 deaths per 1,000 live births. A Demographic and Health Survey + (DHS +) was implemented in 2015, and preliminary results are expected in November 2016.

Nonetheless, malaria continues to be a major health problem and is the principal cause of morbidity and mortality in Angola. Malaria accounts for 35% of curative care demand, 35% of mortality in children, 40% of pre-natal mortality, 25% of maternal morbidity, and causes 60% of hospital admissions in children under five years of age and 10% of admissions of pregnant women (National Health Development Plan [*Plano Nacional de Desenvolvimento Sanitário*] PNDS 2013, annex 4). Furthermore, malaria is a leading cause of low birth weight, and anemia due to malaria is a major cause of morbidity and mortality in both children and pregnant women.

In 2015, there were 3,254,270 cases (2,792,807 confirmed) of malaria reported in the public sector, with 7,999 deaths (NMCP 2015). The majority of malaria cases are caused by *Plasmodium falciparum* (87%), with a portion of cases caused by *P. vivax*, *P. malariae*, and *P. ovale* (estimated at 7%, 3%, and 3%, respectively).¹ Based on current evidence, there are five anopheline species responsible for malaria transmission in the country: *Anopheles gambiae* s.s., *An. funestus*, *An. melas* (in coastal areas), *An. arabiensis* and *An. pharaoensis* (in southern unstable mesoendemic areas). During the first quarter of 2016, the number of cases of malaria increased dramatically to 1,531,629, up from 980,192. Mortality due to malaria during the first quarter of 2016 was double that for the same period in 2015 according to

¹ Fortes, F et al. (2014) *Estudo do Parasita da Malaria em Angola em Assintomaticos, por Tecnicas Comparativas de Microscopia Optica e Biologia Molecular*. (The estimation of *P. vivax* is 2.5-7.0%.)

NMCP data. Although health management information system (HMIS) data are unreliable, and while it is unclear how much of the resurgence might be due to increased health-seeking behavior for fevers or to co-infections with yellow fever, PMI/Angola believes that the increased rains from *El Niño* as well as stockouts of malaria treatments and diagnostics played a key role in the reported upsurge in malaria cases.

The entire Angolan population is at risk for malaria, but there is significant heterogeneity in transmission, with hyperendemicity in the northeast provinces: Cabinda, Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, and Uíge. In the north, the peak malaria transmission season extends from March to May, with a secondary peak in October-November. The central and coastal provinces are largely mesoendemic with stable transmission: Benguela, Bie, Cuanza Sul, Huambo, Luanda, Moxico, and Zaire. The four southern provinces bordering Namibia have highly seasonal transmission and are prone to epidemics. Figure 1, below, depicts the prevalence of malaria in 2011 (MIS 2011); data collected through the 2015 DHS+ are expected in November 2016 and may indicate changes that have occurred over the past four years. Angola is party to two trans-border initiatives for malaria control: the Trans-Kunene (with Namibia) and the Trans-Zambezi (with Botswana, Namibia, Zambia, and Zimbabwe). Angola is a member of the “Elimination 8” countries (along with Botswana, Mozambique, Namibia, Swaziland, South Africa, Zambia, and Zimbabwe).

Figure 1: Malaria Transmission in Angola



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

The government has been investing in health infrastructure and working to expand the health network, emphasizing primary care facilities. It is estimated that about 45% of the population has access to public

health facilities (PDNS, 2013)². However, there are major disparities among provinces in terms of public investment levels, and people travel longer distances to access health facilities in the easternmost provinces. Furthermore, there is notable disparity between urban and rural inhabitants' access to care. Service delivery is also affected by an unbalanced distribution of human resources, stockouts of commodities, and poor infrastructure. Contributing factors to low access to public healthcare include cultural beliefs and reliance on traditional healers and preference of purchasing medicine from private drug sellers without medical consultation.

The Angolan National Health System has three levels of care: primary care, in which basic care is provided through health posts, health centers, and municipal hospitals; secondary care, in which care is provided through general (provincial) hospitals; and tertiary care, in which specialized care is provided through central hospitals in the capital city of Luanda. The public health network is composed of a total of 2,356 health units, including: (i) 1,650 health posts; (ii) 331 health centers; (iii) 43 maternal and child health centers; (iv) 165 municipal hospitals; (v) 25 provincial hospitals; (vi) 20 central/national hospitals, of which 15 are in Luanda, 2 in Benguela, 2 in Huambo, and 1 in Huila; (vii) 39 national level health facilities; and (viii) 83 non-classified health facilities. While the GRA has prioritized increasing human resources for health (and the number of doctors tripled between 2005 and 2009), there is still a critical shortage and inequitable distribution of health workers.

The MoH currently has four levels of administration: the national, provincial, municipal, and health facility. The central level includes the National Directorate of Public Health of the MoH (where the NMCP is located), where national guidelines and norms are elaborated, adapted, or adopted, and the national technical direction is set. The provincial level, which includes the *Direcção Provincial da Saúde* (Provincial Health Directorate [DPS]), is responsible for coordinating all health activities in the province and providing oversight to the general (provincial) hospitals. The municipal level provides technical and operational directives to municipal hospitals, local health centers, and posts. The administration of each health facility provides direct supervision for the day-to-day operation of the health unit and health staff, but each facility depends on the municipality for budget and procurement.

The government recognizes the need to extend health services to the community level and to adopt integrated community case management (iCCM). The NMCP has been leading a process to develop a community approach using *Agentes de Desenvolvimento Comunitário e de Saúde* (ADECOS) (community health workers) as part of the health system. In 2014, the ADECOS national policy framework was jointly developed by the Angolan Ministry of Territorial Administration and the MoH, and has been approved by both ministries. The policy was presented to the council of Angolan ministries for final approval and adoption and implementation. Currently, the main objectives of the ADECOS are to increase awareness in the community of health prevention interventions, such as basic malaria prevention activities (e.g., use of ITNs, early treatment-seeking, and compliance with diagnostic outcomes), as well as vaccination, improved sanitation, access to safe water, etc. Implementation is scheduled to begin in September 2016 in 18 municipalities in 7 provinces, with a target of 1,080 ADECOS trained initially (14,100 by 2018). The planned three-month curriculum includes training on providing some basic services including testing with rapid diagnostic test (RDTs) and administering ACTs. Severe cases are to be referred to the nearest health facility. ADECOS will be linked to municipal health centers, where integrated health teams will be responsible for performing routine supervision. Salaries and operational costs are to be covered by the Ministry of Territorial Administration. Roll out of

² According to the WHO, access to health services is calculated as the percentage of population living within 5 km of a health facility (total number of health facilities per 10 000 population).

ADECOS is likely to take longer than originally planned. The launch of the ADECOS program has already been delayed by one year, due to the delays in approval of the plan by the GRA. One factor that contributed to this delay is that it is a multi-sectoral intervention; ADECOS will be tasked with assisting their communities in several aspects of development. The policy has now been adopted and was launched in September 2016.

Since the late 1990s, the GRA has embarked upon various degrees of administrative and more recently, fiscal, decentralization. The law now grants municipal governments the authority to budget, manage, and implement their own pools of funds. In an attempt to improve public services, in 2012 the GRA transferred over \$400 million to municipal governments (approximately \$2 million per municipality), mostly to carry out health services. With the economic crisis and ongoing challenges related to having funds flow from the central government to the decentralized level, these funds have been only partially allocated to municipalities (less than 25% of planned). Next to be decentralized are water and education services, where funds will be allocated directly to the municipalities. In 2016, 43.2% of the overall GRA budget went to the social sector, with 5.5% for health. From 2015 to 2016, the overall GRA budget was significantly decreased and consequently the social sector and health portions of the budget have decreased substantially.

In 2013, the GRA approved the National Health Development Plan (PNDS), which outlines the strategy to improve the health system from 2012-2025. This strategy has been costed with technical support from PMI. All municipalities have developed municipal health development strategies, enabling them to plan health activities independently of the provincial level. Although these strategies were expected to be funded through the Ministry of Finance's decentralization budget for municipalities, budget cuts have resulted in very limited if any funding for strategy implementation.

Prior to the interruption of the Global Fund grant in July 2015, the NMCP was composed of a core central technical group at the national level, including specialists responsible for epidemiology, parasitology, entomology, case management, malaria in pregnancy, monitoring and evaluation, and behavior change communication, as well as for administration and fund management. Forty percent of these staff were previously funded by the Global Fund. Currently, the NMCP does not have the financial means to support the full staff previously supported by the Global Fund. However, now that the suspension has been lifted, the newly awarded Global Fund grant includes financial resources to re-hire at least three advisors: a data manager, a supply chain logistician, and a financial manager. In addition, there are 18 provincial malaria control supervisors (typically health technicians) and malaria municipal supervisors in the municipal health directorate staff who are responsible for institutional support in planning, implementing, and managing malaria activities at these levels. Until 2014, the Global Fund had seconded one provincial official for malaria in each of the 18 provinces to support the malaria provincial supervisors. Funding for these positions ended, and the GRA did not integrate these personnel into the government-funded health system. The Global Fund is expected to restart funding these 18 provincial supervisor positions again under the newly awarded grant. Entomology core teams (34 technicians trained in entomology) have been created at provincial and municipal levels to conduct routine entomologic monitoring. A national insectary has been installed by PMI in the province of Huambo but has not been recently used because of the lack of human resources at the provincial level. PMI trained two basic entomologists with the aim that they will be funded by the provincial health system to maintain the insectary—however, the provincial government has yet to hire them. A consultative reference group, the National Technical Committee for Malaria, has been constituted to provide technical assistance to the NMCP.

4. National malaria control strategy

The general objective of the National Malaria Strategic Plan (2016-2020) is to reduce malaria-related morbidity and mortality by 60% by 2020, from 2012 baseline figures. The strategy includes the following objectives and targets:

Prevention of Malaria: The NMCP's strategy for malaria prevention has four main components: ITNs, prevention of malaria in pregnancy, spraying (indoor and outdoor), and larviciding.

- (1) The GRA strategy calls for two approaches for ITN distribution: mass campaign distribution to achieve universal coverage (UC) and routine distribution to maintain coverage. At the time of writing, the rolling mass distribution campaign, which started in 2013, was still underway, and three provinces (Benguela, Huila, and Uige,) are being covered by PMI in 2016. Routine distribution of ITNs occurs through the following channels: (i) distribution through antenatal care clinics (ANC) and the expanded program for immunization (EPI), and (ii) outreach services for communities with no or little access to health services, such as mobile municipal health units and municipal health days.
- (2) In addition to distributing ITNs to pregnant women to help prevent malaria in pregnancy, the national policy calls for provision of IPTp with sulfadoxine-pyramethamine (SP) at all health units with ANC services. The target is that by the end of 2020, at least 80% of pregnant women with access to ANC and targeted for IPTp receive at least three doses of IPTp with SP.
- (3) The NMCP strategy calls for indoor and outdoor residual spraying to be implemented in targeted areas of epidemic risks and low transmission.
- (4) Larviciding is financed exclusively by the GRA with technical support from the Cuban government.

Malaria Case Management: In accordance with WHO guidelines, Angola's strategic plan recommends that all suspected cases of malaria be diagnosed parasitologically, using either microscopy or RDTs. Only positively confirmed malaria cases should be treated with an ACT. The country has three alternative first-line ACT treatments: artesunate-amodiaquine (AS-AQ), artemether-lumefantrine (AL), and dihydroartemisinin-piperaquine (DP). National treatment guidelines for severe malaria recommend (in order of preference) injectable artesunate, intramuscular (IM) artemether, and injectable quinine. Injectable quinine continues to be the most commonly used treatment for severe malaria nationwide, and oral quinine is also commonly used for treatment of uncomplicated malaria, particularly during stockouts of ACTs. Currently, malaria case management is only provided at the health facility level. However, the NMCP plans to extend it to the community level through the ADECOS program. The MoH approved the community case management policy for a pilot in some municipalities. The ADECOS program is a community development program consisting of workers at the community level providing education, BCC, and basic support related to health, water and sanitation, and other community development initiatives. The GRA is launching the ADECOS program on a large scale, with support from the EU. iCCM is not included in the standard package of services that ADECOS are trained to or expected to provide. However, both PMI and the Global Fund are supporting pilots of iCCM in different provinces, utilizing the ADECOS as a platform. The PMI pilot is not implemented in parallel, but is intended to inform future MoH strategies. We anticipate that the PMI pilot will provide examples of best practices and systems for quality assurance to the MoH and the Global Fund-supported pilot.

Monitoring and Evaluation and Epidemiologic Surveillance: The NMCP has developed a Monitoring and Evaluating (M&E) Plan described in the National Strategic Plan for Malaria Control

(2016-2020). The NMCP has had a focal point for M&E at the national level in the past. Due to a lack of NMCP staffing, PMI now collects morbidity and mortality data from health facilities and administrative and managerial levels, integrating not only malaria related data but also data on logistics and essential malaria drugs provision and consumption. At each province, there is a malaria supervisor. At the municipal level, there is a malaria municipal supervisor who regularly collects data and transmits them to the national program, through the provincial level.

The GRA is working to strengthen its epidemiology surveillance system. The National Epidemiological Surveillance System collects weekly reports on clinically diagnosed cases of malaria from the four epidemic-prone provinces in the south— Cunene, Cuando Cubango, Huila, and Namibe. However, since not all districts report on a regular basis and there are delays in releasing reports to the NMCP, these weekly data are currently of limited value for detecting and containing malaria epidemics. Nonetheless, the strategy's target is that by the end of 2020, 100% of eligible municipalities of the southern provinces of Angola (Cuando Cubango, Cunene, Huambo, Huila, and Namibe) will be at the pre-elimination phase. In 2015, these provinces currently accounted for 13% of all reported malaria cases in Angola.

Procurement and supply management: The National Program of Essential Drugs revised the content of national essential drugs kits for health posts and for health centers in 2012. Antimalarial drugs, including ACTs, rectal artesunate, and SP are delivered to health facilities through these drug kits; RDTs and injectable artesunate are still individually distributed. The number of kits received by each health facility and the frequency of reception are based on consumption and availability. Municipal, provincial, and central (national) hospitals are accorded budgets and are responsible for procurement of their own health commodities. Stockouts of malaria commodities at all levels are common.

The *Central de Compras de Medicamentos e Meios Medicos de Angola* (Central Unit for Procurement and Provision of Medicines and Medical Supplies; CECOMA) is the part of the Angolan Ministry of Health (MoH) that has responsibility for the acquisition, storage, and distribution of drugs and medical supplies. CECOMA has a central warehouse located in Luanda and three regional warehouses.

Due to theft in past years of large quantities of PMI-funded commodities from the central warehouse, PMI uses a parallel system to distribute its commodities. The Global Fund also uses a parallel system for the warehousing and distribution of malaria commodities in Angola.

5. Updates in the strategy section

- PMI has shifted its geographic scope to focus implementation of prevention and case management activities, as well as prioritize the distribution of commodities, in hyper-endemic provinces in the north and east (Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, and Uige), and an adjacent province classified as meso-endemic stable (Zaire) while maintaining strategic health systems strengthening investments at the national level.
- A nationwide ITN coverage campaign is planned to be completed over 12-18 months. The provinces of Benguela, Huila, and Uige, where campaigns are currently underway, will not be included in this upcoming nationwide campaign.
- In light of continued lack of investment in vector control by the GRA at national and provincial levels, PMI has decided to suspend entomologic monitoring support for Angola in both FY 2016 and FY 2017 in order to prioritize funding for the universal coverage campaign.
- Angola's negotiations for the new Global Fund grant have been completed and the new grant will run from July 2016 to June 2018.

