This Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. The final funding available to support the plan outlined here is pending final FY 2015 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.

USAID
FROM THE AMERICAN PEOPLE

PRESIDENT'S MALARIA INITIATIVE

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

PRESIDENT'S MALARIA INITIATIVE

Madagascar

Malaria Operational Plan FY 2015

TABLE OF CONTENTS

ACRONYMS 3

I. EXECUTIVE SUMMARY 5

II. STRATEGY .....
1. Introduction 9
2. Malaria Situation in Madagascar 9
3. Country Health System 13
4. National Malaria Control Plan and Strategy 15
5. Integration, Collaboration, Coordination 19
6. Goals and Targets of PMI... 20
7. Current Status on Malaria Indicators 20
8. Challenges, Opportunities, and Threats 22

III. OPERATIONAL PLAN 24
1. Insecticide-Treated Nets 24
2. Indoor Residual Spraying 29
3. Malaria in Pregnancy 33
4. Case Management: Diagnosis 36
5. Case Management: Treatment 38
6. Case Management: Pharmaceutical and Commodities Management 41
7. Monitoring & Evaluation 43
8. Operational Research 50
9. Behavior Change Communication 52
10. Capacity Building 55
11. Staffing and Administration 56
12. Tables 58

ACRONYMS AND ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AMFm	Affordable Medicines Facility – malaria
AMM	*Agence du Médicament de Madagascar*
ANC	Antenatal care
AS/AQ	Artesunate-amodiaquine
BCC	Behavioral change communication
CDC	Centers for Disease Control and Prevention
CDS	*Comité de Développement Sanitaire* /Health Development Committee
CHL	Central highlands
CHV	Community health volunteer
CSB	*Centre de santé de base*
DHS	Demographic and Health Survey
EPI	Expanded program on immunization
FBO	Faith-based organization
FIND	Foundation for Innovative new Diagnostics
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GHI	Global Health Initiative
GoM	Government of Madagascar
HMIS	Health management information system
HSS	Health systems strengthening
iCCM	Integrated community case management
IPM	*Institut Pasteur de Madagascar*
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated net
LLIN	Long-lasting insecticide-treated net
MDG	Millennium Development Goal
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MoH	Ministry of Health
MOP	Malaria operational plan
NMCP	National Malaria Control Program
NGO	Non-governmental organization
OP	Organophosphate
PCV	Peace Corps Volunteer
PhaGDis	*Pharmacie de Gros de District* (District pharmaceutical depots)
PMI	President's Malaria Initiative
RA	Resident advisor
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SALAMA	Madagascar central medical stores
SP	Sulfadoxine-pyrimethamine
SSD	*Service de santé de district*
UNICEF	United Nations Children's Fund

USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization
WHOPES	WHO Pesticide Evaluation Scheme

I. EXECUTIVE SUMMARY

Malaria prevention and control are major foreign assistance objectives of the U.S. Government (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through the GHI, the United States helps partner countries improve health outcomes, with a particular focus on improving the health of women, newborns, and children.

The President's Malaria Initiative (PMI) is a core component of GHI, along with HIV/AIDS and tuberculosis programs. PMI was launched in June 2005 as a five-year, $1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa by 2010. With passage of the 2008 Lantos-Hyde Act, funding for PMI was extended and, as part of the GHI, the goal of PMI was adjusted to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. Programming of PMI activities follows the core principles of GHI: encouraging country ownership and investing in country-led plans and health systems; increasing impact and efficiency through strategic coordination and programmatic integration; strengthening and leveraging key partnerships, multilateral organizations, and private contributions; implementing a woman- and girl-centered approach; improving monitoring and evaluation; and promoting research and innovation.

Madagascar was in the third wave of eight new PMI countries in 2008, which brought the total to 15 focus countries. Full implementation began in Madagascar with FY 2008 funding. Malaria is a major health problem in Madagascar, although its epidemiology varies considerably in different regions of the country. On the East Coast, transmission is stable and perennial, while the West Coast has a long, rainy transmission season and a brief dry season. Almost one-third of the Central Highlands is above 1,500 meters elevation, where malaria transmission rarely occurs. In the rest of the Central Highlands, however, transmission is seasonal and moderately unstable with occasional epidemics. The semi-desert South has highly seasonal and unstable transmission and is also vulnerable to epidemics.

Madagascar has been the recipient of eight malaria grants totaling US $225 million from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund). The United Nations Children's Fund (UNICEF) has played an important role in the prevention and treatment of malaria during pregnancy; the distribution of insecticide-treated nets (ITNs); and the implementation of integrated community case management of malaria, pneumonia, and diarrheal diseases in children under five years of age at the community level. The World Health Organization, and the Principality of Monaco have been significant sources of technical assistance to the *Programme National de Lutte Contre le Paludisme* (National Malaria Control Program; NMCP).

After a military coup in 2009, PMI was unable to provide direct assistance to the government of Madagascar (GoM), hindering ability to support activities at the health facility level, including support for malaria in pregnancy, case management and monitoring and evaluation activities. The suspension of all activities that required direct collaboration with the Government has

impeded full application of the fundamental tenets of the GHI. Nevertheless, over the past four years, PMI has focused support on the Madagascar National Strategic Plan for malaria; increased efficiencies through greater coordination and programmatic integration with key partners; implemented woman- and girl-centered approaches through its community-level programming; and improved and expanded the monitoring and evaluation of the program.

As a result of internationally recognized free and fair presidential elections conducted in December 2013, followed by the inauguration of a new government in March 2014, the U.S. Government lifted the restrictions on working directly with the Government health system of Madagascar on May 27, 2014. This FY 2015 Malaria Operational Plan is the first to be developed with the perspective of re-engaging with the Malagasy Ministry of Health (MoH) from the central level to the primary health facility level since 2009. Planning for FY 2015 was carried out in Madagascar in May 2014 and included representatives from the United States Agency for International Development and the United States Centers for Disease Control and Prevention staff based in Washington, Atlanta, and Madagascar. The proposed FY 2015 PMI budget for Madagascar is $26 million.

The following major activities will be supported with FY 2015 funding:

Insecticide-treated nets (ITNs): PMI is supporting the National Strategic Plan 2013-2017 goal of universal coverage with one long-lasting ITN per two persons in 92 of the 112 health districts where seasonal or perennial malaria transmission occurs. PMI supports free mass distribution campaigns to achieve equitable coverage, and will scale up keep-up strategies, such as continuous distribution methods at the community level to replace damaged nets and cover new sleeping spaces, based on the results of a 12-month pilot continuous distribution that is being implemented in Toamasina II district on the East Coast. The final evaluation results of this pilot intervention will be disseminated at a workshop in August 2014. PMI also supports social marketing of highly subsidized ITNs in limited peri-urban areas, and with the lifting of restrictions will again support routine distribution in health facilities to reach pregnant women coming for antenatal care and children coming for vaccination.

With FY 2013 funds, PMI procured approximately 1.45 million ITNs for community-based continuous distribution. With FY 2014 funding, PMI will procure approximately 2.8 million ITNs, plus 2.1 million ITNs using previous year's pipeline, for distribution during the 2015 single mass distribution campaign, which will replace the ITNs distributed during 2012/2013.

With FY 2015 funding, PMI will procure approximately 2 million ITNs for routine distribution in health facilities during EPI and antenatal care clinics, and continuous distribution in the 32 districts on the East Coast.

Indoor residual spraying (IRS): The 2013–2017 National Malaria Strategy calls for focalized IRS stratified at the commune level in the Central Highlands (CHL), Fringe, and South and West extension zones previously covered by three to four years of blanket spraying, covering up to 30% of communes in previously sprayed zones and prioritizing those at high-risk, identified using clinical case data with evidence of the highest transmission. Spraying should be coupled with surveillance to ensure rapid detection and response to malaria outbreaks. With FY 2013

funds, PMI-supported IRS in 347,776 structures and protected approximately 1.6 million people in 15 districts in the CHL, Fringe areas and the South. With FY 2014 funds, PMI will continue to support focalized spraying in the CHL and Fringe areas, and also shift away from IRS in the South, moving instead to the East Coast into areas of higher malaria transmission.

With FY 2015 funds, and in coordination with Global Fund-supported IRS activities, PMI will support blanket IRS in at least three districts in the high burden area on East Coast, spraying approximately 150,000 structures. PMI will also continue its environmental mitigation measures, improve monitoring and supervision, as well as expand its support for entomologic monitoring and evaluation.

Malaria in Pregnancy (MIP): Intermittent preventive treatment in pregnancy (IPTp) using sulfadoxine-pyrimethamine (SP) was adopted as a national policy in late 2004 in the 93 districts where stable malaria transmission occurs. Because of the political constraints related to working with Government of Madagascar since March 2009, PMI has focused its efforts to prevent and control malaria in pregnancy on behavior change communication (BCC) at the community level to promote early and frequent antenatal care (ANC) clinic attendance and improve understanding of the benefits of IPTp.

With FY 2015 funding, PMI will procure approximately 2.8 million treatments of SP for IPTp provided at ANC clinics following the new WHO IPTp guidelines. With the ability to re-engage with health facilities, PMI will also strengthen MIP activities to increase IPTp uptake including MIP training curriculum uptake, training midwives and ANC staff at health facilities, and the broad dissemination of updated MIP policy and guidelines.

Case management: The NMCP policy requires that, where possible, all cases of malaria be diagnosed by microscopy or a rapid diagnostic test (RDT). PMI activities to improve diagnostics, supply chain management, and case management at public health facilities were suspended in FY 2009. While working under political restriction since that time, PMI has invested in community-based interventions and support to private sector non-governmental organizations (NGOs) and faith based organizations (FBOs). PMI has supported integrated community case management (iCCM) of malaria, pneumonia, and diarrhea in rural communities more than five kilometers from the nearest health facility and has reached about one-third of those communities nationwide. To date, PMI has supported training of more than 11,000 Community Health Volunteers (CHVs) in malaria case management including use of RDTs for diagnosis. In collaboration with implementing partners, PMI has set up 933 malaria commodities supply points at the commune level to serve the CHVs. PMI has also supported training in malaria diagnostics and RDT use by providers from NGO and FBO run health facilities. With FY 2014 funding, PMI will be supporting an assessment of malaria case management quality in public and private health facilities.

With FY 2015 funding, PMI will procure approximately 2 million RDTs and 1.2 million ACTs for malaria case management at health facility and community level. PMI will also support refresher training and supportive supervision of CHVs and health facility workers for malaria case management. With the lifting of the USG restrictions for working with the GoM, PMI will provide support to build the national capacity for quality assurance and quality control in

diagnostics, including the implementation of recommendations from a 2014 diagnostics assessment.

Monitoring and evaluation (M&E): The NMCP, with support from Global Fund and other partners, has developed a National Malaria M&E Strategy and Plan. PMI contributed to the nationwide 2008/2009 Demographic Health Survey (DHS), the 2011 and 2013 Malaria Indicator Survey (MIS), the 2013 Millennium Development Goal survey and continues to provide support for fever surveillance at 15 sentinel sites. PMI is working with partners to strengthen M&E for community-based interventions.

With FY 2015 funding, PMI will strengthen M&E nationally by supporting expansion, improving reporting quality, and ensuring timeliness of epidemic surveillance. PMI will support the planning and implementation for the next MIS, including the collection of malaria biomarkers, slated for 2016. PMI will also continue to support high-quality data reporting of malaria indicators from the 15 fever sentinel sites and 9 entomology monitoring sites. PMI will also support therapeutic efficacy studies in 6 sites.

Behavior Change Communication (BCC): PMI supports a variety of BCC strategies to promote healthy behaviors including mass- and mid-media approaches such as radio spots, mobile videos with local actors, and print materials for sensitization. PMI continues its support for the *Champion Commune* approach, which works with the local Health Development committees (CDS), NGOs, and Roll Back Malaria partners to establish an innovative community empowerment and mobilization program. In FY 2014, PMI is coordinating with the NMCP and implementing partners to strengthen BCC approaches for malaria prevention and treatment at the community level by emphasizing interpersonal communication methods. This includes the promotion of the *Champion Commune* approach, with a particular focus on an integrated community management of pneumonia, diarrheal diseases, and malaria. PMI also collaborates with the Peace Corps on activities to improve malaria treatment-seeking and prevention behaviors.

With FY 2015 funds, PMI will support the implementation of harmonized key message around malaria prevention and care seeking, at the community and in health facilities. PMI will continue to support a third-year malaria PCV to coordinate the involvement in malaria control of all PCVs throughout Madagascar.

Operational Research (OR): PMI supports the NMCP's operational research priorities as outlined in the 2013–2017 national strategic plan. With FY 2013 funds, PMI is supporting a school-based serology survey to validate facility-based data used for prioritizing focalized IRS in the CHL.

With FY 2015 funds, PMI will support an operational research study to assess the effectiveness and costs of various approaches to active case detection in pre-elimination districts of the Central Highlands. The study would examine reactive case detection of passively detected malaria cases, in order to help the NMCP determine the most effective approaches to further reducing and maintaining malaria transmission at low levels.

II. STRATEGY

1. Introduction

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

FY 2008 was the first year of PMI funding in Madagascar. The FY 2015 Malaria Operational Plan (MOP) presents a detailed implementation plan for Madagascar based on the National Malaria Control Program's (NMCP's) five-year National Strategic Plan, 2013–2017. The activities that PMI is proposing to support fit in well with the 2013–2017 National Malaria Control Strategy and build on investments made by PMI and other partners, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund), to improve and expand malaria-related services. This document briefly reviews the current status of malaria control policies and interventions in Madagascar, describes progress to date, identifies challenges and unmet needs if the targets of the NMCP and PMI are to be achieved, and provides a description of planned FY 2015 activities.

FY 2015 MOP takes into consideration the lifting of restrictions from the United States Government (USG), as a result of the Government of Madagascar (GoM) holding internationally recognized free and fair elections to elect the new President in December 2013. This MOP reflects plans for direct reengagement of USG with GoM, including public sector systems assessment and programs implementation.