6. Integration, collaboration, and coordination

Funding

Funding for malaria control in Angola is provided by the GRA, private partners such as the ExxonMobil Foundation and Chevron, PMI, and the Global Fund. The consolidated Global Fund Round 7 and Round 10 granted ended in March 2015; the GRA has signed a new grant with the Global Fund which started in July 2016 and will end in June 2018. While the GRA has historically also received malaria contributions from the World Bank, WHO, UNICEF, Japan International Cooperation Agency (JICA), the Cuban Government, the Spanish Cooperation, the Global Alliance for Vaccines and Immunizations (GAVI), and private partners, PMI and the Global Fund are currently the only significant donors for malaria in Angola.

The overall Angolan budget for health in 2016 is approximately \$635 million, with the National Endemic Diseases Program including the NMCP receiving approximately \$4.1 million. These funds are used for commodity procurement, larviciding, training and capacity building of health personnel, and general operational costs. National hospitals in Luanda, provincial hospitals, and some municipal and provincial governments receive budgets directly from the GRA, which also contribute to malaria prevention and treatment. In addition, the GRA has budgeted \$2 million per year to each municipal government for health programs, including malaria. Because of the ongoing economic crisis in Angola, however, the municipal governments have received less than 25% of planned funding.

The GRA has financial resources to contribute to malaria control and prevention, as well as other important health priorities. Within the framework of the National Health Development Plan, the GRA is costing program areas and allocating more resources to disease prevention. These resources, in conjunction with the process of decentralization, afford an opportunity for the government, especially at the municipal levels, to assume more ownership and financial responsibility for its malaria control program. However, within the context of the drop in oil prices in 2014-2015 and its detrimental impact on Angola's economy, budget allocations for health and malaria were decreased. As a result, the MoH did not purchase malaria commodities, as they had promised, leading to stockouts of ACTs, RDTs, and SP. PMI and the Global Fund were the only organizations who procured RDTs and ACTs in December 2015 and January 2016. During the first quarter of 2016, Angola faced an upsurge of malaria cases and deaths. PMI provided assistance to the GRA to investigate and respond to the reported increases in malaria cases and deaths. Working in collaboration with PMI, the U.S. Ambassador engaged GRA leadership concerning this reported increase in cases. During this time period, the NMCP was unable to provide requested data on commodity gaps needing support and a concrete response plan. PMI offered an emergency procurement of ACTs under the condition that the GRA would also contribute their own domestic resources for a portion of the needed procurement.

Private Sector

Since the launch of PMI in Angola in 2006, the ExxonMobil Foundation has contributed \$6.2 million to support the scale up of ACTs, IPTp, and malaria diagnostics, as well as capacity building and health systems strengthening at health facility, municipal, and provincial levels through PMI. This project was implemented by five non-governmental organizations (NGOs) mainly in eight provinces (Benguela, Cabinda, Huambo, Kwanza Norte, Luanda, Malanje, Moxico, and Uige). Chevron donates ITNs on an *ad hoc* basis.

NMCP Coordination

The NMCP works in close collaboration with other departments at the health directorate, such as Reproductive Health and Maternal and Child Health, on implementation of malaria in pregnancy interventions and Integrated Management of Childhood Illness. There is a continued effort to strengthen working relationships within these departments to coordinate efforts and maximize resources.

The Malaria Partners Forum, made up of civil society and other interested partners focused on malaria, was created in 2007 in order to help the NMCP coordinate partners' activities and minimize duplication of efforts and resources. Currently, there are about 100 members, including the NMCP, PMI, WHO, UNICEF, local and international NGOs and faith-based organization (FBOs), bilateral and multilateral organizations, Angolan military forces, and private sector companies. The Malaria Partners Forum is also present in some provinces, but coordination of malaria activities remains weak at provincial level and varies from province to province. In 2016, ten provinces in Angola have established provincial malaria forums to coordinate the activities of partners.

Within the U.S. Government

PMI contributes 65% of the budget for health activities within the USAID Angola Mission and contributes to a number of integrated programs. PMI supported the NMCP in the revitalization and decentralization process, mainly through the USAID integrated health systems strengthening and NGO strengthening projects. The integrated program assists health managers at the central and provincial levels to set budgets and track progress against them. Both projects have been working with the NMCP to develop or adopt guidelines and with the municipal leadership to develop administrative, financial, and technical capacity to ensure improved access and quality of all health services, including malaria. In 2015, PMI, along with PEPFAR and other partners, made significant financial and technical contributions to the DHS+.

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

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

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

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

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

³ http://whqlibdoc.who.int/publications/2007/9789241596084_eng.pdf

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

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

Activities funded with FY 2017 resources will contribute to these key indicators and progress will be monitored—using results from the DHS 2015 as baseline and MIS 2018 to track progress.

8. Progress on coverage/impact indicators to date

A nationwide MIS was conducted between November 2006 and April 2007 with PMI and Global Fund support. This was the first nationwide health survey in more than 20 years in Angola. At the time, ACT and IPTp implementation had only just begun, so the figures reported for the proportion of children under five years of age receiving an ACT and the proportion of pregnant women receiving two doses of IPTp can be considered accurate baselines for PMI. In the case of ITNs, where a large-scale campaign in seven provinces had occurred several months prior to the survey, families interviewed were asked specifically when they had received their ITNs and an adjustment was made in the calculations to take campaign ITNs into account in estimating the baseline ownership of ITNs.

In 2011, PMI contributed to a second nationwide MIS with an expanded sample size to provide up-to-date information on progress in malaria prevention and treatment activities. A DHS+ that incorporated malaria indicators was implemented in 2015 (preliminary results available September 2016), following the national census of 2014. The results for the major indicators used by PMI include the baseline MIS of 2006/7 and the 2011 MIS outlined in the table below:

Table 1: Key Malaria Indicators in Angola

Indicator	2006–2007 MIS	2011 MIS
% Households with at least one ITN	28%*	35%
% Children under five who slept under an ITN the previous night	18%	26%
% Pregnant women who slept under an ITN the previous night	22%	26%
% Children under five years old with fever in the last two weeks who received treatment with an ACT within 24 hours of onset of fever	2%	12%
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	3%	18%

*The estimated PMI baseline before the 2006 measles-ITN mass campaign was 11%.

The table below shows parasitemia at baseline in the 2006/2007 MIS compared with the 2011 MIS, and demonstrates an almost 40% reduction in parasitemia nationwide from 21% to 14%.

Table 2: Malaria Parasitemia in Angola

Malaria Transmission Zones	% Parasitemia	
	2006–2007 MIS*	2011 MIS
Hyperendemic: Cabinda, Uige, Cuanza Norte, Lunda Norte, Lunda Sul, and Malanje	31%	25%
Mesoendemic stable: Benguela, Bie, Cuanza Sul, Huambo, Luanda, Moxico, and Zaire	26%	15%
Mesoendemic unstable: Cunene, Huila, Kuando Kubango, and Namibe	21%	9%
Luanda (city)	6%	2%
Total (nationally)	21%	14%

*The 2006/7 figures listed here are from the 2011 MIS report and are different than those published in the 2006/7 MIS (erroneous denominator used in 2006/7 report).

All-cause under-five mortality decreased from 118 deaths per 1,000 live births in 2001-2006 to 91 deaths per 1,000 live births in 2011. This represents a reduction of under-five mortality by 23%.

9. Other relevant evidence on progress

A longitudinal assessment of mortality trends and exploration of associated factors in Northern Angola was published in 2016. This household survey collected demographic events (including births and deaths) with verbal autopsies for a population of 60,000 in Dande municipality (Bengo Province) at least twice a year between 2009 and 2012. The study found that malaria was the most common cause of

death. Malaria deaths ranked first among children under five (34%) as well as for older children ages 4-15 years (39%). Malaria also ranked second (23%) after diarrhea (31%) for children from 28 days to 11 months of age. The under-five mortality rate was 90.9 deaths per 1,000 live births in 2010, 93.6 in 2011 and 71.5 in 2012. Infant mortality rate followed a similar trend with 67.1, 78.4, and 60.2 per 1,000 live births in 2010, 2011, and 2012 respectively.⁴

During the first quarter of 2016, Angola faced an upsurge of malaria cases. Based on HMIS data, the NMCP reported that the number of cases of malaria increased dramatically to 1,531,629, up from 980,192 in the first quarter of 2015. Mortality due to malaria during the first quarter of 2016 was double that for the same period last year according to NMCP data.

⁴ Rosário, Edite Vila Nova, et al. "Main causes of death in Dande, Angola: results from Verbal Autopsies of deaths occurring during 2009–2012." *BMC public health* 16.1 (2016): 719.

III. OPERATIONAL PLAN

PMI's strategy for Angola supports most of the NMCP's strategic goals and priorities and complements the efforts of the GRA and other partners. PMI prioritizes malaria prevention and case management and supports capacity building at all levels of the health system. PMI does not support larviciding or outdoor spraying. Due to high costs, low overall impact, and other GRA priorities, PMI has transitioned away from support for IRS and entomological monitoring. The NMCP and provincial governments have demonstrated that IRS is not a priority by not allocating any funding for IRS program or funding staff for entomological monitoring.

With FY 2017 funding, PMI will focus support for high-impact malaria treatment and prevention activities in northern provinces (Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Uige, and Zaire). In line with USAID's Angola Country Development Cooperation Strategy (CDCS), PMI will continue to emphasize capacity building and health systems strengthening across its interventions and identify opportunities to provide demand-driven technical assistance to the GRA. For example, PMI will continue to build the capacity of the MoH to provide high quality malaria treatment services, procure quality-assured antimalarial commodities, and manage its supply chain for health products.

1. Vector monitoring and control

NMCP/PMI objectives

The NMCP's strategy for malaria prevention has three vector control components: ITNs, spraying (indoor and outdoor), and larviciding. The NMCP's goal, with the support of PMI and the Global Fund, is to cover 80% of the population with one vector control prevention measure (i.e. 80% of households own at least one ITN or house covered with IRS, 80% of households sleep under an ITN the previous night or in a house covered with IRS; and 80% of pregnant women and children under five years of age sleep under an ITN or in a house covered with IRS the night before). Entomologic monitoring of IRS and ITNs and the effect on the vectors has been mostly implemented by PMI; the Cuban government provides some entomologic monitoring reflective of the larviciding program.

The GRA strategy calls for two approaches for ITN distribution: mass campaign distribution to achieve universal coverage and routine distribution to maintain coverage. The rolling mass distribution campaign, which started in 2013, is to be completed by the third quarter of 2016. Routine distribution of ITNs occurs through the following channels: distribution at ANCs and at EPI visits; and outreach services for communities with little or no access to health services such as mobile municipal health units and municipal health days. The NMCP strategy calls for indoor and outdoor residual spraying to be implemented in targeted areas of epidemic risk and low transmission. Larviciding is financed exclusively by the GRA with technical support from the Cuban government.

The objectives of the NMCP are to provide universal coverage of ITNs to all Angolans (one ITN for every two persons), with a special focus on protecting pregnant women and children under five years of age. The routine distribution of ITNs at ANCs continues where available. Both routine distribution of nets and universal coverage campaigns have been supported by PMI. The Global Fund supported malaria activities through the MoH until 2014. The evaluation of ITN durability monitoring has also been incorporated into the national policy.

PMI has supported and continues to support the NMCP's goal of reaching high levels of ITN coverage through procurement and distribution of ITNs. PMI-procured ITNs have been distributed from the central level to the provinces. The promotion of ITN ownership and use through SBCC messaging has also been a strong component of PMI support. PMI has also performed ITN durability monitoring.

a. Entomologic monitoring and insecticide resistance management

Progress since PMI was launched

PMI supported IRS in Angola with procurement, implementation, and technical assistance between 2005 and 2014. PMI and the NMCP covered select municipalities in epidemic-prone provinces along the Namibia border and parts of Huambo Province. PMI transitioned out of implementation support for IRS in 2014 and began collecting entomologic indicators in areas where IRS was previously implemented.

In 2014, PMI supported insecticide resistance monitoring in Bailundo municipality (Huambo Province), where IRS was to be conducted in 2014. The results indicated that there was no resistance in *An.gambiae s.l.* to deltamethrin (a pyrethroid), bendiocarb (a carbamate), or fenitrothion (an organophosphate).

For the monitoring of IRS and ITN programs, a colony of insecticide susceptible mosquitoes is required. There is currently no susceptible colony of mosquitoes in Angola, and this is affecting the ability to monitor the residual effects of IRS and ITNs. PMI supported the construction of an entomology laboratory/insectary in 2014 to support IRS entomologic monitoring and evaluation in Huambo Province; this was the first insectary in Angola since the end of the civil war. The entomology laboratory can support the rearing of mosquitoes and perform basic entomologic activities such as mosquito morphological identification and sample processing. The insectary was constructed from a large container and is located on the grounds of the Huambo Provincial Hospital.

PMI has conducted longitudinal entomologic surveillance in former IRS areas, for vector species, abundance, resting behavior, and mosquito malaria infection rates at a total of six sentinel sites in Huambo and Huila provinces. Since May 2014, there have been four sentinel sites in Huambo Province spread between the three municipalities of Huambo (former IRS area), Caala (non-IRS area) and Bailundo (2014 IRS area). In Huila, there were two sentinel sites in the municipality of Chibaone in a former IRS area and the other in a non-IRS area. Monthly mosquito collections were conducted using Centers for Disease Control and Prevention (CDC) light traps, pyrethrum spray catches (PSCs), and pit traps. In Huila, the number of *Anopheles* collected were low in both sites, ranging from 0 –1.5 mosquitoes/house/day. In Huambo, the highest collections were from Bailundo municipality ranging from 0 –11.4 mosquitoes/house per day, with the highest collections in May and June. Initial analysis by morphological identification of these mosquitoes was conducted at Witwatersrand University, South Africa. However, since this institute has not been able to perform molecular analysis on mosquitoes that are not from the *An. gambiae* and *An. funestus* complex, these samples were sent to the CDC for species identification by molecular analysis in 2015, and additional samples will be sent in 2016.

PMI supported the NMCP's interest in conducting national insecticide resistance studies aimed at establishing provincial and municipal capacity to carry out insecticide resistance monitoring and determining vector resistance in Angola to insecticides currently being deployed. Due to a lack of entomologists and entomology technicians in Angola, PMI has supported developing a cadre of basic entomology technicians via a number of entomology trainings focused on field mosquito collection techniques, mosquito identification, mosquito rearing techniques, and insecticide resistance testing using

the WHO susceptibility tests and the CDC bottle assay. In December 2014, PMI conducted a training for provincial and municipal health authorities for insecticide resistance testing in Benguela, Cunene, Huambo, Huila, Luanda, Malanje, Namibe, Uige, and Zaire. These nine provinces represent the malaria stratification of the three endemic areas of the country. Trainings, conducted with the NMCP, have included personnel from selected provincial and district health authorities and in some instances with personnel from other institutes such as the *Instituto de Investigação Agronomica* in Huambo. These provincial teams have undertaken basic entomology work and engage directly with provincial health directors at the DPS. Thirty-four technicians have been trained in basic entomology monitoring techniques to form these entomology core teams. Due to the financial crisis, these entomologic monitoring capabilities have not been sufficiently funded to be maintained within the public health system. No current entomology staff are funded by the Global Fund nor is there funding in the new Global Fund grant.