2. Malaria Situation in Madagascar

The estimated population of Madagascar was 21.3 million in 2012[1] of which approximately 19% are children under five years of age and 4.5% are pregnant women. Madagascar is one of the poorest countries in the world with an average per capita income of $430.[2] In 2013, 91% of the population was estimated to live under the poverty line with less than two dollars a day[3], an increase from 69% in 2011.[4] In 2012, malaria was the second leading cause of death among

[1] Annuaire Statistique 2012
[2] World Bank, 2011
[3] MDG Survey Report 2013
[4] EPM 2005, EPM 2010

children under five years of age reported from district hospitals.[5] Life expectancy is 65 years for women and 62 years for men.[6]

Madagascar witnessed a decade of health improvement between 1997 and 2008. According to the 2008/2009 Demographic and Health Survey (DHS), under-five mortality fell from 159 per 1,000 live births in 1997 to 72[7] and 62[8] per 1,000 live births by 2008 and 2012 respectively. Other determinants of child survival — such as morbidity and coverage of important health interventions — have improved significantly during this period. For instance, between 1997 and 2008, the prevalence of diarrhea in children decreased by about 70% and respiratory infections by approximately 87%, while the proportion of moderately or severely anemic children fell by 59% between 1997 and 2008.

Despite these improvements in child health indicators, Madagascar still faces major health challenges, which threaten social and economic development. Access to and quality of health services have been negatively impacted by the political crisis, which started with the March 2009 coup and led to more than 200 *centre de santé de base* (CSB) closures over the last five years. National health infrastructure, information, and commodity management systems are extremely weak, and much remains to be done at central and regional levels to ensure quality services and sustainable health financing.

These challenges have a significant impact on overall health and malaria activities at every level of the public health system. There have been delays in planned health policy reform, limited supervisory and monitoring visits due to security issues and lack of funds, delayed data reporting, and interruptions in supplies of essential medicines to the health facility level. The nongovernmental sector has reported difficulties due to insecurity in the field and reduced capacity of the health sector at the decentralized level as a result of changes in personnel and delays in fund disbursements.

Malaria transmission and epidemiology: Malaria is endemic in 90% of Madagascar; however the entire population is considered to be at risk for the disease. Malaria cases and deaths reported through the national Health Management Information System (HMIS) have fallen between 2003 and 2012. Overall, hospital deaths attributed to malaria fell from 17% in 2003 to 10% in 2012. In 2012, malaria was the fourth leading cause of outpatient consultation, and 5% of all children under five years of age admitted to a hospital were diagnosed with severe malaria.[9] Severe malaria remained among the top five causes of reported overall mortality.

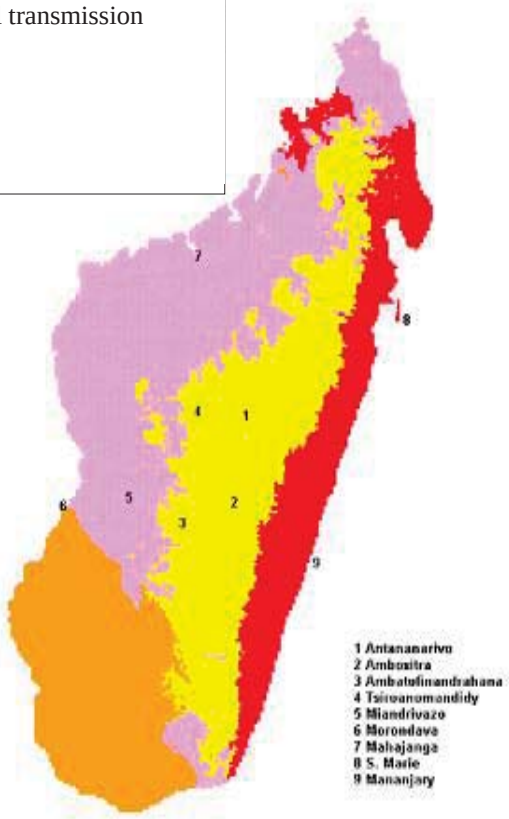
The country has been stratified into four malaria epidemiologic zones based on the duration and intensity of malaria transmission: the West Coast including the North; the Central Highlands; the East Coast; and the South, roughly corresponding to the bioclimatic map below. The rainy season varies, starting in late October or early November and lasts until April or May; however, on the East Coast the rainy season and increased malaria transmission may last as long as nine

[5] Annuaire Statistique 2012
[6] WHO Global Health Observatory Data Repository 2012
[7] DHS 2009 Report
[8] MDG Survey Report 2013
[9] Annuaire des Statistiques Sante 2012

months. The cyclone season extends from December to April. In February 2013, Cyclone Haruna hit Madagascar, resulting in widespread devastation and destruction of homes and property in the southwest. Cyclones often result in flooding and increased risk of communicable diseases and malaria, compounded by the loss of ITNs.

Figure 1: Madagascar Malariometric Stratification

Red: Lowland perennial transmission;
Pink: Lowland long transmission season;
Yellow: Highland unstable seasonal transmission (epidemic prone);
Orange: Semi-desert unstable seasonal transmission (epidemic prone).



The East Coast has perennial transmission and the West Coast has seasonal transmission that typically runs from October to May with reduced transmission in July and August. In both regions, immunity among adults is reported to be high and most morbidity and mortality is among children under five years of age and pregnant women. Almost one-third of the Central Highlands lies above 1,500 meters, where malaria transmission does not occur, or the transmission season is short, seasonal, and unstable. In the semi-desert South, transmission is also seasonal but very unstable and in some areas, is almost absent. Immunity is limited in the human population of both the upper Central Highlands and the South, and those areas are prone to periodic epidemics, which are often associated with high levels of mortality in all age groups. The most recent large-scale epidemic occurred in the late 1980s in the Central Highlands and killed an estimated 30,000 people. The Fringe districts of the Central Highlands are those areas with an altitude between 800 and 900 meters that lie between the epidemic-prone areas of upper Central Highlands and the malaria-endemic areas on the coasts.