Progress during the last 12-18 months

From April 1, 2015, through March 31, 2016, PMI carried out monthly entomological monitoring activities in three sentinel sites over six months. These activities were conducted using CDC light traps, Prokopack aspirators, and PSCs. The three sentinel sites were located in Cunene, Huambo, and Malanje provinces and were selected based on malaria endemicity and conversations with local public health staff. One sentinel site was selected in a specific municipality in each province: Cuanhama municipality in Cunene Province, Mungo municipality in Huambo Province, and Cangandala municipality in Malanje Province.

Assisted by seasonal workers hired to conduct regular entomological monitoring activities, CDC light traps were used in ten houses and two outdoor traps in each sentinel site for one night. Prokopack aspiration collections were also carried out in ten houses in each sentinel site. PSC collections were carried out in five randomly selected houses in each sentinel site per visit. From November 2015 through March 2016, a total of 5,075 *Anopheles* mosquitoes were collected from all three sentinel sites. The majority of these mosquitoes were collected from indoor light traps, followed by the PSC collection method.

Out of all anophelines collected 91% were *An. funestus*, 5% were *An. gambiae* s.l., and 3% were other anophelines belonging to nine different species. Out of these nine other species, the majority were *An. coustani* and *An. squamosus*. These mosquitoes were identified using morphological identification keys and PMI expects to send a representative sample for molecular analysis and species confirmation to an external institution. Three individual mosquitoes were unidentifiable.

Collections from the Malanje sentinel site produced 4,328 mosquitoes, the most of all of the sentinel sites. Of these, 94% were *An. funestus* and 5% were *An. gambiae* s.l. From Huambo, a total of 709 mosquitoes were collected, where 77% were *An. funestus* and 5% were *An. gambiae* s.l. Only 38 mosquitoes were collected from the Cunene sentinel site, 92% of which were *An. gambiae* s.l. No *An. funestus* were collected in Cunene during the reporting period. Notable increases in collections were observed in Malanje with each subsequent field visit. This was a trend at the other two sites, but at lower levels.

The PSC collection method resulted in a total of 1,086 anophelines. Of these, 98% were collected in Malanje, while the remainder came from Huambo. Over 90% of the indoor resting mosquitoes collected using PSC were blood-fed. During this period, the number of indoor resting *An. funestus* per house

ranged from 1 to 60 and blood-fed *An. funestus* per human host ranged from < 1 to 21. The same trend was observed among samples collected using Prokopack aspiration in Malanje.

Field work for resistance testing was carried out in two phases in February and March 2015, analysis of data and report preparation were done in the 2015/2016 work plan period. Resistance levels of *An. gambiae* s.l. to five public health insecticides approved by WHOPEs for use in IRS and long-lasting ITN impregnation were assessed. These five insecticides were:

1. Deltamethrin (pyrethroid class);
2. Lambda-cyhalothrin (pyrethroid class);
3. Pirimiphos-methyl (organophosphate class);
4. Fenitrothion (organophosphate class); and
5. Bendiocarb (carbamate class).

These were studied in nine provinces of Angola – Benguela, Cunene, Huambo, Huila, Luanda, Malanje, Namibe, Uíge, and Zaire – using the standard WHO bioassay tube test. Only female *Anopheles* mosquitoes reared from larvae collected from different breeding sites and visually/morphologically identified as *An. gambiae* s.l. were tested.

Table 3. Municipality sentinel sites for national susceptibility study

	Province	Municipalities
1	Benguela	Benguela Sede and Catumbela
2	Cunene	Cuanhama and Ombadja
3	Huambo	Bailundo and Huambo
4	Huila	Chibia and Lubango
5	Luanda	Cacuaco, Kilamba Kiaxi, and Viana
6	Malanje	Kiwaba Ngozi, Kwand-Dia-Baze, Kalandula, and Malanje Sede
7	Namibe	Bibala and Namibe
8	Uíge	Negage, Quitexe, Uíge, and Sede
9	Zaire	Cuimba, Mbanza Congo, N'zeto, and Tomboco

Preliminary results of this study indicate the possible emergence of pyrethroid resistance in Angola, as most of the provinces have shown decreased susceptibility to deltamethrin and/or lambda-cyhalothrin. In the most recent IRS campaigns, pyrethroids were used in five provinces at different times. Bendiocarb (carbamate class) and pirimiphos-methyl (organophosphate class) showed full susceptibility in all provinces where testing was conducted and could be good candidates for future vector control, particularly for IRS. Fenitrothion was only tested in three provinces. Results are presented in Table 4.

Table 4: Percentage 24-Hour Holding Mortality of *An. gambiae* s.l.

	Benguela	Cunene	Huambo	Huila	Luanda	Malanje	Namibe	Uige	Zaire
Deltamethrin	96% (100)	100% (100)	97% (100)	100% (100)	100% (100)	92% (100)	93% (100)	98% (100)	97% (100)
Lambda-cyhalothrin	N/D	92% (100)	N/D	99% (120)	100% (20)	97% (75)	100% (60)	100% (100)	N/D
Bendiocarb	100% (100)	100% (100)	100% (100)	100% (100)	100% (100)	100% (100)	100% (100)	100% (100)	100% (30)
Pirimiphos-methyl	100% (100)	100% (100)	100% (100)	98% (100)	100% (100)	100% (100)	99% (100)	100% (100)	N/D
Fenitrothion	N/D	100% (100)	N/D	98% (100)	N/D	N/D	97% (100)	N/D	N/D

KEY:

Confirmed resistance	Probable resistance	Susceptible
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() No. of mosquitoes tested

N/D – Not Done

Recently, after the new Minister of Health was appointed, the GRA provided a letter of support and authorization to export collected mosquitoes for species identification by molecular analysis.

In light of continued lack of investment in vector control by the GRA at national and provincial levels, PMI has decided to discontinue entomologic monitoring support for Angola with both FY 2016 and FY 2017 funds in order to prioritize funding for the nationwide mass campaign outlined in the ITN section. The planned FY 2015-funded activities should conclude at the end of 2016.

Plans and justification

PMI will suspend entomologic monitoring support for Angola with FY 2016 and FY 2017 funding in light of the GRA's continued lack of investment in vector control. PMI will continue to provide limited, targeted technical assistance to the GRA. The focus of PMI's FY 2016 and FY 2017 resources will be to simplify its efforts and focus on increasing ITN coverage. Entomologic monitoring support by PMI will be suspended until the GRA has demonstrated buy-in and uptake of its vector control program. PMI has developed some parameters on what is needed to reintroduce basic entomological support to the GRA. PMI will remain engaged in discussing how to strengthen its program and monitor progress of the NMCP in their efforts to develop their vector control program. The GRA will not be without entomological support as Cuban and Portuguese entomologists will continue to provide entomological assistance to the GRA while PMI focuses its efforts on increasing ITN coverage through the UC coverage campaign in the interim.

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

No activities planned with FY 2017 funding

b. Insecticide-treated nets

Progress since PMI was launched

Since 2006, over 14 million nets have been distributed in the country through various partners. Multiple partners including the GRA, PMI, the Global Fund, UNICEF, UNITAID, JICA, Malaria No More, and the ExxonMobil Foundation have supported procurement and distribution of ITNs. In addition, there are

full-price nets available in the commercial sector. PMI has procured approximately six million ITNs and distributed approximately 1.8 million ITNs procured by other partners since 2006. Between 2010 and 2013, 5,058,666 ITNs were procured and distributed through Global Fund Rounds 7 and 10, the GRA, PMI, JICA, and Exxon Mobil. Distribution has been accompanied by strong SBCC messaging to build and support a growing ITN culture in Angola.

In 2011, an MIS was carried out in Angola, which provided updates on malaria control efforts in Angola. Key findings included:

- 35% of households own an ITN (an increase from 11% in 2006);
- 26% of all children under five years of age slept under an ITN the previous night;
- 61% of all children under five years of age slept under an ITN the previous night, among households with at least one ITN;
- 26% of all pregnant women slept under an ITN the night prior to the survey;
- 68% of pregnant women in households with an ITN slept under an ITN the previous night.

Since 2014, PMI's ITN focus has exclusively been on campaigns; ANC and EPI distribution are no longer supported by PMI. In spite of considerable investment and effort over the 11 years PMI has been supporting malaria control activities in Angola, little progress towards universal coverage has been seen. The health system in Angola is very weak and routine distribution systems face particular challenges. Therefore, PMI will postpone utilizing routine distribution systems until universal coverage has been reached through one or more universal distribution campaigns, and a coherent national strategy to strengthen routine channels has been developed.

ITN durability was evaluated in Cuanza Sul and Uige provinces beginning in 2011. DAWA Plus 2.0® campaign ITNs were randomly selected and evaluated for ownership, physical integrity, and insecticidal activity over two years of use. Of the 268 households interviewed, ITN ownership decreased after two years post campaign: 70% (95% confidence interval (CI): 63-76%) and 55% (95% CI: 49-61%) retained at least one ITN after one year and two years, respectively. Of ITNs still at the household, hole damage was evident in 87% (95% CI: 78-93%) after one year and 88% (95% CI: 81-94%) after two years. Manufacturer specifications require deltamethrin concentrations of 80.0 mg/m². The median deltamethrin concentration among ITNs declined significantly from 45.7 mg/m² (95% CI: 19.4–79.4) after one year to 27.9 mg/m² (95% CI: 14.8–51.4) after two years (Kruskal-Wallis test, p=0.0007).

Progress during the last 12-18 months

In March 2015, the Global Fund ended its relationship with the GRA due to financial improprieties. The financial, technical, and commodity support provided to the MoH ended. The Global Fund was a major donor of ITN procurements and their absence significantly reduced the number of ITNs provided to maintain high net coverage in Angola. During the last 12-18 months, there was no routine distribution organized by the NMCP but some districts with their funds from the decentralization have purchased nets for the routine distribution. The Global Fund will return to support the GRA in 2016. The new Angolan Global Fund grant includes routine distribution of ITNs. PMI is advocating with the Global Fund and the GRA to shift support under the grant from routine distribution of ITNs to support for the nationwide mass campaign in order to achieve universal coverage. The decision to halt the routine distribution was a decision of the NMCP to reach universal coverage more quickly.

A DHS+ with a malaria module was completed in 2015 and preliminary results have not been released at the time of this writing. New data on ITN coverage and use indicators should be shared to provide a

more recent description of the ITN culture in Angola as well as the impact of the more recent years of ITN distribution in the targeted provinces. In 2015, the GRA procured 800,000 nets for Luanda Province that have been partially distributed as of the writing of this MOP.

PMI incurred large warehouse fees in 2015 due to frequent shortcomings from the Ministry of Health to facilitate passage of ITNs through customs. ITNs procured and imported by PMI were stored at warehouses at the port of Luanda until more than \$300,000 was paid by PMI to remove them. The GRA had committed to preventing long-term warehousing of the ITNs, yet did not facilitate approval to ease customs clearance with minimal warehousing fees. Numerous attempts by U.S. Embassy staff to obtain the proper documentation from the GRA did not produce a quick clearance through Angolan customs. The U.S. Ambassador to Angola and PMI Senior Leadership shared their concerns about this problem with the GRA.

Rolling UC campaigns have been completed in several provinces over the past few years. Approximately 876,000 ITNs were distributed in Malanje in 2013 and 1,000,000 ITNs in Bie in 2014. The Huambo ITN distribution (1,200,000 ITNs) began in October 2014 and was completed in September of 2015. Approximately 541,138 ITNs have been distributed by PMI in Benguela and Uige provinces since October 2015 and have continued through 2016. ITN distribution campaigns were paused during the holidays and some of the rainy season of 2015/16. Upon completion of the distribution of ITNs in Benguela, there was a shortfall of 65,000 ITNs, possibly due to an under-estimate of the population in Benguela Province. Available ITNs were therefore prioritized to higher risk regions within the province. PMI will complete the distribution of ITNs in Uige Province by August 2016. Not all municipalities in all provinces are covered, and distribution took almost one year to cover one province. The ITN distribution in Huila is schedule to take place in late 2016 after delays. PMI will work with the GRA and partners to ensure the remaining fifteen provinces are covered in a sufficient time frame during the upcoming nationwide mass campaign.

Results of a PMI-supported 2011-2013 ITN durability monitoring study were presented to the NMCP in May 2015 and at the American Society of Tropical Medicine and Hygiene meeting in October 2015. Of the ITNs collected at baseline in 2011, 40% did not meet manufacturer's specifications with regards to insecticide content. Of the ITNs found in the households after two years of use, approximately 20% were classified as torn using the WHO classification. In the first year, most of the ITNs lost to attrition were lost for reasons other than ITN damage (e.g. ITNs were donated to other family members or friends). Of the ITNs found in the households after two years of use, approximately 20% did not protect the users adequately, according to the WHO proportional hole index (PHI). The PHI was calculated according to WHOPEPES (2013) guidelines: on each net, every hole was weighted by size and summed as follows to calculate the PHI = (1 x no. size-1 holes) + (23 x no. size-2 holes) + (196 x no. size-3 holes) + (576 x no. size-4 holes). By WHO standards, a PHI of 643 and above indicates that a net is "torn" and protective efficacy for the user is in serious doubt.

Commodity gap analysis

Table 5. ITN Gap Analysis

Calendar Year	2016	2017	2018
Total targeted population ¹	21,650,285	22,234,843	22,835,184
Continuous Distribution Needs (Routine)			
<i>Suspended to focus on the universal coverage mass distribution</i>			
Mass Distribution Needs			
Estimated total need for campaign ²	2,828,800	4,873,677	6,643,847
Partner Contributions			
ITNs carried over from previous year	0	0	1,848,406
ITNs from MoH ³	0	1,000,000	1,300,000
ITNs from Global Fund ^{4,5}	0	1,325,083	1,427,693
ITNs planned with PMI funding	2,828,800	4,397,000	636,204
TOTAL ITNs Available	2,828,800	6,722,083	5,212,303
Total ITN Surplus (Gap)	0	1,848,406	(1,431,544)

Assumptions

- 1) The targeted population for the mass campaign excludes Luanda urban, which is estimated to be about 5,700,000 people. The nationwide mass campaign is scheduled for all remaining portions of Angola's 18 provinces as follows: 2016: three provinces of Benguela, Huila, and Uige (completed). 2017: six TBD provinces (and Luanda peri-urban/rural). 2018: nine TBD provinces. Actual provinces will be identified as planning gets underway.
- 2) Total needs for the mass campaign are calculated as follows: With a 2017 estimated total population of 27,934,843, the population of people living in Luanda urban (5.7 million) will not participate in this campaign (the 800,000 people living in Luanda peri-urban and rural will receive nets in 2017). This leaves us with a 2017 targeted population of 22,234,843. Total nets needed are calculated by dividing total population by 1.8. In 2016, three provinces received ITNs via mass campaign. In 2017 there will be six provinces reached; in 2018 the final nine provinces will receive their ITNs.
- 3) Assumption: GRA will procure the quantities included in its Global Fund concept note
- 4) Assumption that the Global Fund will shift all nets to national mass campaign. Used \$3.65 per net (PMI estimate of net cost in Angola) for additional Global Fund contribution based on available funding.
- 5) Assumption that the Global Fund will shift their net procurement and distribution to cover 25% of the 2018 needs for the national mass campaign. Global Fund estimates for 2017 and 2018 will be updated based on future quantification exercises.

Plans and justification

With only 9 of 18 provinces covered by the rolling UC campaign since 2013, there will be a shift in objective for PMI strategy in ITN distribution in Angola. PMI will focus its strategy to a nationwide mass campaign in all provinces that have not been covered in CY 2016 (15 provinces). PMI will work with an implementing partner to assess bottlenecks and develop a strategy for addressing issues that

have previously hampered ITN distribution. Benguela, Huila, and Uige will be covered by the end of 2016 and this will not be included in the plans for this upcoming nationwide mass campaign. PMI will use reprogrammed FY 2015 and FY 2016 funds and planned FY 2017 funds to procure and distribute ITNs in a nationwide mass campaign. If additional resources are needed, the PMI Angola team will consider reprogramming additional funds to this activity. These ITNs will be utilized for the campaign to take place in calendar year 2017 and 2018 over a 12-18 month period. PMI will work with the Global Fund and the GRA to cover the expected needs of the nationwide mass campaign including social and behavior change communications (SBCC) activities related to the campaign (see SBCC section). With recent ACT purchases by the GRA during the 2016 malaria outbreak and new MoH leadership, there is strong belief the GRA will take a larger role in ITN procurement and distribution. Due to the large undertaking and resources needed for a national campaign, PMI will not support the procurement of ITNs for the routine distribution as planned in the FY 2016 MOP. PMI will provide technical assistance to help quantify needs and plan for the overall distribution strategy with the GRA and other partners. The U.S. Government will request greater assistance from the GRA to facilitate moving the ITNs through customs with minimal costs and delays.

Proposed activities with FY 2017 funding: (\$6,752,234)

1. PMI will procure 636,204 ITNs to be distributed via nationwide mass campaign. This includes distribution costs from the central level down to the provincial level. (\$3,095,520)
2. Planning, supervision, registration, and logistical support for nationwide mass campaign in 15 provinces over a 12-18 month period; this includes distribution costs from the central level down to the provincial level. (\$2,156,714)
3. PMI will support the promotion, planning, and implementation of the nationwide mass campaign from the launch of the campaign as well as continual promotion throughout the 12-18 month distribution. (\$1,500,000)

c. Indoor residual spraying

Progress since PMI was launched

PMI supported IRS in Angola with procurement, implementation, and technical assistance between 2005 and 2014. PMI has now transitioned out of implementation support for IRS; the MoH has not prioritized IRS at the national level and shifted the responsibility for IRS to the provinces and municipalities, where there has been interest but no financial commitment. PMI has focused its efforts to support the MoH with its ITN coverage in areas that previously had IRS and PMI has also collected entomologic indicators in these areas.

PMI first implemented IRS with WHO in Cunene and Huila provinces in 2005. Namibe Province was added in 2006, but, by 2008, both Namibe and Cunene were dropped and Huambo Province (previously a province with high transmission) was added. In 2010, Cunene was again added at the request of the NMCP, in support of Namibia's malaria pre-elimination efforts and as part of the Southern African Development Community plans for the elimination of malaria in the region. IRS was focused in municipalities where there was greatest movement between Angola and Namibia. Since 2005, pyrethroids have been used in all spray campaigns, based on susceptibility testing.

Table 6 shows a list of PMI-supported IRS activities during 2010-2014, including coverage and areas where IRS was used. In these areas where IRS was used, PMI tested for insecticide susceptibility

annually. PMI used the WHO cone bioassay tests to determine quality of spraying activities and decay rates. Since there is not a susceptible colony of *Anopheles* mosquitoes in Angola, WHO cone bioassays have been conducted with mosquitoes collected as larvae from the field, reared to adults and then used for the testing. This method of conducting cone bioassays is not ideal, as confounding factors such as insecticide resistance may make it difficult to interpret the cone bioassay data. This was shown in 2013, when mortality dropped to under 50% at three months post-spraying with deltamethrin in Bailundo municipality. Cone assays immediately after spraying indicated that the quality of spray was adequate. Testing of insecticide potency at CDC confirmed that the quality of insecticide met the required specification. However, insecticide resistance testing using the CDC bottle assay confirmed low levels of insecticide resistance to deltamethrin.

Table 6: PMI-supported IRS activities 2010 -2014

Calendar Year	Name of Provinces Sprayed*	Insecticide Used	Number of Structures Sprayed	Coverage Rate	Population Protected
2010	Huambo, Huila, Cunene	Lamdacyhalothrin	135,856	96%	649,842
2011	Huambo, Huila, Cunene	Deltamethrin	145,264	98%	689,668
2012	Huambo, Huila, Cunene	Deltamethrin	141,782	97.7%	676,090
2013	Huambo, Huila, Cunene	Deltamethrin	98,136	92.1%	419,353
2014**	Huambo (Bailundo Municipality only)	Deltamethrin	14,649	88.7%	58,370

*In each province, only selected municipalities were sprayed, thus the whole province did not receive IRS.

** 2014 was the final year PMI supported implementation of IRS in Angola.

Progress during the last 12-18 months

Neither PMI nor the NMCP have implemented IRS since 2014. Entomologic monitoring has been done in areas previously covered by IRS. Please see the Entomologic Monitoring section for more information on resistance monitoring in these areas.

Plans and justification

PMI will be ready to provide technical assistance when the NMCP or the provinces return to implementing IRS and request assistance. In the meantime, no IRS-specific activities are planned.

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

No IRS-specific activities are planned.

2. Malaria in pregnancy

NMCP/PMI objectives

The NMCP has a three-pronged approach to malaria prevention and control during pregnancy, including IPTp, ITN use, and diagnosis and treatment of clinical illness in line with WHO recommendations.

According to its strategic plan, the NMCP has the following objectives for malaria in pregnancy (MIP):

- By the end of 2020, at least 80% of pregnant women sleep under an ITN.
- By the end of 2020, 80% of pregnant women have access to prenatal consultations and those eligible for IPTp receive at least three doses of SP.
- By the end of 2020, at least 80% of all patients with malaria receive diagnosis and treatment conforming to national standards at all levels of the health system.

Progress since PMI was launched

The 2011 MIS found that only 17.5% of pregnant women reported having taken at least two doses of IPTp during their last pregnancy, representing a significant increase up from 2% in 2007. In 2013, in accordance with the new WHO guidelines, the NMCP adopted the new IPTp policy: that IPTp be given to all pregnant women in areas of moderate to high malaria transmission at every scheduled ANC visit, except during the first trimester. This policy currently applies to the entire country, including epidemic-prone areas in the south. Data from the reproductive health department's routine information system states that the policy is being implemented in all units with prenatal appointments in operation.

However, most health centers do not provide ANC services and do not provide IPTp. Nationally, 848 facilities provide ANC, out of a total of 2,350. The Health Facility Survey showed that the proportion of facilities that manage SP distribution was 79% in Huambo Province and 54% in Uige Province.

According to *Inquérito Integrado sobre o Bem-Estar da População* (People's Wellbeing Inquiry [IBEP 2008/9]), less than half of all pregnant women attend four or more antenatal visits, and only 42% of births occur in a health facility, due to limited access. Services provided at ANC include IPTp, iron folate (5 mg dose), and BCC to promote prevention and treatment of MIP. ITNs are distributed through ANC services on an *ad hoc* basis, supported by local governments and health facilities in some areas.

With regard to the treatment of uncomplicated malaria in pregnancy, the NMCP's policy is to administer oral quinine during the first trimester and ACTs during the two last trimesters of the pregnancy. For severe malaria, the first-line treatment is intravenous (IV) artesunate, with IM artemether as second-line treatment, and quinine IV as third-line treatment. However, since artesunate and artemether are often not available, quinine IV is the treatment most often administered.

PMI has been training health providers in MIP since October 2011 in eight provinces: Benguela, Cuanza Norte, Cuanza Sul, Huambo (replaced with Bie midway through the project), Huila, Malanje, Uige, and Zaire. PMI has trained a total of 1,206 nurses on MIP since 2011. PMI collaborated with the NMCP, the Reproductive Health and the HIV departments to update the *National Protocol for Malaria in Pregnancy* and developed a new training manual based on the new policy adopted in 2013. PMI-supported advocacy around the issue of promoting IPTp and ANC contributed to Angola's increase in ANC service locations, up from 408 in 2012 to 848 in 2015.

Progress during the last 12-18 months

The 2015 NMCP data indicate that of 1,160,018 pregnant women who made their first prenatal care visit, 47% received the first dose of IPTp, 35% the second dose, 14% the third dose, and 4% the fourth dose. Routine HMIS data indicates that 47% of pregnant women in the eight PMI target provinces received at least two doses of IPTp in 2015. While this is a significant increase from the 2011 baseline, it actually represents a decrease from the 2014 figure of 51%. Reported stockouts of SP at the facility

level have impeded progress. PMI hopes to address these weaknesses through greater investments in improving the supply chain at all levels (see Pharmaceutical Management section).

The GRA continues to reaffirm its commitment to procure SP for IPTp. Based on discussions with the NMCP, PMI anticipates that the GRA will be able to procure sufficient amounts and PMI will continue to work with all levels of the supply chain to ensure that there are not stockouts at health facility level. Since PMI does not procure SP in Angola, an SP commodity gap analysis table has not been included in this MOP.

In 2015, PMI trained a total of 1,313 health workers on MIP and distributed MIP protocols to facilities throughout the eight target provinces. PMI also supported provincial and municipal health staff to conduct supervisory visits for quality assurance and on-the-job training on MIP, using tools created by PMI programs. In addition to best practices for IPTp, ANC nurses were also trained to provide SBCC on the correct use of ITNs by pregnant women. At the end of FY 2015, PMI found that 71% of health workers in the target provinces can provide correct information about when pregnant woman should begin IPTp, up from 65% in FY 2013. However, there is an exceedingly high rate of turnover of health workers in rural health facilities (mainly because the government does not consistently pay salaries). In addition, not all health workers work five days a week, which increases the total number of individuals to be trained at each health facility. For this reason, continuous in-service training is required.

Beginning with FY 2016 funding, PMI is shifting its geographic focus for improving clinical malaria services in Angola, and efforts to improve access to and quality of MIP services will be focused in six provinces: Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Uige, and Zaire. An emphasis will be placed on increasing the role of community health workers in encouraging women to access IPTp and on improving the quality of MIP services at the lowest level of health facilities in these provinces.

Table 7. Status of IPTp policy in Angola

WHO policy updated to reflect 2012 guidance	2013
Status of training on updated IPTp policy	In process
Number of health care workers trained on new policy in the last year	349 (full 3-day training) 964 (1-day training)
Are the revised guidelines available at the facility level?	Yes – in PMI-supported facilities
ANC registers updated to capture three doses of IPTp-SP?	Yes
HMIS/ DHIS updated to capture three doses of IPTp-SP?	Yes

Plans and justification

This year the GRA has committed to procuring 100% of SP needs in 2017, and has conducted a national quantification exercise that includes needs for SP. They will be using that quantification to plan their procurements. PMI will closely monitor the procuring of SP. PMI will continue to sustain and build on increasing IPTp rates in Cuanza Norte, Malanje, Uige, and Zaire provinces, as well as adapting best practices experienced in those areas to begin training and capacity building efforts for MIP in Lunda Norte and Lunda Sul. Training for Lunda Norte and Lunda Sul will focus on mastering implementation of the updated IPTp protocols based on WHO 2012 recommendations and appropriate management of malaria in pregnancy. Similar training will be conducted in the other provinces on a smaller scale, in order to replace trained staff due to turnover. PMI will support health facilities to continue to strengthen

ANC services, maintain and expand support for training and supervision, and promote early and regular ANC attendance through community health workers.

Proposed activities with FY 2017 funding: (\$400,000)

PMI will continue to collaborate with the NMCP and Reproductive Health Division to strengthen prevention, diagnosis, and treatment of malaria in pregnancy at municipal and health facility levels and at the community level.

1. Training and supervision of healthcare workers in select provinces, while supporting supervisory structures and quality improvement practices. (\$400,000)
2. SBCC to promote IPTp through interpersonal communication (IPC) and outreach at the community level. (\$0 – costs covered under SBBC section)

3. Case management

a. Diagnosis and treatment

NMCP/PMI objectives

PMI is helping the NMCP to achieve its 2020 objective that all suspected cases at health facilities and in the community will be tested for malaria prior to treatment. The NMCP is committed to the expansion of access to ACTs, with the objective that all malaria cases seen in health facilities and the community be treated in accordance with national treatment guidelines by 2020.

The NMCP equally recommends three first-line antimalarials for the treatment of uncomplicated malaria: AL, AS-AQ, and DP. The recommendations are the same for pregnant women in the second or third trimester. For those in the first trimester, oral quinine (with or without clindamycin) is recommended. For severe malaria, IV artesunate is recommended in facilities able to administer IV medications. In lower level facilities, IM artemether is recommended. IV quinine is the third-line option for treatment of severe malaria, but is commonly used due to unavailability of IV artesunate or IM artemether. For pre-referral treatment of severe disease, country guidelines recommend rectal artesunate suppositories for all ages (including adults) even though this is contrary to WHO guidelines, which specify pre-referral rectal artesunate should be restricted to children under the age of six. Additionally, very little, if any, training for rectal artesunate has been offered nationally. For *P. vivax* and *P. ovale* infections, a course of primaquine in addition to an ACT is also recommended, except during pregnancy.

The GRA recognizes the need to extend health services to the community level and to adopt iCCM. The NMCP has been leading a process to develop a community approach using ADECOS, or community health workers, as part of the health system. The main objectives of ADECOS are to increase community awareness of health prevention interventions, such as basic malaria prevention activities (e.g., use of ITNs, early treatment-seeking and compliance with diagnostic outcomes), as well as vaccination, improved sanitation, access to safe water, etc. The planned three-month curriculum includes training on providing some basic services including testing with RDTs and administering ACTs. Severe cases are to be referred to the nearest health facility. ADECOS will be linked to municipal health centers, where integrated health teams will be responsible for performing routine supervision.

Progress since PMI was launched

PMI has supported the NMCP's transition from routine clinical diagnosis of malaria to laboratory confirmation of all suspect malaria cases. Since 2006, PMI has procured over 25 million ACTs, 10 million RDTs and over 260 microscopes and malaria microscopy kits.

Since 2011, PMI has worked in concert with the NMCP to improve case management in Angola. PMI conducted health worker malaria case management training sessions in eight provinces: Benguela, Cuanza Norte, Cuanza Sul, Huambo (Bie subsequently replaced Huambo as one of the eight provinces), Huila, Malanje, Uige, and Zaire. These sessions have reached: 1) 568 doctors in one-day sessions focusing on ACTs, RDTs, and severe malaria treatment; 2) 6,865 nurses (out of a total 13,958) in three-day sessions focusing on malaria case management fundamentals and 7,348 nurses in a one-day refresher of case management fundamentals; 3) 825 laboratory technicians (out of a total of 1,218) in 10-day sessions focusing on microscopy and RDT use and 1,154 laboratory technicians in two-day refresher sessions; and 4) 905 municipality warehouse managers in three-day sessions and 1,606 in one-day sessions focusing on commodity stocking and management fundamentals.

In addition to these structured educational sessions, PMI also supports supervisory visits to each healthcare facility in the target provinces. The supervisory team is usually composed of a member from the DPS and a member from the municipality, both of whom have received three days of basic training on being a supervisor (e.g., how to use a checklist for malaria metrics). A member from the national level is also sometimes present for these visits (PMI has supported the training and mentorship of 11 national level laboratory trainers and supervisors). Some of the items evaluated during these visits include, but are not limited to: 1) Pharmacy: Malaria medication organization and availability; 2) Laboratory: Technician staffing and availability of reagents, 3) Personnel: Number of doctors, nurses, and other healthcare workers; ability of healthcare workers to adequately demonstrate the use of RDTs and ACTs; 4) Record-keeping: Log book availability and timeliness. Preliminary data from a 2016 health facility survey indicates that supervision is not happening as often as the desired target of twice annually. In Uige, only 69% of healthcare workers received a supervisory visit in the last six months; in Huambo, the percentage was even lower, at 58%. PMI will work with the NMCP and in particular the DPS at the provincial levels to evaluate roadblocks to supervision and focus on increasing the number of quality supervisory visits to improve the quality of case management.