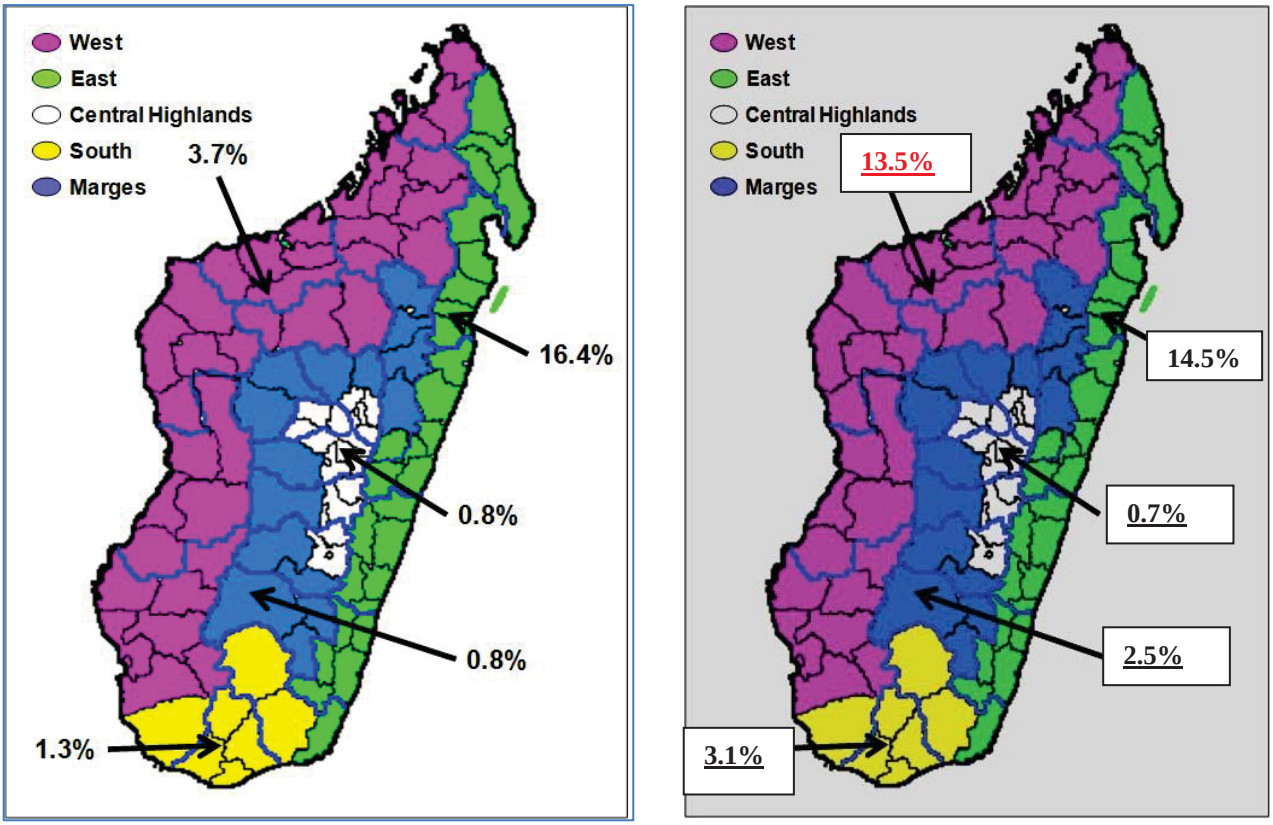
Because of the scale-up of prevention and case management interventions over the past few years, the transmission dynamics of malaria are changing. The new national strategy has organized the country into three geographic zones based on the local epidemiology and level of coverage of malaria interventions: control, consolidation, and pre-elimination zones.[10]

Plasmodium falciparum is the predominant species of malaria parasite in all areas. The 2013 Malaria Indicator Survey (MIS) found less than 1% of *P. vivax and P. malariae*, however historically the prevalence of non-*Plasmodium falciparum* infections has been higher in certain epidemiological zones. The two primary vectors are *Anopheles gambiae* (East and West Coasts) and *An. funestus* (Central Highlands and South). *An. arabiensis* is present in all four epidemiological zones. *An. funestus* increases in abundance during the rice-growing season and was the primary vector responsible for the outbreaks in the Central Highlands in the late 1980s. Since this vector prefers to feed and rest indoors, it is quite sensitive to IRS. *An. arabiensis*, also present in the Central Highlands, is more ecologically independent of humans and their domestic environment. *An. mascarensis* has been reported as a primary vector in the southeast and as a secondary vector on the island district of Sainte Marie.

Two Malaria Indicator Surveys (MIS) were conducted in 2011 and 2013 during the high transmission season in April–May. The 2011 MIS followed a national scale-up of malaria prevention interventions from 2006–2010, including the first nation-wide universal coverage campaign of ITNs in 2009–2010. The 2013 MIS followed the November/December 2012 ITN mass distribution campaign on the East Coast, but remaining districts had not been covered for three years during the time of the survey. In addition the IRS strategy changed in 2012 moving from generalized to focalized spraying which resulted in much less coverage of IRS in the Central highlands and the fringe areas. Overall there was lower coverage of malaria interventions in the Central Highlands (CHL), Fringe, and the South which contributed to the increase in parasitemia prevalence in 2013. The MIS 2011 showed lower than expected parasitemia prevalence among children under five years of age, at 6.2% nationally with the following point estimates: 0.8% in the Central Highlands, 0.8% in the bordering Fringe zone, 1.3% in the South, 3.7% on the West Coast, and 16.4% on the East Coast. The MIS 2013 showed an unexpected national increase in parasitemia among children under five from 6.2% in 2011 to 9.1% in 2013. It also demonstrated increases in parasitemia point estimates in the West (13.5%), in the South (3.1%), and the Fringe (2.5%), and a slight reduction on the East Coast from 16.4% to 14.5%, and in the Central Highlands from 0.8% to 0.7%, as shown in Figure 2. These findings underscore the need to maintain high levels of malaria prevention coverage. In addition, these findings suggest that high coverage with ITNs is effective in bringing down parasitemia levels.

[10] WHO *Malaria Elimination: A field manual for low and moderate endemic countries*

Figure 2: Malaria parasitemia in children < 5 years of age, Madagascar, MIS 2011 &2013



MIS 2011 **MIS 2013**

3. Country Health System Structure and Ministry of Health Organization

The Ministry of Health (MoH) at the national level is represented by the cabinet of the Minister of Health and the national directorates reporting directly to the MoH Director General under the Secretary General of the MoH. Madagascar is administratively divided into 22 regions, 119 districts, 1,579 communes, and 17,485 fokontany,[11] the equivalent of villages in most African countries. Each region has a regional health directorate and a regional hospital. There are only 112 health districts. Contrary to other administrators in Madagascar, the fokontany chief is chosen through a grass roots selection process by community members and is not affiliated with a political party.

[11] INSTAT, 2012

The organization of the health system follows the same general organization as the administrative system down to the district level. At the commune level there is at least one public primary health care facility, known as a *centre de santé de base* (CSB), serving each commune. The formal health system is composed of four levels[12]:

- There are six university teaching hospitals in the capital city and five former provinces that serve as specialized referral centers.
- There are 16 regional hospitals for patients requiring a higher level of care that serve as tertiary care health facilities.
- There are 150 first referral hospitals serving as secondary care for the primary health centers.
- There are over 2,509 public primary health centers or CSB. Among these 1,614 are known as CSB Level II and are supposed to be staffed with at least one doctor. There are also around 895 CSB I, staffed by a nurse or paramedic and in some cases a nurse's aide.

In addition, about 630 health facilities are privately run, and predominantly by non-governmental organizations (NGO)/faith based organizations (FBOs). The majority of these facilities are classified as CSBs. Since 2012, PMI supports training and donation of malaria commodities, mostly RDTs, in 161 non-public facilities offering malaria diagnostics and treatment services. Some FBO-run hospitals are part of the district level hospitals[12]

The MoH has a critical staff shortage at all levels of the public health system, especially for service provision below the central level. In addition, health workers are not distributed equitably throughout the country, resulting in higher concentrations of qualified health staff in the urban areas. According to the 2012 National Health Statistics (*Annuaire des Statistiques du Secteur Sante*), the national ratio of doctors to the population is 1 per 7,201, with rural regions having fewer than one doctor for every 10,000 inhabitants.