Although data reported through the parallel NMCP reporting and recording system indicate that 85% of suspect cases were tested either by RDT or microscopy in 2014, these data likely significantly overestimate the true testing rate. For example, the 2016 health facility study showed that only 31% and 70% of suspected malaria cases in Huambo and Uige, respectively, were evaluated with an RDT or microscopy. Challenges encountered in Angola include low access of the population to the public health sector, stockouts of RDTs and ACTs, poor capacity of healthcare workers and laboratory technicians, and failure of healthcare workers to interpret test results to correctly prescribe treatment. Challenges specific to microscopy include a lack of laboratory-based training in universities (i.e., strictly textbook-based), unreliable power supply, and stockouts of other supplies including equipment, slides, and reagents, in many health facilities.

PMI supported a therapeutic efficacy study (TES) in Angola in 2013. Another GRA 2004 study found a high (100%) rate of efficacy of both AL and AS-AQ in Huambo Province. The 2013 TES conducted in Uige and Zaire Provinces found PCR-corrected efficacy of DP of 100% in both Uige and Zaire, and a PCR-corrected efficacy of AL of 97% in Uige and 88% in Zaire. Although there was molecular evidence of lumefantrine resistance in Zaire Province, all of the treatment failures were wildtype for the K13 artemisinin resistance marker. Angola participates in the PMI Antimalarial Resistance Monitoring in Africa (PARMA) network, whose laboratory evaluation demonstrated that all treatment failures were

wildtype for K13 (the mutation associated with artemisinin resistance), but all AL treatment failures had *pfmdr1* haplotypes previously associated with decreased susceptibility to lumefantrine. The aforementioned TES and PARMA results indicate a parasite population sensitive to artemisinin derivatives.

Progress during the last 12-18 months

PMI provided technical assistance to update the 2015 National Standards for Diagnosis and Treatment. PMI procured and distributed 1.185 million ACTs and 1.7 million RDTs in FY 2015. During this same timeframe, PMI conducted health worker malaria case management training sessions in eight provinces: Benguela, Bie, Cuanza Norte, Cuanza Sul, Huila, Malanje, Uige, and Zaire. These sessions reached in total: 1) 217 doctors in one-day sessions focusing on ACTs, RDTs, and severe malaria treatment; 2) 1,610 nurses (out of a total 13,958) in three-day sessions focusing on malaria case management fundamentals and 1,033 nurses in a one-day refresher course of case management fundamentals; 3) 246 laboratory technicians (out of a total of 1,218) in 10-day sessions focusing on microscopy and RDT use and 550 laboratory technicians in two-day refresher sessions; and 4) 208 municipality warehouse managers in three-day sessions and 582 in a one-day session focusing on commodity stocking and management fundamentals.

Because less than half of Angolans seek care in the public sector, PMI has continued to support a pilot project to provide malaria testing and treatment in private pharmacies. Over the last year, the pilot project providing sales of subsidized ACTs in Huambo Province was expanded to Uige Province. In both provinces, PMI and NMCP were able to successfully negotiate with provincial authorities to allow select private pharmacies to test for malaria using RDTs. In this model, private pharmacies buy RDTs and ACTs from the PMI implementing partner, and then sell a malaria test and treatment “service.” Patients pay a small fee and are administered an RDT, and if positive, the test becomes free if they purchase an ACT. Many private pharmacies have expressed their satisfaction with this approach, and the project is expected to transition to be self-sustaining later this year.

The PMI and WHO-supported TES in 2015 enrolled 586 children, of which 475 (81%) reached a study endpoint. Excluding reinfections, the corrected efficacy at Day 28 was 96.3% (95% CI: 91–100) for the AL arm in Benguela, 99.9% (95–100) for ASAQ in Benguela, 88.1% (81–95) for the AL arm in Zaire, 100% for ASAQ in Lunda Sul. For DP, the corrected efficacy at Day 42 was 98.8% (96–100) in Zaire and 100% in Lunda Sul.

For the first half of 2016, many Angolan hospitals have reported an increase in confirmed malaria cases and deaths. Many of these reports have originated from the capital city of Luanda, but other Angolan municipalities in other provinces have experienced an increase as well. Of the many possible attributable factors for the increase in the number of severe malaria cases and deaths, one of the most evident is an overall lack of malaria commodities, a problem exacerbated by the GRA’s inability to purchase previously agreed-upon amounts of RDTs and ACTs. These 2016 stockouts have occurred despite a recent emergency procurement of RDTs and ACTs by the Global Fund in late 2015 and the arrival of PMI commodities in early 2016 that should have adequately supplied the country for months. In late May 2016, the GRA made a €5.8 million procurement of AL (3.385 million treatments). In response, PMI approved an emergency procurement of 501,210 treatments of AL and 500,000 RDTs.

Commodity gap analysis

The following tables summarize the result of the gap analyses for RDTs and ACTs in Angola.⁵

Table 8: RDT Gap Analysis

Calendar Year	2016	2017	2018
RDT Needs			
Total country population ¹	27,200,431	27,934,843	28,689,084
Population at risk for malaria	27,200,431	27,934,843	28,689,084
Total number of projected fever cases ²	18,442,803	18,940,759	19,452,159
Percent of fever cases tested with an RDT ³	32.8%	36.1%	39.6%
Total RDT Needs⁴	7,552,328	6,845,190	7,706,946
Partner Contributions			
RDTs carried over from previous year	1,450,648	0	2,027,405
RDTs from Government ⁵	0	3,422,595	3,853,473
RDTs from Global Fund ⁶	2,050,000	2,600,000	1,300,000
RDTs planned with PMI funding ⁷	1,700,000	2,850,000	1,926,736
Total RDTs Available	5,200,648	8,872,595	9,107,614
Total RDT Surplus (Gap)	(2,351,680)	2,027,405	1,400,668

Total population figures are based on 2014 census data with a 2.7% annual increase.

- 1) Based on the following population breakdown and number of fevers per age group:
 - a. < 3 years (11.77% of the population); 1.5 fevers/year
 - b. 3-8 years (20.91% of the population); 1.0 fevers/year
 - c. 9-14 years (14.61% of the population); 0.63 fevers/year
 - d. > 14 years (52.71% of the population); 0.38 fevers/year
- 2) Assumes the following percentage of people will have access to public health facilities: 54.6% 2016; 55.6% in 2017; and 56.6% in 2018. This also assumes that 60%, 30%, and 10% of fevers will be assessed by RDT, microscopy, and clinically, respectively in 2016; that 65%, 30%, and 5% of fevers will be assessed by RDT, microscopy, and clinically, respectively in 2017; that 70%, 30%, and 0% of fevers will be assessed by RDT, microscopy, and clinically, respectively in 2018.
- 3) Includes a pipeline of three months.
- 4) The GRA will be expected to procure 50% of the RDT need in 2017 and 2018.
- 5) Global Fund estimates for 2017 and 2018 will be updated based on future quantification exercises. The 2018 estimate only accounts for the first half of the year.
- 6) PMI will procure 25% of the RDT need in 2018.

⁵ These estimates were developed prior to the recognition of the upsurge in malaria cases. In the coming months, these estimates will be revised and appropriate adjustments to commodity requirements will be made.

Table 9: ACT Gap Analysis

Calendar Year	2016	2017	2018
ACT Needs			
Total country population ¹	27,200,431	27,934,843	28,689,084
Population at risk for malaria	27,200,431	27,934,843	28,689,084
Total projected number of malaria cases ²	5,130,548	4,918,532	4,668,207
Total ACT Needs³	6,413,185	4,918,532	4,668,207
Partner Contributions			
ACTs carried over from previous year	0	2,372,181	1,342,708
ACTs from Government ⁴	3,385,000	2,459,266	2,334,103
ACTs from Global Fund ⁵	2,570,556	1,100,000	550,000
ACTs planned with PMI funding ^{6,7}	2,829,810	329,793	1,167,052
Total ACTs Available	8,785,366	6,261,240	5,393,863
Total ACT Surplus (Gap)	2,372,181	1,342,708	725,656

- 1) Total population figures are based on 2014 census data with a 2.7% annual increase.
- 2) Figures are from a national gap analysis, which based numbers on percentage positivity of RDTs and microscopy plus clinically diagnosed cases.
- 3) Includes a pipeline of three months.
- 4) The GRA made a \$5.8 million purchase of 3.385 million treatments of AL in May 2016. They will be expected to procure 50% of the ACT need in subsequent years.
- 5) Global Fund estimates for 2017 and 2018 will be updated based on future quantification exercises. The 2018 estimate only accounts for the first half of the year.
- 6) Although 2,000,000 ACTs were estimated to be purchased in 2016 with \$1.19 million at the time of the MOP writing, the lower cost of ACTs has permitted slightly more, 2,328,600, to be purchased. This amount, plus the 501,210 ACTs bought as an emergency procurement in May 2016, yield the 2016 ACT total of 2,829,810. The 501,210 ACTs will be deducted from the previous 2017 total.
- 7) PMI will procure 25% of the ACT need in 2018.

Plans and justification

The NMCP and PMI participate in a national commodity quantification exercise annually, where the country's total need of RDTs and ACTs is estimated. PMI will procure approximately one quarter of that total required amount of RDTs and ACTs with FY 2017 resources. Consistent with PMI policy, the RDTs will be single-species *Plasmodium falciparum* tests. Based on recent TES results and cost comparisons, PMI will procure the ACT AS-AQ, a move supported by the NMCP; the TES demonstrated a reduced efficacy of AL (attributable to the lumefantrine and not the artemether component), while AS-AQ maintained high efficacy. The goal is for the GRA to fill at least half of the ACT and RDT gap, an objective that has been communicated to the GRA. PMI will support two planning and coordination visits in preparation for the 2019 TES.

The GRA plans to use IM artemether preferentially in peripheral health facilities, while reserving IV artesunate for larger hospitals with the capacity to provide IV treatment. While the GRA remains responsible for the procurement of severe malaria supplies, PMI plans to procure a limited amount, approximately one quarter of the need, of severe treatments to complement the GRA's continued efforts to procure quality-assured parenteral artemisinin derivatives. No rectal artesunate suppositories will be procured with PMI funding due to the low numbers of available community health workers and the current lack of training in this treatment modality.

Since expansion of access to RDTs and ACTs necessarily involves improving case management at the health facility level, PMI will continue to support training and supervision of healthcare workers and laboratory technicians. Capitalizing on the presence of provincial and municipal malaria supervisors, PMI will work to strengthen their capacity to train and supervise healthcare workers on malaria case management. This will involve training the supervisors on formative supervision and supporting them to be able to conduct regular, scheduled supervisions in health facilities in their areas. Similarly, PMI will support and train provincial-level laboratory supervisors to build their technical capacity to properly conduct trainings and formative supervisions, and provide them with logistical support to conduct regular, scheduled supervisions in laboratories in their areas. These activities will be focused in municipalities located in the provinces of Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Uige, and Zaire, although provincial supervisors from all 18 provinces will receive training.

PMI will support the NMCP's plan to introduce iCCM through the ADECOS system, in Lunda Sul and Malanje (municipalities have yet to be determined). This will supplement GRA and Global Fund planned implementation for iCCM to begin in 18 municipalities in 7 provinces, with a target of 1,080 ADECOS trained in 2016 and another 14,100 in 2017. This will include training existing ADECOS to incorporate iCCM into their activities, establishing supervisory systems to ensure quality control and logistics systems to ensure a secure supply of RDTs and ACTs. PMI will also support training of ADECOS in best practices for IPC and SBCC techniques (see SBCC section for details and associated costs). Salaries for ADECOS will not be supplied by PMI.

Proposed activities with FY 2017 funding: (\$6,297,766)

1. *Procurement of RDTs*: Procurement of approximately 1.9 million RDTs for the public sector. (\$655,090)
2. *Procurement of ACTs*: Procurement of approximately 1.2 million treatments of ASAQ for the public sector. (\$536,844)
3. *Procurement of treatments for severe malaria*: Procurement of both IM artemether and IV artesunate to be used in referral centers and larger health centers, respectively. (\$100,500)
4. *Preparation for the 2019 TES*: Two visits to meet with the NMCP, partners, and other stakeholders to discuss and plan for a TES in 2019. (\$30,000)
5. *Strengthen malaria case management*: Training and supporting formative supervision for provincial and health facility workers to improve malaria case management. This activity will also include: (1) training of trainers at the provincial and municipal level of malaria supervisors on conducting formative supervision; and (2) support to municipal level (malaria supervisors) to provide regular supervision visits to health facilities on a quarterly basis. All trainings will be coordinated with the NMCP and will last three to five days. The geographic focus will be the provinces of Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Uige, and Zaire, which together possess more than 650 health facilities. (\$3,825,332)
6. *Training and supervision on laboratory diagnosis (RDTs and microscopy) and quality control*: Training and supporting formative supervision for provincial and municipal laboratory

supervisors to improve malaria diagnostics in the laboratory, training of trainers at the provincial level of laboratory supervisors on conducting formative supervision. (\$750,000)

7. *Expand support to iCCM/ADECOS activity:* In coordination with the Global Fund, PMI will continue to support the GRA's iCCM initiative with ADECOS to include new municipalities within provinces that have previously received support. PMI will provide RDTs and ACTs; the MoH will provide commodities for the other diseases included in the care package (ex. pneumonia, diarrhea). (\$400,000)

b. Pharmaceutical management

NMCP/PMI objectives

PMI and the NMCP's goals are to prevent stockouts of ACTs, RDTs, severe malaria treatments, and other malaria-related commodities at public health facilities. PMI is committed to working with the National Directorate of Medicines and Equipment (DNME) and the parastatal central medical stores (CECOMA) to strengthen the GRA national distribution system to the point that it can assume distribution of government- and donor-supplied malaria commodities.

Progress since PMI was launched

Pharmaceutical products entering Angola are required to be registered through the DNME before entry and distribution. The Department of Pharmaceutical Inspection within the MoH conducts border and post-marketing inspections. At present, all products that need to be tested are sent to laboratories in Portugal or Brazil as there is no in-country capacity for in-depth quality assurance testing. The DNME also has a Department of Pharmacovigilance established to track adverse events from medications. A PMI and USAID-supported assessment of the medicines regulatory system and supply chain identified several key concerns, including an insufficient legal framework, limited human resource capacity, and an inadequate quality control system.

Products purchased by the GRA are stored and managed at the parastatal central medical stores, CECOMA. Since 2009, PMI has supported an augmented supply chain system for PMI-procured commodities; all commodities are delivered directly to the provincial warehouses, bypassing CECOMA. The provinces then assume responsibility for the ultimate delivery to health facility level. Delivery from provinces to health facilities remains weak, with some provincial warehouses possessing expiring stocks while, at the same time, many health facilities experience stockouts. At the national level, proper quantification and forecasting of malaria commodities have been challenged by a lack of consumption data and a weak logistics management information system. The GRA does not yet have a qualified central level laboratory or an adequate surveillance system to systematically evaluate the quality of pharmaceutical commodities coming into Angola.