Regional directors oversee health teams that implement integrated health interventions; currently all regional teams and district health teams have malaria focal persons. The District Hospital is the first referral structure for CSBs; the district health team, currently known as *service de santé de district* is headed by a medical chief called *Médécin Inspecteur*, responsible for technical supervision of all CSBs in his/her jurisdiction.

The malaria control service was established in 1921 with the aim of preventing malaria epidemics. Until the late 1980s, the focus was on the 26 epidemic-prone districts. In 1998, the first five-year national malaria control strategy was designed, defining control interventions per transmission zones and introducing the use of chloroquine for community-based malaria treatment and chemoprophylaxis among pregnant women. In June 2011, the GoM elevated the malaria control service to a National Malaria Control Program (NMCP) directorate level in the MoH organizational structure. Assisted by a Deputy Director, the NMCP Director supervises a team comprising six technical divisions: Vector Control, Case Management, Laboratory, Epidemiologic Surveillance, M&E, and BCC, and one support division: Finance and Administration. With the June 3rd, 2014 Government Decree restructuring the organization of the MoH, the NMCP was elevated to the cabinet level, under direct supervision of the Minister.

[12] Annuaire des Statistiques du Secteur Sante 2012

In 2008, Madagascar approved an integrated community case management (iCCM) package offered by Community Health Volunteers (CHVs) to provide health services at the fokontany level. Currently, CHVs provide treatment for uncomplicated malaria with ACTs, acute respiratory infections with antibiotics, diarrhea with oral rehydration solution and zinc tablets, family planning for eligible families, micronutrient supplementation, and nutrition monitoring and referral. The community-based health services policy plans that CHVs will provide a more comprehensive package of services including primary care to newborns. Two recent pilots, one testing the resupply of pregnant women with iron and folic acid and a second testing the administration of pregnancy tests by CHVs were successful and are being scaled up. Based on the national implementation directives, each fokontany has a team of two CHVs, one specialized in child health and another in maternal and reproductive health. Plans are underway to cross-train all CHVs so that they can at least advise and refer all maternal and child patients in their respective communities. There are over 34,000 CHVs in the country, trained mostly by a Global Fund National Strategy Application (NSA) grant and by the United States Agency for International Development (USAID)-funded integrated bilateral health projects.

The iCCM package delivered by CHVs supported by USAID-funded projects targets populations in fokontanys located five kilometers or more than one hour's walk from the nearest health facility. However, the selection and establishment of CHVs supported by Global Fund is not based on the same distance criteria. Efforts are underway to harmonize the two approaches. In addition, three directorates in the MoH — NMCP, Maternal Child and Reproductive Health, and the Health Districts Directorate — have a share in the oversight of the iCCM activities, which makes coordination and ownership a challenge. Especially challenging are harmonization of supervision tools and content, commodity management, activity reporting, and data management.

4. Country Malaria Control Plan and Strategy

Madagascar's National Strategic Plan for the period 2013–2017 identifies different epidemiological levels and provides key intervention for each phase: control, consolidation and pre-elimination. The table below describes the key strategies in each transmission zone.

Table 1: NMCP Strategy by Intervention and Transmission Zone

Strategies/interventions	Higher-Transmission Control Zones (<80% interventions coverage: Scale-up)	Moderate to low Transmission (≥ 80% intervention coverage: Control Zones (Consolidation of Interventions)	Low transmission Pre-Elimination Zones (Slide positivity rate <5% among suspected cases)
IRS			
Universal IRS		√	√
Focalized IRS for epidemic response		√	√
ITNs			
ITN universal coverage	√	√	
ITN coverage in households at increased risk			√
Routine ITN distribution	√	√	
Focalized ITN distribution in response to epidemics		√	√
IPTp			
IPTp among pregnant women	√	√	
Case management			
Diagnostic case confirmation	√	√	√
ACTs for confirmed cases	√	√	
Radical treatment (ACT plus primaquine) for confirmed cases			√
Surveillance			
Weekly surveillance	√	√	√
Active case detection during an epidemic (ACTS for confirmed cases)	√	√	
Active case detection, around index case (ACT + PQ for confirmed cases)			√

The National Strategy includes the following criteria for each phase of malaria control based on World Health Organization (WHO) guidelines:

Control zone applies to areas where: parasitemia prevalence among children under 5 years of age is ≥2%, microscopy and RDT test positivity rate >5%, at least 10% of the population is tested, and the annual number of malaria cases (Annual Parasite Incidence; API) is >10 cases/1000 population.

There are two types of control phases:

1) Control phase 1: where the zone has less than 80% coverage of malaria interventions and the priority is on scaling up interventions
2) Control consolidation phase: where the area has more than 80% coverage of malaria interventions and the priority is on maintaining high coverage and reinforcing surveillance to move to pre-elimination phase.

Pre-elimination zone applies to areas where: parasitemia prevalence among children under 5 years of age is <2%, microscopy and RDT test positivity rate is <5%, at least 10% of the population is being tested, and the API is <10 cases/1000 population.

There are presently no pre-elimination zones in Madagascar; however, the NMCP is currently putting in place all measures necessary to declare certain districts as pre-elimination districts by 2016. While some limited geographic zones may meet some of the pre-elimination criteria (for example, <5% test positivity rate and <10 cases/1000 population reported through health facilities), data are still inadequate to be able to confirm all criteria are met to classify a zone as pre-elimination and shift to a pre-elimination strategy. As such, the current focus is on control until the pre-elimination criteria are confirmed and remain stable over time.

ITNs: In 2008, a major strategic change regarding ITN distribution in Madagascar occurred, moving from targeted distribution of ITNs to vulnerable groups to universal coverage, defined in the 2008–2012 National Strategy as two nets per household. The goal of two nets per household was applicable to all 92 malaria endemic districts, but excluded the 20 health districts of the CHL that received IRS and where epidemic surveillance systems were in place. According to the 2008–2009 DHS, the average household size in Madagascar is 4.7 (4.8 in the rural areas). In order to achieve the objective of two ITNs per household, the distribution methodology of one ITN per three persons during free mass campaigns (which translates into one ITN per 2.4 persons) was adopted to ensure equity.

Under the 2013–2017 National Strategic Plan (NSP), the universal coverage goal was changed from two ITNs per household to one ITN for every two persons. By the end of 2015, the goal is for at least 80% of all households in targeted districts to own at least one ITN per two persons.
Madagascar prioritizes free ITN distribution through mass campaigns as the primary approach to scaling up to universal coverage. In addition, four “keep up” strategies are supported: routine distribution of free ITNs through antenatal care (ANC) and expanded program on immunization (EPI) clinics targeting pregnant women and infants; continuous distribution in perennial transmission East Coast aiming to cover every sleeping spaces and replacing damaged or lost nets; and the sale of highly subsidized ITNs in some peri-urban communities.

IRS: The 2013–2017 National Strategic Plan calls for focalized IRS stratified by commune in three geographic zones, which have completed three to four consecutive years of blanket IRS: the CHL; the Fringe areas bordering the CHL; and districts to the west and south of the Fringe. Blanket IRS was coupled with free mass ITN distribution in 37 out of the 53 districts that received nets in the 2010 and 2013 mass distributions. These included all IRS districts except for those in the CHL. At the end of the 2011 spray round, the CHL and Fringe districts (32 districts) completed four consecutive years of universal IRS coverage and transitioned to spraying in the

30% of communes with the highest malaria transmission, based on the incidence of reported malaria at health facilities. By the end of the 2012 spray round, the extension districts to the South and West (21 districts) had received three consecutive years of blanket IRS coverage and the majority of districts transitioned to focalized IRS, except the 7 districts in the South. Focalized IRS includes only the highest transmission communes for spraying and relies on malaria surveillance and response planning to prevent epidemics. Approximately 30% of all communes undergo spraying prioritized based on clinical and entomological data that show the highest levels of ongoing transmission.

MIP: IPTp has been implemented since 2004 in 93 fringe and coastal districts where malaria transmission is stable or seasonal. The policy excludes 19 districts in the CHL, which are epidemic prone. The malaria in pregnancy (MIP) strategy includes the provision and promotion of ITN use during pregnancy and IPTp, delivered as a package during ANC visits. The 2013–2017 NSP calls for two doses of sulfadoxine-pyrimethamine (SP) to be taken at least one month apart: the first dose after quickening and the second dose one month later. However, the NSP is currently undergoing an amendment to update the IPTp policy to four doses of SP starting after quickening.

Administration of IPTp should be directly observed and free-of-charge. CHVs play an essential role in promoting the use of antenatal services. All focused antenatal care, including tetanus vaccination and malaria prevention activities, is integrated at the CSB level. The NMCP works closely with the *Direction de la Santé de l'Enfant, de la Mère et de la Reproduction* (Directorate of Child and Maternal Health and Reproductive Health) to plan and implement MIP activities, including IPTp. The NMCP has also included IPTp as part of an integrated ANC services package during the mother and child health promotion weeks held twice a year in April and October. In addition to ANC counseling activities, these biannual health weeks distribute vitamin A and deworming medicines to children 6 – 59 months, and iron, and folic acid to pregnant women, conduct mass immunization campaigns, and disseminate health promotion messages.

Case Management: ACTs were adopted as the first-line treatment for malaria in 2005. ACTs and RDTs were rolled out in public health facilities from late 2006 through 2008 and at the community level in late 2008. The NMCP policy requires that, where possible, all cases of malaria be diagnosed by microscopy or RDT, including at the community level. Where biological diagnosis is not possible, diagnosis should be based on clinical evaluation and treatment should be provided after other causes of fever have been excluded.

The 2013–2017 National Strategic Plan calls for correct and timely diagnosis and treatment of at least 95% of malaria cases seen at health facilities. In pre-elimination districts, the national strategy calls for use of RDTs coupled with progressive use of microscopy and eventual use of molecular testing from filter paper blood spots. The plan sets a target for correct case management, including biological diagnosis using microscopy or RDTs, of at least 80% of fever cases among children under five years of age evaluated and treated at the community level within 24 hours of fever onset. First-line treatment is artesunate-amodiaquine (AS/AQ) (except for pregnant women in their first trimester, in which case treatment is oral quinine); in pre-elimination zones, the national strategy also calls for administration of a single dose of primaquine in addition to AS/AQ for cases of simple malaria, except in pregnant women and

children less than four years of age. Treatment of severe malaria is injectable artesunate at the hospital level. Rectal artesunate should be administered as a pre-referral treatment at community and health facility level for symptoms of severe malaria in children less than five years of age. As of mid-2014, injectable artesunate and pre-referral rectal artesunate have not yet rolled out but this is planned to occur before the end of 2014.

PMI has supported the training of more than 11,000 CHVs in integrated community case management in rural communities located at more than five kilometers from the nearest health facility, covering about one-third of those communities nationwide. Global Fund is also supporting the scale up of CHVs, and with support from these donors, by the end of 2012, over 35,000 CHVs were trained in over 17,000 fokontanys. CHVs have been trained to use RDTs to confirm all malaria cases. They are also trained in integrated case management of diarrhea and pneumonia, providing treatment with oral rehydration salts plus zinc and cotrimoxazole, respectively.

The national strategy objectives for the management of malaria commodities are as follows:
In areas in the malaria control/consolidation phase:

- At least 95% of health facilities experience no stockout of RDTs and ACTs of longer than one week over the previous three months
- At least 95% of health facilities experience no stockouts of SP or ITNs of longer than one week over the previous three months

In areas in the malaria pre-elimination phase:

- 100% of districts have a system of routine quality assurance and quality control
- No clinic experiences a stockout of RDTs or ACTs of more than one week over the previous three months

5. Integration, Collaboration, and Coordination

Several donors and partners support malaria interventions in Madagascar, including PMI, Global Fund, United Nations Children's Fund (UNICEF), WHO, the Principality of Monaco, and Roll Back Malaria (RBM)/Southern Africa Regional Network, with the NMCP coordinating all partners. Under NMCP leadership, a strong local RBM partnership has been established, and committee meetings are held monthly. Over the last three years, RBM partners worked closely to oversee and conduct two Malaria Indicator Surveys (MIS 2011 and MIS 2013), to plan and design the Malaria Program Review (July 2011), to organize and facilitate a national conference on pre-elimination (November 2011) to inform the new 2013–2017 National Strategic Plan, to conduct the 2012 and 2013 mass distribution of over nine million ITNs in 92 districts, and to coordinate technical assistance as needed at all levels. Currently, RBM partners are preparing an ITN mass distribution for August/September 2015 to cover all the 92 districts targeted for ITNs in a window of two months.

With FY 2015 funding PMI will continue to seek opportunities to collaborate with USG health programs to ensure maximum impact for every health dollar the USG invests in the country. The integration of maternal and child health services at the community level is an example which

PMI has been supporting since 2009. Since malaria prevention and control activities have been implemented as part of integrated maternal and child health services, PMI will contribute to strengthen the capacity to deliver these services. PMI will work with other USG-funded programs and other partners to support the comprehensive primary health care package, including the training and implementation of community-based diagnosis and treatment of fever, IPTp, and early correct case management. With FY 2015 resources, PMI will continue to support universal coverage of ITNs via continuous distribution campaign and various keep-up distribution methods.

6. Goal and Targets of the President's Malaria Initiative

The goal of PMI is to reduce malaria-associated mortality by 70% compared to pre-Initiative levels in the 15 original PMI countries and to reduce malaria associated mortality by 50% in new countries added to PMI in FY 2010 and later. By the end of 2015, PMI will assist Madagascar to achieve the following targets in populations at risk for malaria:

• >90% of households with a pregnant woman and/or children under five years of age will own at least one ITN;
• 85% of children under five years of age will have slept under an ITN the previous night;
• 85% of pregnant women will have slept under an ITN the previous night;
• 85% of houses in geographic areas targeted for IRS will have been sprayed;
• 85% of pregnant women and children under five years of age will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the last 12 months;
• 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy
• 85% of government health facilities will have ACTs available for the treatment of uncomplicated malaria; and
• 85% of children under five years of age with suspected malaria will have received treatment with ACTs within 24 hours of onset of their symptoms.