Angola has a push system in which commodities that have arrived at the provincial level are immediately sent to the facilities for use. While this system has some benefits, in that stocks arrive to the end-user while minimizing lost time at the warehouse, there is little evidence that proper minimum and maximum stock levels are maintained at any level of the supply chain. Furthermore, distribution plans are often made in isolation of all stakeholders, including CECOMA, the DNME, and other donors. This has led to an oversupply of commodities in some provinces and unequal distribution in others. Stock levels in the country often fluctuate greatly depending on the timing of donor-procured commodities arriving in Angola. The process of delivering PMI-procured commodities directly to the provincial warehouses has proven to be more efficient than previous methods through the central medical stores. PMI-procured supplies are usually delivered to all provincial warehouses within two weeks of arrival in

the country. PMI supports end-use verification (EUV) surveys biannually to monitor stock levels and capacity for case management at the facility level.

PMI recognizes the need to engage in capacity building and the development of sustainable systems. Therefore, PMI supported supply chain strengthening activities at the health facility level in eight provinces, and at the municipal level in Huambo and Luanda provinces, which included strengthening their capacity for budgeting, planning, and M&E.

In late 2012, PMI assisted the NMCP to quantify and forecast malaria commodity needs for 2013 through 2015. In order to build capacity for the NMCP to conduct quantification routinely and independently, a five-day workshop was conducted to strengthen the understanding of quantification methods and develop terms of reference for the national quantification technical working group.

PMI has been working closely with the NMCP to develop an operational strategy, standard operating procedures, terms of reference for staff, tools for storage and distribution, performance indicators, tools for operations management, and a logistics management information system. At lower levels, PMI has supported improved stock management at the provincial and health facility level. This includes training on stock management, provision of tools and job aids, and supervision. All training and supervision tools used are uniform and approved by the MoH. With PMI support, CECOMA and the DNME have developed annual work plans with budgets, with the goal of leading to a comprehensive national supply chain strategy. Concurrently, PMI provided assistance to the NMCP in the data-driven development of quarterly distribution plans to efficiently distribute malaria commodities to the provinces, as well as a forecasting tool to predict future demand for malaria commodities.

Progress during the last 12-18 months

In Angola, the governance of the supply chain and the management system is still challenging. During the last year, PMI has supported the NMCP, the DNME, and CECOMA to improve the supply chain and its management system.

During the past year, PMI continued to provide a significant portion of malaria commodities jointly with the Global Fund. PMI continues the process of delivering PMI-procured commodities directly to the provincial level; however, PMI also maintained its support to strengthen the national supply chain and address weaknesses. To sustain an inclusive mechanism of forecasting and supply planning, PMI advocated for the establishment and implementation of a consensus-based national quantification mechanism for antimalarial commodities. The Malaria Quantification Technical Working Group is not functional yet due to a lack of human resources at the NMCP level. Two NMCP staff have received quantification training funded by PMI in March 2016. A forecasting and quantification exercise of the country needs for antimalarials was conducted by these staff. PMI supports a full-time data analyst to work with the NMCP. This data analyst assists the NMCP with compiling all of the provincial reports.

Support to CECOMA, DNME, and Inspeção Geral da Saúde

PMI continues to provide support to CECOMA to improve warehouse management processes and procedures. This assistance was designed by using a participatory, on-the-job, capacity building approach that includes improving the warehouse operation management system and tools, and optimizing warehouse layout to improve processes and efficiently utilize storage space. These changes in CECOMA are being led and monitored by CECOMA leadership for ownership and sustainability through regular technical meetings.

In order to obtain preliminary data on the quality of medications in the country, medications were collected and sent to an accredited laboratory for testing. Although not nationally representative, the results of this baseline study were received and discussed with the General Inspection of Health (*Inspecção Geral da Saúde*) and DNME. In order to facilitate in-country quality testing, PMI supported a training workshop at DNME on the use of Minilabs® in Luanda in October 2015.

PMI supported a round of EUV surveys in December 2015, and a second one is ongoing. The ongoing survey will include five provinces: Bie, Cuanza Norte, Kuando Kubango, Luanda, and Malanje. The most recent survey, which included 42 health facilities in 5 provinces, found high rates (45%) of ACT and RDT stockouts on the day of visit, and widespread weaknesses in commodities management, including the lack of use of stock cards and poor commodity storage conditions in most facilities.

Plans and justification

PMI will continue to strengthen supply chain, logistics, and pharmaceutical management including forecasting, quantification, training, supervision, and monitoring stocks and malaria commodity needs/gaps. PMI will work with the NMCP, MoH, and appropriate partners for improved supply and distribution plans to ensure that essential life-saving drugs, including RDTs and ACTs, reach the end user. Assistance will have an emphasis on sustainability and capacity building with two seconded technical advisors working directly with their Angolan counterparts, creating the appropriate regulatory framework and training a skilled cadre to continue to strengthen the MoH distribution system. One technical advisor will be placed at CECOMA and another at the NMCP to provide organizational capacity building and technical assistance on supply chain management. While the eventual transition to a single distribution system is prepared, PMI will continue to support a separate distribution system for PMI-procured commodities from the port to the provincial level.

Proposed activities with FY 2017 funding: (\$1,850,000)

1. Technical assistance and support for import, clearance, storage, distribution, and management of RDT and ACT commodities: Provide assistance in the distribution of PMI-procured RDTs and ACTs from port, storage, customs approval, and down through to the provincial level. (\$300,000)
2. Strengthen MoH antimalarial drug management system: Strengthen pharmaceutical management related to antimalarial drugs including regular supervision, training of provincial pharmacists, and help with printing of supply chain management forms. Strengthen capacity at the NMCP to forecast demand and distribute commodities in line with prioritized needs. (\$650,000)
3. Institutional capacity building on supply chain planning: Support for two seconded technical advisors to be placed in CECOMA and the NMCP to provide organizational capacity building and technical support on supply chain improvements, as well as quantification, distribution, and prioritization. This will include bolstering systems and oversight to ensure commodities go from provincial warehouses to their intended health facilities. (\$900,000)

4. Health system strengthening and capacity building

PMI supports a broad array of health system strengthening activities that cut across intervention areas, such as training of health workers, supply chain management and health information systems strengthening, drug quality monitoring, and NMCP capacity building. Building capacity and health systems towards full country ownership is a core area of strategic focus under the PMI Strategy.

NMCP/PMI objectives

The Angolan NMCP is tasked with planning, supervising, and monitoring malaria activities throughout the country. The NMCP sets standards, prioritizes the use of resources, and tracks progress. A lack of human resources at all levels inhibits progress. In recent years, the Angolan decentralization process, whereby municipalities are responsible for a significant portion of planning, budgeting, and financial management of health resources, as well as the interruption of financial support from the Global Fund, have created additional challenges for the NMCP. Current plans for the new Global Fund grant include support for additional staff at the provincial level. PMI supports the NMCP to strengthen health systems at all levels in order to improve the malaria program performance and ensure sustainability of PMI's investments. PMI's overall approach to health systems strengthening is through the provision of technical assistance to various levels of the government in the areas of budget and finance, HMIS, human capacity building, and logistics and supply chain management, with a particular emphasis on strengthening malaria program management at the provincial level.

Progress since PMI was launched

PMI has worked to strengthen human resource capacity and HMIS in the provinces of Huambo and Luanda through an integrated health systems strengthening activity (co-funded by PEPFAR) since 2011, working closely with the MoH at the national, provincial, and municipal levels with the goal of improving capacity for service delivery, leadership, management, and supervision skills of health workers to deliver quality care and services. PMI worked with selected municipalities to develop their strategies in line with the national health strategy, assisted with implementation of the National Health System Strategic Information Plan, and worked to improve effectiveness and efficiency of human resources at the municipal level.

To improve service delivery, PMI has invested in pre-service training of trainers and nursing school teachers for quality improvement and standards-based clinical practices. After the approval of the PNDS by the Angolan government, USAID and PMI provided significant technical assistance to cost the plan, and supported municipalities in nine provinces to develop municipal health plans and associated budgets in standardized formats and based on epidemiological data.

PMI supported the MoH to develop and finalize an M&E Plan for the PNDS, to examine both programmatic and financial progress. The plan includes concrete steps for implementation of M&E activities and will strengthen accountability for program performance and budget execution for PNDS at the central, provincial, and district levels.

PMI trained a cadre of national, provincial, and municipal supervisors to conduct supportive supervision at health facilities. Support included supervision planning and tool development, health facility malaria report verification, and municipal and provincial level malaria reports and database management. In addition, PMI projects promoted active review and discussion of monthly reports with municipal and provincial supervisors to foster analysis for problem identification and explore possible solutions. The focus has been on improving documentation in facility-held records so that the quality of the data available for analysis improves.

The Field Epidemiology and Laboratory Training Program (FELTP) began its first cohort in Angola in FY 2012. FELTP, a collaboration between CDC, the *Agostinho Neto* University, and the MoH, trains select health personnel in field epidemiology. Participants acquire skills in data analysis, epidemiologic methods, and use of strategic information to make appropriate health decisions. Annually, PMI supports

two students who focus on malaria for their field work; however, in Angola, all of the FELTP students in the program have participated in multiple investigations and responses to malaria outbreaks in different provinces across the country. In 2012 and 2013, the FELTP students participated in multiple suspected and confirmed malaria outbreaks across the county, and developed a “short course” on epidemic investigation and control that is provided at the regional level. Three of the nine members from the first FELTP class have taken prominent positions in the MoH, and one was appointed to be a member of the national emergency response team.

PMI continues to support the Malaria Partners Forum to assist the NMCP in coordinating malaria partners and stakeholders and to track and coordinate all malaria activities. The Forum is responsible for mapping malaria partners as well as creating provincial-level forums to improve coordination amongst partners at lower levels.

Progress during the last 12-18 months

PMI conducted an assessment of public financial management systems and procedures, to provide short-medium- and long-term options for supporting a more formal planning and budgeting process that aligns with GRA requirements.

Three FELTP students/ graduates worked on the PMI TES in 2015. In February 2016, two FELTP students were team leads during the health facility survey completed in Huambo and Uige provinces. With the increase in the incidence of severe malaria morbidity and mortality in Luanda Province, an FELTP student developed a protocol to look at risk factors for death among severe malaria cases in hospitals in a few Luanda Province municipalities.

PMI worked to improve the capacity of staff of the MoH and the Inspector General on best practices and laws related to the regulation of medicines and the challenges with regulating substandard and poor quality medicines. PMI trained staff on techniques for screening of poor quality medicines and conducted monitoring of medicine quality.

PMI continued to support supervisory structures and quality improvement visits at the provincial and national levels, to reinforce protocols on diagnosis and treatment, MIP, and data collection and management.

Plans and justification

PMI will continue work to build systems and human capacity for managing and monitoring malaria programs. An emphasis will be placed on strengthening the lower levels of the decentralized health system, to ensure that management improvements have a direct impact on the availability and quality of malaria services. PMI will support ongoing malaria control program development, monitoring, and supervisory activities. These activities include:

- investment in pre-service training of trainers and nursing school teachers for quality improvement and standards-based clinical practices;
- review of the recently developed municipal health plans in PMI-focused provinces as well as the M&E Plan for the PNDS, to examine both programmatic and financial progress; the plan includes concrete steps for implementation of M&E activities and will strengthen accountability for program performance and budget execution for PNDS at the central, provincial, and district levels; and
- continued training of national, provincial, and municipal supervisors to conduct supportive supervision at health facilities.

Proposed activities with FY 2017 funding: (\$850,000)

1. Build the capacity of municipal and provincial governments to plan, fund, monitor, and supervise malaria programs. (\$600,000)
2. Support two students in the FELTP to focus on malaria. (\$200,000)
3. Continued support to National Malaria Partners' Forum to improve coordination of malaria activities at the provincial and national levels. (\$50,000)

Table 10: Health Systems Strengthening Activities

Health Services	MIP	Strengthen malaria in pregnancy services at health facilities
	Case Management	Training and support supervision for provincial and health facility health workers to improve malaria case management and RDT use
Health Workforce	Health Systems Strengthening	FELTP
		Training for outreach workers, improving communication skills, materials for distribution to incentivize ITN use by identifying and promoting positive and discouraging deviant behavior
Health Information	Surveillance, Monitoring and Evaluation	Seconded staff to NMCP on SM&E
		Supporting harmonization of HMIS at provincial, municipal, and facility levels; includes training and supervision of data collection staff
Essential Medical Products, Vaccines, and Technologies	Pharmaceutical Management	Strengthen MoH antimalarial drug management system
		Institutional capacity building on supply chain planning
Health Finance	NA	NA
Leadership and Governance	Health Systems Strengthening	Build the capacity of municipal and provincial governments to plan, fund, monitor, and supervise malaria programs
		Support to Malaria Partners' Forum secretariat

5. Social and behavior change communication

NMCP/PMI objectives

The NMCP's objective is to have at least 80% of caregivers know the cause, signs and symptoms of malaria, and at least one prevention and one treatment measure by the end of 2020. Social behavior change communication (SBCC) activities aim to increase coverage of malaria prevention and treatment practices, increase demand for these services, improve ITN use, improve uptake of IPTp, and promote better provider adherence to malaria diagnosis results (either by RDT or microscopy). In order to

achieve their objectives, the NMCP and PMI focus SBCC investments on both interpersonal and mass media communications. IPC activities include the involvement of local NGOs, faith-based organizations, and respected community leaders. The focus for mass media is to use radio as the main vehicle to reach communities in urban and rural areas.

The NMCP is currently revising its strategy for SBCC, to provide a framework to guide and coordinate SBCC activities for malaria in Angola. The strategy's main goals are to: define roles and responsibilities of all key actors; identify priority issues and gaps; and provide a basis for multi- and bilateral assistance and intersectoral coordination. Overall, the strategy also addresses misconceptions about malaria in Angola and seeks to improve knowledge in key behaviors essential to achieve sustained malaria control. The strategy covers four main malaria interventions: vector control (IRS, ITNs, and larviciding), case management, IPTp, and epidemic preparedness and response. A national SBCC workshop was held in February 2016 with representatives from across the country to inform the development of the first draft of the national strategy, to be disseminated in mid-2016. A formal SBCC working group will be established to help guide, coordinate, and advocate for rigorous evaluation of SBCC activities.

Progress since PMI was launched

Low perception of malaria risk and poor practices related to malaria are common in Angola and many misconceptions persist. For example, only 27% of women interviewed in the MIS 2011 identified mosquitoes as a source of malaria, and only 30% knew that malaria can be prevented by using a mosquito net.

Since its inception in 2005, PMI has supported a variety of SBCC activities aimed at supporting demand and uptake of key interventions in Angola. From 2006 onward, PMI launched several SBCC activities in the key malaria intervention areas (ITNs, MIP/IPTp, and case management) and provided support for the development and dissemination of new SBCC materials for information, education, and communication. This has largely focused on ITN use and care, improving ANC attendance and IPTp uptake, and instilling prompt case management-seeking behavior.

With the launch of the UC campaign in 2013, the NMCP and partners developed a specific SBCC effort focused on improving ITN use. These SBCC activities include municipal health days, house-to-house visits, and radio programs. Angola does not yet have a strong culture of ITN use; therefore, much work is still needed to promote consistent ITN use as well as appropriate care. Similarly, there has been low ANC attendance, which has impacted IPTp uptake. Furthermore, there has been low adherence by healthcare workers to correctly provide a quality ACT for a positive diagnostic result or use differential diagnosis for other febrile diseases when confronted with a negative malaria test result.

SBCC activities have been coordinated and targeted at the provincial level, given the variation of malaria transmission in Angola. Key messages at the community level, via radio, include promotion of correct ITN use, importance of malaria prevention during pregnancy, and the importance of prompt diagnosis and treatment of malaria with ACTs. Efforts include multiple channels of communication (radio, personal communication, local drama activities), which are targeted to the areas affected.