7. Progress on coverage/malaria indicators

The most recent DHS was carried out from November 2008 to August 2009 and provides baseline indicators for PMI in Madagascar. Child mortality was estimated at 72 per 1,000 live births by the direct method. A Millennium Development Goal (MDG) survey was conducted in December 2012/January 2013 and estimated child mortality at 62 per 1,000 live births, a small decrease from 2009, but with a stagnant and high maternal mortality rate of 479 deaths per 100,000 live births. Additional household surveys carried out include the MIS in 2011 and 2013. Supplementary data, including routine malaria-specific HMIS data and malaria program data compiled by the NMCP, are reported and centrally stored in a national malaria database. Some national malaria indicators have been estimated based on these data and additional sources such as special studies and limited surveys. Results for these malaria indicators are summarized in the tables below.

Table 2: Nationwide household survey results, Madagascar 2008-2013

Indicator	2008-2009 DHS (PMI baseline)	2011 MIS	2013 MIS
Proportion of all households with at least one ITN	73%	94%	79%
Average number of ITNs per household[1]	1.1	1.8	1.4
Proportion of households with at least one ITN for every two people[1]	23%	40%	35%
Proportion of population with access to an ITN within their household[1]	44%	74%	61%
Proportion of individuals who slept under an ITN the previous night[1]	48%	82%	65%
Proportion of children under five years of age who slept under an ITN the previous night[1]	58%	89%	71%
Proportion of pregnant women who slept under an ITN the previous night[1]	58%	85%	68%
Proportion of women who received two or more doses of IPTp during their last pregnancy in the last two years[2]	8%	22%	21%
Proportion of houses sprayed with IRS in the 12 months preceding the survey[3]	Not available	79%	59%[4]
Proportion of population who slept under an ITN the previous night or in a house that has been sprayed with IRS in the last 12 months	Not available[5]	87%	71%
Proportion of children under five years of age with fever in the last two weeks who had a finger or heel stick	Not available	6%	15[1]%
Proportion of children under five years of age with fever in the last two weeks for whom advice or treatment was sought from a health facility or provider	41%	34%	44%
Proportion receiving ACTs, among children under five years of age with fever in the last two weeks who received any antimalarial drugs	5%	19%	54%
Proportion Receiving First-Line Treatment According to National Policy Among Children Under Five Years Old with Fever in the Last Two Weeks Who Received Any Antimalarial Drugs	2%	15%	39%
Proportion of children under 5 years of age with fever in the last 2 weeks who received treatment with ACTs within 24 hours of onset of fever	0.4%	3.8%	6.1%

Proportion of government health facilities that have ACTs available for treatment of uncomplicated malaria	Not available	Not available	Not available

[1]Among 92 targeted districts that receive ITNs per the national strategy 2008-2012
[2]Among 93 districts targeted districts that benefit from IPTp
[3]Among 53 targeted health districts that benefit from IRS per the national strategy 2008-2012
[4] In 2012 Madagascar transitioned from district-wide to focalized IRS targeting communes in the Central Highlands, but the MIS estimate is at the district level.
[5]The DHS 2008/2009 did not collect information on IRS

Table 3: Impact indicators

Indicator	2008/2009 DHS (PMI baseline)	MIS 2011	MIS 2013
All-cause under-five mortality rate (Direct method)	72/1000 live births	Not available	Not available
All-cause under-five mortality rate (Indirect, Brass method)	83/1000 live births	61/1000 live births[1]	58/1000 live births[1]
Proportion of children aged 6-59 months with malaria parasitemia	Not available	6.2%	9.1%
Proportion of children aged 6-59 months with a hemoglobin of <8 g/dL	2.5%	1.4%	3.8%

1 http://data.worldbank.org/indicator/SH.DYN.MORT: Estimates developed by the UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division)

8. Other relevant evidence on progress

A major cross-sectional study conducted in 2012/13 by *Institut Pasteur Madagascar* (IPM) to evaluate the efficacy and impact of malaria interventions collected blood samples and administered household questionnaires in 62 sites and 15,465 participants throughout the country. Preliminary results from the study found that 3.7% of participants were RDT-positive, and that ITNs had a protective effect on the population. However, results also showed that combining ITNs and IRS in low-transmission zones had no significant added value, and the protective effect of IRS in low-transmission areas was still questionable.

9. Challenges, Opportunities, and Threats

Due to the previous political constraints related to working with the GoM since March 2009, the USG and some other donors were not able to support health interventions, such as malaria case management, monitoring and evaluation, program supervision and reporting, and behavior change communication activities in the public health sector over the last five years. Inadequate supervision, lack of refresher training, staffing shortages, incomplete and inaccurate reporting, and commodity stockouts have continued to pose challenges across the public health services and the NMCP. The NMCP, along with partners, has engaged CHVs to deliver iCCM for malaria, pneumonia, and diarrhea. However, results from a CHV assessment conducted in 2011 showed weaknesses in the ability of CHVs to assess symptoms, determine the correct diagnosis,

and administer a correct treatment or refer. Only 51% of the CHVs observed performed satisfactorily compared to a gold standard measurement. PMI bilateral partners are currently conducting refresher training and formative supervision of CHVs to address this issue.

Following the successful presidential and legislative elections in December 2013, international donors resumed direct support to the government of Madagascar in the first semester of 2014, and the USG lifted restrictions on May 27, 2014. With the resumption of support to the public health sector, PMI will directly engage and collaborate with the NMCP in the implementation of the national malaria control strategy. More specifically, PMI will provide technical and material assistance to strengthen NMCP capacity to plan and coordinate inputs from various malaria partners. At the implementation level, PMI will support the districts and CSB health teams to increase supervision of CHVs' work and re-engage efforts to strengthen health facility services, including training of health care staff and ensuring availability of malaria commodities.

An estimated 50–60% of the population does not seek care in health facilities when they are ill; some rely on self-treatment with drugs purchased from the informal sector. Other factors limiting the use of health facilities include long distances or physical barriers such as crossing rivers in order to reach the nearest health facility, and lack of monetary income to pay for health services. With the lifting of USG restrictions, PMI will re-engage at the facility level to focus on improving service delivery.

Parallel supply chain systems exist in Madagascar: one for the public sector and one for socially marketed products. Highly subsidized sales of health commodities through social marketing have been promoted historically in Madagascar with funding both from the Global Fund as well as the USG. However, weak commodity management, frequent delays due to late financing from donors, and inadequate stock management and information systems lead to stockouts. PMI and Global Fund are coordinating efforts to improve supply chain management for the socially-marketed ACTs; the European Union and the French Cooperation are supporting the strengthening of Madagascar Central Medical Stores (SALAMA), the national entity in charge of procurement and distribution of medical and pharmaceutical commodities.

An assessment of the national pharmaceutical management capacity in 2008 highlighted several constraints: (1) lack of trained pharmacists in public pharmacies; (2) weak institutional capacity; (3) insufficient pharmaceutical policies and guidelines; (4) low capacity and inadequate human resources for pharmaceutical management in the health care system; (5) multiple vertical health programs lacking integration and coordination; and (6) logistics and distribution challenges at the peripheral level. These constraints still remain. The adoption and expansion of the community health services through the established CHVs to conduct preventive activities and iCCM is a partial but significant response to improving access to services and care seeking behaviors. With regards to pharmaceutical management, specific USG-supported interventions, including PMI, will be developed based on the findings of a supply chain assessment conducted in July/August 2014 by the Madagascar USAID/Health, Population and Nutrition office.