The municipal health system revitalization process is intended to improve the quality of existing services and integration of service delivery. Community outreach through municipal health days provides communities with an integrated package of health interventions including ITN distribution, vaccination, de-worming, and other essential services. Thus, the malaria components of SBCC are integrated with other health activities and services before and during these days at the community level.

Progress during the last 12-18 months

During the past year, PMI has continued to support both mass and IPC to improve knowledge and change behavior on malaria prevention and care-seeking. Activities included community outreach using face-to-face discussions, drama shows on malaria, and mobile videos; training of health and community workers; radio spots; and printed messages together with those that accompany packaged ITNs and ACTs. Implementation of these activities occurs at various locations, including clinics, homes, religious institutions, schools, and community events.

In FY 2015, PMI reached 105,131 people through IPC with churches and home visits to promote ITN use and general malaria transmission messages. Radio programs and songs (2,708 programs in FY 2015) were also aired to target audiences in Bie and 84% recalled a malaria prevention message. PMI also distributed 16,844 IEC materials with ITN use promotion and general malaria transmission messages in FY 2015. PMI's SBCC efforts targeted both health workers (supply side) and communities (demand side).

Between October 1, 2015, and March 31, 2016, PMI reached 97,366 people in health facilities and 300,491 people through community outreach. Messages included:

- Sleeping under a mosquito net
- Prevention of malaria in pregnancy: use of mosquito net and IPTp promotion
- Knowledge of malaria symptoms and creating treatment demand
- Knowledge of severe childhood malaria symptoms
- Adherence to RDT results by health workers

Survey results after the SBCC campaign conducted by one PMI implementing partner revealed an increase from 26% to 76% of participants knowing that sleeping under a mosquito net can prevent malaria. Furthermore, after the campaign, the proportion of survey respondents that slept under an ITN the night before increased from 7% to 87%.

Over the past two years, PMI has worked with the NMCP to draft the national SBCC strategy. The NMCP's capacity to coordinate and monitor all malaria-related SBCC activities carried out by the NMCP, provincial governments, and other in-country stakeholders in Angola has been limited.

PMI continues to support the National Malaria Partners Forum to ensure effective implementation and coordination of malaria control interventions including SBCC focused on the community level and on capacity building at the central level.

Plans and justification

Under the NMCP's guidance, PMI plans to focus on the development and roll out of communications materials for mass media and community-based activities, IPC, pre-season transmission malaria prevention activities, and case management of malaria. Evidence-based messages focused on a target audience will be used and support will be provided to the NMCP to begin to evaluate specific interventions and actual behavior change.

Many Angolans do not have access to public health facilities, thus improving awareness of malaria at the household level is an especially important element of the malaria control strategy. One aspect of this strategy is the implementation of iCCM, which is aimed at reaching underserved populations. Health promotion through the ADECOS program will be a key component of community health workers'

activities focusing on ITN, MIP, and case management messages. SBCC activities through the ADECOS will include developing and conducting training for outreach workers, improving communication skills, materials for distribution to incentivize ITN use by identifying and promoting positive behavior. Furthermore, community health workers will promote MIP services at the ANC and encourage women in the community to seek care to improve IPTp uptake. PMI will undertake promotion and messaging to increase patient demand for malaria testing in accordance with the test-and-treat national policy. Emphasizing the importance of testing will encourage patients to adopt health-seeking behavior.

Within the context of the upcoming 2018 nationwide mass campaign, PMI continues to support SBCC at the community- and facility-level to increase ITN usage and to build an ITN culture (see ITN section). This activity will be timed to correspond with the end of the 2018 national mass distribution efforts so that at the community level, there will be promotion of correct and consistent use of ITNs and ITN care. PMI FY 2016 funding will also be used to promote ITN SBCC messaging to prepare for the 2018 net campaign to increase awareness of the campaign (timing, registration plans, etc.) and increase mobilization of the community to participate in the mass campaign activities.

Proposed activities with FY 2017 funding: (\$1,200,000)

1. Use SBCC at the community level to improve prevention of malaria in pregnancy at the community level, through promotion of ANC attendance and education on the importance of ITN use and receiving at least three doses of IPTp in six focus provinces. (\$300,000)
2. Training of ADECOS on malaria prevention at the community level in one focus province (e.g., communication strategies for improving ITN use culture, early diagnosis and treatment, and IPTp). (\$400,000)
3. SBCC campaign to promote ITN use and care and repair, as a component of the nationwide campaign. (\$300,000)
4. SBCC to increase patient demand for malaria testing and promote health-seeking behavior in six focus provinces. (\$200,000)

6. Surveillance, monitoring, and evaluation

NMCP/PMI objectives

Strengthening surveillance, monitoring, and evaluation (SM&E) capacity and using SM&E information for data-based decision-making is a core area of strategic focus under PMI's current strategy, and is also a priority for the Angolan NMCP. Currently, malaria data in Angola are collected through the HMIS and by the municipal malaria supervisor through a parallel system. However, HMIS data are unreliable and often conflict with data collected through the parallel system. The NMCP is aware of these limitations and has developed a plan to strengthen M&E, described in the 2011-2015 National Strategic Plan for Malaria Control and the Concept Note submitted to the Global Fund. The main M&E objectives of the NMCP's plan are, by 2020:

- To establish an efficient epidemiology SM&E system in all 18 provinces; and
- To develop capacity to detect and to appropriately respond to epidemics within two weeks in 16 epidemic-prone municipalities.

Progress since PMI was launched

Since its launch, PMI has provided training, supervision, data quality checks, and reporting tools to health facilities at the municipal and provincial levels. In addition, PMI supports the maintenance and

use of a training and supervision database used by most municipalities to track staff that have been trained and to track supportive supervision from both the health facility and the municipalities, respectively. These training databases help to minimize duplication and ensure that staff are provided with the required skill sets.

PMI has supported two MIS (2006/7 and 2011) and a DHS+ that was conducted in 2015. The DHS was conducted in collaboration with the INE, and collected data on the primary malaria indicators. Preliminary results will be available in July 2016. The 2006/7 MIS provided baseline estimates of malaria control intervention coverage, and the 2011 MIS provided a follow-up after five years of implementing malaria control activities.

In 2013, an evaluation of the Malaria Early Warning System was performed in Cuando Cubango, an epidemic-prone province. This evaluation showed the presence of inconsistent stocks of diagnostic supplies, errors in patient registries and report forms, and lack of staff's ability to conduct the system's activities at the facility and municipal levels. Several recommendations were made to improve the system, and PMI continues to work with the NMCP on incorporating these recommendations into future programming.

In 2014, together with the NMCP, PMI implemented an enhanced epidemiologic surveillance activity in nine health units in five municipalities across the three PMI-targeted provinces: Huambo and Bailundo (Huambo Province); Lubango, (Huila Province); and Kwanhama and Namacunde (Cunene Province). Findings of this activity demonstrated a lack of interest in surveillance by health facilities' directors, poor standard data collection, non-compliance with malaria testing, and stockouts of RDTs and ACTs. As a result, PMI trained health facility staff and conducted supervisory visits to ensure malaria data were being collected and reporting processes were being followed.

In 2014, PMI supported a six-week visit of the NMCP official responsible for laboratory monitoring and supervision, to the CDC/Atlanta, for advanced training in molecular biology techniques for malaria diagnosis, including real-time PCR, Sanger sequencing, and microsatellite genotyping analysis.

Progress during the last 12-18 months

PMI, as well as PEPFAR and the Department of State, invested in a DHS+ to collect disease indicators in 2015. Data are currently being analyzed and preliminary results are expected in July 2016. The data were collected at a regional level and included parasitemia data.

A health facility survey was conducted in Uige and Huambo in February and March 2016. The primary objective of the survey was to assess the provision of malaria case management services in public health facilities. There were 44 health facilities visited in Huambo and 45 in Uige; health posts, health centers, and hospitals were visited in both provinces. There were some deficiencies with ACT and severe malaria stocks in both provinces. Health workers in Huambo, however, struggled more than those in Uige.

Health workers in Huambo demonstrated difficulty in managing suspected cases: 31% of suspected malaria cases underwent diagnostic testing. Only 28% of true malaria cases were treated appropriately with an antimalarial. Approximately 42% of health workers in Huambo Province and 31% in Uige had not received supervision within the last six months. These preliminary results were shared with the NMCP and with provincial health officials in the second quarter of 2016. PMI will work with the NMCP and in particular the DPS at the provincial levels to evaluate roadblocks to supervision and focus on increasing the number of quality supervisory visits to improve the quality of case management.

HMIS data is a big challenge at the health facility level. There is no national surveillance database. Registry input by health workers is weak and inconsistent. For example, those in the Provincial Health Department who collect statistics will capture diagnoses for its aggregate database. Health workers often state that there was a positive test for a thin smear, but leave the diagnosis response blank. The statistics staff will miss the data point, because the health worker did not enter the data in all needed responses. Tallying of cases is done using an unusual method that is difficult to decipher by most health workers. In an attempt to improve and modernize the current system, the MoH, with technical assistance from PMI and in collaboration with the World Bank, the EU and the INE, began a DHIS-2 pilot in three municipalities in Huambo Province. This platform uses a standardized format and open-source electronic databases to facilitate the collection, reporting, and analysis of aggregated HMIS and disease surveillance data. With funding from the Global Fund and other partners, the MoH plans to eventually implement the DHIS-2 in all 18 provinces. To inform this national roll out, PMI will conduct a rapid assessment to gain a comprehensive understanding of HMIS and other routine malaria surveillance systems (including reporting rates) to help target PMI investments in system strengthening, identify country-specific technical assistance needs, and track progress in HMIS strengthening moving forward. The new bilateral project will also perform rapid assessments of the data systems in place (including reporting rates, quality assessments, and reports produced).

NMCP staffing was greatly reduced after the Global Fund exited Angola. The provincial level malaria monitoring and evaluation activity supported by the Global Fund and *Oficial Provincial do Programa da Malaria* (OPPMs) was discontinued. Several central-level malaria monitoring and evaluation staff were also released due to lack of financial support. The GRA did not immediately follow-up and hire the staff that were released. Thus, the NMCP and the provinces have been suffering from a dearth of malaria monitoring and evaluation expertise since late 2014.

Table 11. Surveillance, Monitoring and Evaluation Data Sources

Data Source	Survey Activities	Year								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
National-level household surveys	Demographic and Health Survey (DHS)*						X			
	Malaria Indicator Survey (MIS)		X							X
	EPI survey									
Health facility and other surveys	School-based malaria survey									
	Health facility survey							X		
	SPA survey									
	EUV survey	X	X	X	X	X	X	X	X	X
Malaria surveillance and routine system support	Support to malaria surveillance system	X	X	X	X	X	X	X	X	X
	Support to parallel routine malaria info system (for GF or other reporting)	X	X	X	X	X	X	X	X	X
	Support to HMIS	X	X	X	X	X	X	X	X	X
Therapeutic efficacy monitoring	<i>In vivo</i> efficacy testing				X		X**		X	
Entomology	Entomological surveillance and resistance monitoring	X		X	X	X	X	X		
	ITN durability monitoring		X	X	X					
Other data sources	Malaria Impact Evaluation			X		X				

*Not PMI-funded: DHS was a joint survey with PEPFAR and other donors with a malaria module funded by PMI
**2015 TES had a third location funded by WHO

Table 12. Routine Surveillance Indicators

Indicators	Value	Comments
1. Total number of reported malaria cases Data source: NMCP database	3,319,107	Provinces and all months were reported except Cabinda in December.
Total diagnostically confirmed cases	2,854,369	Tested by microscopy and RDT.
Total clinical/presumed/unconfirmed cases	464,738	
<i>If available, report separately for outpatients and inpatients</i>		
Outpatient number of reported malaria cases	N/A	The available data did not differ from the internal data
Diagnostically confirmed	N/A	
Clinical/presumed/unconfirmed	N/A	
Inpatient number of reported malaria cases	N/A	
Diagnostically confirmed	N/A	
Clinical/presumed/unconfirmed	N/A	
2. Total number of reported malaria deaths Data source: NMCP database	8,581	
Diagnostically confirmed	2,854,369	
Clinical/presumed/unconfirmed	464,738	
3. Malaria test positivity rate (outpatients) Data source:	N/A	
Numerator: Number of outpatient confirmed malaria cases	N/A	
Denominator: Number of outpatients receiving a diagnostic test for malaria (RDT or microscopy)	N/A	
4. Completeness of monthly health facility reporting Data source: NMCP database		
Numerator: Number of monthly reports received from health facilities	24,560	This indicator is difficult. Not all health facilities in the provinces turn in their data on time.
Denominator: Number of health facility reports expected (i.e., number of facilities expected to report multiplied by the number of months considered)	32,113	

Plans and justification

With FY 2017 funding, PMI will continue to support malaria SM&E within the framework of the National Malaria M&E Plan described in the new National Strategic Plan for Malaria Control (2016-2020). Available funding will be targeted towards improving the country's M&E capacity, and data quality assurance. PMI will collect important SM&E data through MIS support, EUV implementation, and CDC TDY support. PMI will fund a WHO staff person and place them in the NMCP to help with strategic decision-making. PMI will also second one SM&E staff member to the NMCP to work alongside an NMCP SM&E staff member for strategic planning, training, and implementation of SM&E activities. Through the HMIS strengthening activity proposed below, PMI will continue to promote the utility of SM&E and support the HMIS at subnational levels (provincial, municipal, and health facility levels). An important focus will be to foment a culture of data collection. As the 2014 enhanced epidemiologic surveillance demonstrated, poor interest in data collection from the health directors was common. Without the belief in the importance of data collection by senior staff, the quality and availability of data collection and management will be poor. This can also become evident in poor case management. It will be helpful for PMI to demonstrate the importance of collecting and analyzing data for decision-making. With greater acceptance of health officials for the need of good quality data improve the collection of complete, accurate, and timely malaria data for public facilities with the paper-based HMIS through improved training and much needed supervision.

HMIS strengthening activities will target multiple levels of the health system. Initially, PMI will support a workshop for all the DPS in Luanda hosted by the NMCP SM&E focal point and PMI counterpart. The workshop will present an opportunity for the MoH's Office of Studies, Planning, and Statistics (GEPE), and the NMCP to identify key challenges to improving data quality, as well as to highlight standards and best practices for strengthening HMIS data collection, analysis, reporting, and data-driven decision-making. PMI will then support quarterly provincial-level meetings of malaria focal persons from each municipality with the DPS in PMI-focused provinces to review the data and provide feedback on the analyzed data.

The PMI implementing partners, in collaboration with provincial health officials, will train staff responsible for data collection in the more than 600 health facilities located in the focus provinces.

In addition to these training workshops, PMI will support periodic visits of NMCP staff, along with the PMI seconded SM&E staff, to the focus provinces to assess data quality and provide feedback on data collection, analysis, and reporting. In the PMI-focused provinces, the municipal malaria focal person will be supported to provide data-focused supervisions and on-the-job mentoring at all health facilities. With the cost of implementing activities in Angola, PMI will only support focus provinces at this time.

Based upon the success of the DHIS-2 pilot, DHIS-2 will be rolled out at the municipal and provincial levels in selected provinces. PMI will also focus on best practices from the DHIS-2 pilot and address the deficiencies identified during the initial roll out of this activity. The SM&E staff seconded to the NMCP and his/her counterpart will work with PMI on developing DHIS-2 trainings and supervision where needed. PMI will provide practical tools to collect and analyze the data from the health facility to the provincial level.

Proposed activities with FY 2017 funding: (\$3,670,000)

- Contribute to and implement the MIS in 2018 to collect malaria control indicators for Angola (\$2,000,000)

- Continue bi-annual EUV/monitoring of commodity availability and use at health facility level (\$150,000)
- Support two CDC TDYs to provide M&E assistance to the NMCP and in-country partners (\$20,000)
- Support one WHO malaria focal point to assist the NMCP to use data for strategic decision-making (\$300,000)
- Second a person to the NMCP to strengthen SM&E capacity by working with an identified NMCP counterpart (\$300,000)
- Continued strengthening of HMIS data collection, reporting, and analysis (including facility-level training, mentoring, and supervision, quarterly data review meetings, and DHIS2 installation and training) in select municipalities⁶ in targeted, hyper-endemic areas (\$900,000)

7. Operational research

As part of Angola’s national health strategic plan through the PNDS, there is a priority list that guides decisions on operational research (OR) as follows:

1. Conduct a study for the introduction of the vaccine against malaria
2. Conduct parasitological, entomological and therapeutic efficacy studies biannually
3. Carry out diagnostic studies of differential febrile malaria suspect syndromes
4. Conduct Knowledge, Attitudes, and Practices (KAP) studies.

However, to date, there has not been much operational research undertaken in Angola. There have been no previous OR studies funded by PMI within the last five years.

Since the end of the war, Angola has been a magnet for Asian migrants seeking economic opportunities, and the size of the population of Southeast Asian migrants in Angola is estimated to be one of the largest in Africa. Because most of these migrants come from malaria-endemic and drug-resistant areas, PMI will support a qualitative study with FY 2016 funds to understand this population’s malaria health care-seeking behavior and prevention practices. The concept note was accepted by the PMI OR committee in June 2016 and the activity is planned for implementation in 2017.

Table 13. PMI-funded Operational Research Studies

Ongoing OR Studies FY 2016			
Title	Start date (est.)	End date (est.)	Budget
Qualitative study on malaria health care-seeking behavior and prevention practices among Southeast Asian migrant workers	January 2017	April 2017	\$75,000

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

No studies are planned with FY 2017 funds.

⁶ The selected municipalities will be identified by PMI through an HMIS needs assessment.

8. Staffing and administration

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

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

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

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

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

Proposed activities with FY 2017 funding: (\$2,980,000)

- CDC IAA staffing and administration: (\$1,200,000)
- USAID/PMI staffing: Support to salaries, benefits, and ICASS for one PSC or TCN (Resident Advisor) and three support staff (FSNs). (\$1,300,000)
- USAID administration/Program Design & Learning: (\$480,000)

Table 1: Budget Breakdown by Mechanism

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

Mechanism	Geographic Area	Activity	Budget (\$)	%
GHSC-PSM	15 provinces (remaining 3 provinces were completed in 2016)	Procurement of ITNs	\$4,687,954	20%
	Filling national gap, but prioritizing the following provinces for distribution: Zaire, Uige, Cuanza Norte, Malanje, Lunda Norte, Lunda Sul	Procurement of RDTs		
	Filling national gap, but prioritizing the following provinces for distribution: Zaire, Uige, Cuanza Norte, Malanje, Lunda Norte, Lunda Sul	Procurement of ACTs		
	Nationwide	Procurement of injectable artesunate for treatment of severe malaria		
	Nationwide	Technical assistance and support for import, clearance, storage, distribution and management of RDT and ACT commodities		
Projecto de Saude para Todos	15 provinces (remaining 3 provinces were completed in 2016)	Distribution of ITNs	\$11,582,046	48%
	15 provinces (remaining 3 provinces were completed in 2016)	Mass campaign (registration, microplanning, logistics)		
	Uige, Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Zaire	Strengthen malaria in pregnancy services at health facilities		
	Zaire, Uige, Cuanza Norte, Malanje, Lunda Norte, Lunda Sul, plus training of supervisors from 12 additional provinces	Strengthen malaria case management		
	Zaire, Uige, Cuanza Norte, Malanje, Lunda Norte, Lunda Sul, plus training of supervisors from 12 additional provinces	Training and supervision on laboratory diagnosis (microscopy and RDT) and quality control		
	Malanje and/or Lunda Sul	Expand support to iCCM/ADECOS activity		

	Zaire, Uige, Cuanza Norte, Malanje, Lunda Norte, Lunda Sul	Facilitate malaria program implementation and health systems strengthening in collaboration with NMCP		
	Nationwide	Support to Malaria Partners' Forum secretariat		
	Malanje and/or Lunda Sul	Training of ADECOS on malaria prevention at the community level (e.g., communication strategies for improving net use culture, early diagnosis and treatment, and IPTp)		
	15 provinces	BCC campaign to promote net use and care and repair, as a component of the universal coverage distribution campaign		
	Central level	Seconded staff to NMCP on surveillance/ M&E		
	Uige, Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Zaire	Strengthen HMIS in target provinces		
TBD (Central SBCC Mechanism)	Uige, Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Zaire	IEC/BCC for malaria in pregnancy at the community level	\$500,000	2%
	Uige, Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Zaire	BCC to increase patient demand for malaria testing		
TBD/ SM&E mechanism	Nationwide	MIS 2018	\$2,000,000	8%
WHO PIO	Central level	Support one WHO malaria focal point	\$300,000	1%
TBD Supply Chain TA	Nationwide	Strengthen MoH antimalarial drug management system	\$1,700,000	7%
	Central level	Institutional capacity building on supply chain planning		
	Nationwide	Survey of availability of malaria commodities at the health facility level (EUV survey)		
CDC-IAA	0	N/A	\$1,450,000	6%

	Nationwide	Field Epidemiology and Laboratory Training Program		
	Nationwide	Technical support for strengthening M&E		
	Central level as well as Benguela, Zaire, and Lunda Sul	Planning and preparation for the 2019 TES		
	Nationwide	CDC staffing		
USAID	Nationwide	USAID/PMI staffing	\$1,780,000	7%
	Nationwide	USAID admin/ PD&L		
Total			\$24,000,000	100%

Table 2: Budget Breakdown by Activity

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

Proposed Activity	Mechanism	Budget		Geographic Area	Description
		Total \$	Commodity \$		
PREVENTIVE ACTIVITIES					
VECTOR MONITORING AND CONTROL					
Entomologic monitoring and insecticide resistance management					
N/A		\$0	\$0		
Subtotal Ento monitoring		\$0	\$0		
Insecticide-treated Nets					
Procurement of ITNs	GHSC-PSM	\$3,095,520	\$3,095,520	15 provinces (remaining 3 provinces were completed in 2016)	Procure approximately 636,204 ITNs for the remaining provinces for the 2017-2018 national mass campaign (at a cost of \$3.50 per ITN and \$1.50 per ITN for distribution from central level to select provinces).
Distribution of ITNs	TBD/Projecto de Saude para Todos	\$2,156,714		15 provinces (remaining 3 provinces were completed in 2016)	Planning, supervision, registration, and logistical support for universal ITN distribution campaign in 16 provinces over a 12-month period.

Mass Campaign (registration, microplanning, logistics)	TBD/Projecto de Saude para Todos	\$1,500,000		15 provinces (remaining 3 provinces were completed in 2016)	Assist with detailed plan to the municipal level for universal coverage campaign in 15 provinces.
Subtotal ITNs		\$6,752,234	\$3,095,520		
Indoor Residual Spraying					
N/A		\$0	\$0		
Subtotal IRS		\$0	\$0		
SUBTOTAL VECTOR MONITORING AND CONTROL		\$6,752,234	\$3,095,520		
Malaria in Pregnancy					
IEC/BCC for malaria in pregnancy at the community level	TBD (Central SBCC Mechanism)	\$0		Uige, Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Zaire	Costs covered under SBCC section.
Strengthen malaria in pregnancy services at health facilities	TBD/Projecto de Saude para Todos	\$400,000		Uige, Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Zaire	Improve health facility workers' understanding and compliance in administering IPTp, diagnosing and treating malaria in pregnancy, LLIN use in pregnant women, and provision of tools to accurately track MIP services.
Subtotal Malaria in Pregnancy		\$400,000	\$0		
SUBTOTAL PREVENTIVE		\$7,152,234	\$3,095,520		
CASE MANAGEMENT					
Diagnosis and Treatment					
Procurement of RDTs	GHSC-PSM	\$655,090	\$655,090	Nationwide	Procurement of 1,926,736 RDTs for the public sector.

Procurement of ACTs	GHSC-PSM	\$536,844	\$536,844	Nationwide	Procurement of 1,167,052 treatments of AS-AQ for the public sector.
Procurement of injectable artesunate and AM for treatment of severe malaria	GHSC-PSM	\$100,500	\$100,500	Nationwide	Procurement of treatments for severe malaria (\$2.00/treatment of injectable artesunate); assumes 6% of 3 million malaria cases are severe.
Therapeutic efficacy study	CDC-IAA	\$30,000		Central level as well as Benguela, Zaire, and Lunda Sul	Preparation and planning visits for the 2019 TES.
Strengthen malaria case management	TBD/Projecto de Saude para Todos	\$3,825,332		Zaire, Uige, Cuanza Norte, Malanje, Lunda Norte, Lunda Sul, plus training of supervisors from 12 additional provinces	Training, support supervision for provincial and health facility health workers to improve malaria case management and RDT use. Includes: (1) training of trainers at the provincial level of malaria supervisors on conducting formative supervision (provincial supervisors) from all 18 provinces; (2) support to municipal level (malaria supervisors) in the six focus provinces to provide regular supervision visits to health facilities on a quarterly basis.
Training and supervision on laboratory diagnosis (RDTs and microscopy) and quality control	TBD/Projecto de Saude para Todos	\$750,000		Zaire, Uige, Cuanza Norte, Malanje, Lunda Norte, Lunda Sul, plus training of supervisors from 12 additional provinces	Training, and support supervision for provincial laboratory technicians and supervisors to improve malaria diagnostics in the laboratory, i.e., training of trainers at the provincial level of laboratory technicians and supervisors on conducting formative supervision in the six focus provinces to municipal level, with participation from provincial supervisors from the other 12 provinces. Includes promotion of RDT use.

Expand support to iCCM/ADECOS activity	TBD/Projecto de Saude para Todos	\$400,000		Malanje and/or Lunda Sul	Continue to support the GRA's iCCM initiative with ADECOS (community health workers) in selected municipalities. PMI will provide RDTs and ACTs; the MoH will provide commodities for the other diseases included in the care package (ex. pneumonia, diarrhea)
Subtotal Diagnosis and Treatment		\$6,297,766	\$1,292,434		
Pharmaceutical Management					
Technical assistance and support for import, clearance, storage, distribution, and management of RDT and ACT commodities	GHSC-PSM	\$300,000		Nationwide	Provide assistance in the distribution from port, storage through customs, and distribution to the provincial level.
Strengthen Ministry of Health antimalarial drug management system	TBD Supply Chain TA	\$650,000		Nationwide	Strengthen pharmaceutical management related to antimalarial drugs including regular supervision, provincial training of pharmacists, help with printing of supply chain management forms. Strengthen capacity at NMCP to forecast demand and distribute commodities in line with prioritized needs.
Institutional capacity building on supply chain planning	TBD Supply Chain TA	\$900,000		Central level	Seconded technical advisors placed in CECOMA and NMCP to provide organizational capacity building and technical support on supply chain improvements, as well as quantification, distribution, and prioritization.
Subtotal Pharma Management		\$1,850,000	\$0		

SUBTOTAL CASE MANAGEMENT		\$8,147,766	\$1,292,434		
HSS & CAPACITY BUILDING					
Facilitate malaria program implementation and health systems strengthening in collaboration with NMCP	TBD/Projecto de Saude para Todos	\$600,000		Zaire, Uige, Cuanza Norte, Malanje, Lunda Norte, Lunda Sul	Build the capacity of municipal and provincial governments to plan, fund, monitor, and supervise malaria programs.
Field Epidemiology and Laboratory Training Program	CDC-IAA	\$200,000		Nationwide	Support two students in the FELTP to focus on malaria; additional funds to ensure recruitment/retention and supporting training in the epidemiologic monitoring sites (short course in epidemiology training).
Support to Malaria Partners' Forum secretariat	TBD/Projecto de Saude para Todos	\$50,000		Nationwide	Continued support to National Malaria Partners' Forum.
SUBTOTAL HSS & CAPACITY BUILDING		\$850,000	\$0		
SOCIAL AND BEHAVIOR CHANGE COMMUNICATION					
IEC/BCC for malaria in pregnancy at the community level	TBD (Central SBCC Mechanism)	\$300,000		Uige, Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Zaire	Use SBCC at the community level to improve prevention of MIP at the community level, through promotion of ANC attendance and education on the importance of ITN use and receiving at least three doses of IPTp in six focus provinces.

Training of ADECOS on malaria prevention at the community level (e.g., communication strategies for improving net use culture, early diagnosis and treatment, and IPTp)	TBD/Projecto de Saude para Todos	\$400,000		Malanje and/or Lunda Sul	Includes developing and conducting training for outreach workers, improving communication skills, and materials for distribution to incentivize ITN use by identifying and promoting positive deviants.
BCC campaign to promote net use and care and repair, as a component of the universal coverage distribution campaign	TBD/Projecto de Saude para Todos	\$300,000		15 provinces	BCC at the community and facility levels to promote net use and continue to build a net culture.
BCC to increase patient demand for malaria testing	TBD (Central SBCC Mechanism)	\$200,000		Uige, Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Zaire	SBCC to increase patient demand for malaria testing and promote health-seeking behavior in six focus provinces.
SUBTOTAL SBCC		\$1,200,000	\$0		
SURVEILLANCE, MONITORING, AND EVALUATION					
MIS 2018	TBD/ SME mechanism	\$2,000,000		Nationwide	Support for the 2018 Malaria Indicator Survey.
Survey of availability of malaria commodities at the health facility level (EUV survey)	GHSC-PSM	\$150,000		Nationwide	At least biannual monitoring of commodity availability and use at health facility level.
Technical support for strengthening M&E	CDC-IAA	\$20,000		Nationwide	Two TDY visits to provide assistance to in-country partners for M&E (including durability monitoring).
Support one WHO malaria focal point	WHO PIO	\$300,000		Central level	Assist the NMCP to use data for strategic decision-making.

Seconded staff to NMCP on surveillance/ M&E	TBD/Projecto de Saude para Todos	\$300,000		Central level	One seconded technical advisor placed in NMCP to provide organizational capacity building and technical support on M&E, data for decision-making, and HMIS strengthening.
Strengthen HMIS in target provinces	TBD/Projecto de Saude para Todos	\$900,000		Uige,Cuanza Norte, Lunda Norte, Lunda Sul, Malanje, Zaire	Supporting harmonization of HMIS at provincial, municipal, and facility levels. Includes training and supervision of data collection staff.
SUBTOTAL SM&E		\$3,670,000	\$0		
OPERATIONAL RESEARCH					
N/A		\$0			
SUBTOTAL OR		\$0	\$0		
IN-COUNTRY STAFFING AND ADMINISTRATION					
CDC staffing	CDC-IAA	\$1,200,000		Nationwide	Support to CDC RA position including salary and benefits.
USAID staffing	USAID/PMI staffing	\$1,300,000		Nationwide	Support to salaries, benefits, and ICASS for one PSC or TCN (Resident Advisor) and two support staff (FSNs).
USAID administration	USAID admin/ PD&L	\$480,000		Nationwide	2% for USAID Mission administration and PD&L.
SUBTOTAL IN-COUNTRY STAFFING		\$2,980,000	\$0		
GRAND TOTAL		\$24,000,000	\$4,387,954		