Lastly, more than 35,000 CHVs had been trained in community case management by December 2012. To date, community level reporting is neither complete nor timely and is of variable quality. In addition, the current HMIS database includes only partial reporting of cases (malaria,

diarrhea, and pneumonia) from the community level and the information is only beginning to reach the central level. Future PMI support will focus on efforts to improve technical supervision, CHV performance, and strengthen reporting.

III. OPERATIONAL PLAN

1. Insecticide-Treated Nets

NMCP and PMI objectives
Under the 2013–2017 National Strategic Plan, Madagascar has adopted one ITN for every two persons to achieve universal coverage for all zones in the control and consolidation phase, and coverage of households at increased risks and in epidemic response in the pre-elimination phase. There are presently no pre-elimination zones in Madagascar; however, the NMCP is currently putting in place all measures necessary to declare certain districts pre-elimination districts.

Progress since PMI was launched
Madagascar completed nationwide, mass campaigns to deliver free ITNs to reach all persons living in malaria endemic areas in 2009–2010 and again in 2012–2013. The 2009–2010 campaign achieved an average of 1.8 ITNs per household compared to the then national target of two ITNs per household. This resulted in high ownership with 94% of households reporting ownership of at least one ITN six months after the campaign compared to 72% ownership in 2008–2009.[13] These results were similar by geographic zone, household economic status, and households with and without children under five years of age. Furthermore, 82% of all individuals sleeping in the household the night before the survey reported sleeping under an ITN and there was even higher usage among children under five years of age and pregnant women (89% and 85% respectively).

The 2012 and 2013 mass campaigns were conducted following the earlier strategy of two ITNs per household (equating to about 1 ITN: 2.4 persons) and delivered ITNs to 31 districts on the East Coast in 2012 and the remaining 61 endemic districts at the end of 2013.

Several reports, including a 2012 PMI assessment of the physical durability of nets distributed in late 2009 on the East Coast, indicate a rapid decline in net survivorship in Madagascar. Among 500 polyester and polyethylene ITNs tagged and examined 3 years later, only 152 (30%) remained in the households. Of those nets no longer present it is not known what proportion were lost due to attrition unrelated to physical durability (e.g. given away) and what proportion were no longer present due to loss of physical integrity. Among the 152 remaining nets found in households after 3 years, 80% were considered “serviceable”. Surviving polyethylene nets were found to have larger-sized holes overall and a larger estimated mean surface area of holes than polyester nets.

The durability assessment highlights the need to support delivery of ITNs between campaigns to maintain high coverage. Two channels have been traditionally used in Madagascar to deliver ITNs between campaigns: delivery through routine ANC and EPI clinics and social marketing.

[13] DHS 2008/9

Both were limited by net availability and far too few nets have been delivered to effectively or equitably cover the anticipated yearly ITN losses across the general population. PMI/Madagascar is testing another channel to improve availability and distribution of ITNs free-of-charge on a more continuous basis. This channel is a community-based intervention using CHVs to deliver ITNs to pregnant women, vaccinated children, and to new and existing households on an as-needed basis. PMI also distributes ITNs to communities in response to epidemics or disasters, such as cyclones. The current channels supported by PMI in Madagascar are listed in Table 4.

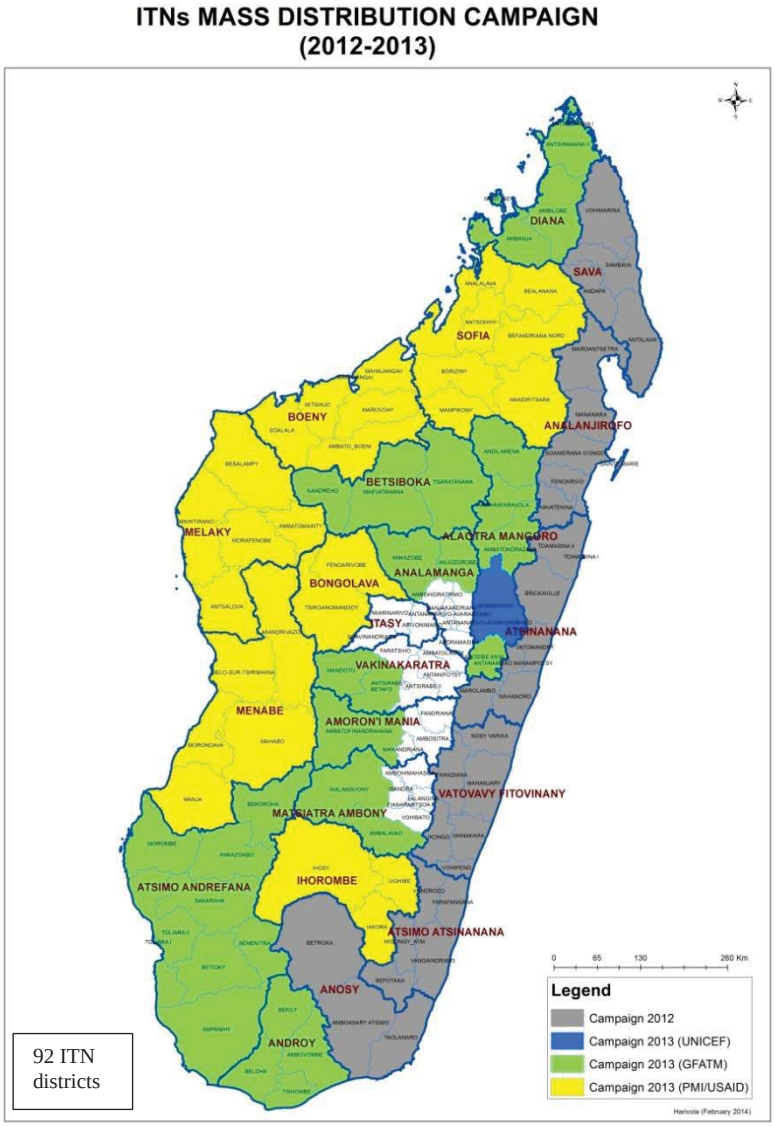
Table 4: Madagascar's national ITN distribution strategies for ITN targeted districts in control or consolidation phase

Type of ITN Distribution	***Strategy***	***Approach***	***Target Pop***	***Geographic Areas***
Free Distribution	Catch-Up	Mass Campaign	One ITN per 2 persons in 92 of the 112 health districts	92 out of the 112 health districts
	Keep-Up	Facility-based delivery to pregnant women at ANC visits to and vaccinated children at EPI visits	Pregnant women and vaccinated children	92 out of the 112 health districts
	Keep-Up	Delivery to pregnant women and vaccinated children at community level by CHVs (pending pilot results)	Pregnant women and vaccinated children	92 out of the 112 health districts
	Keep-Up	Community-based distribution through CHVs to those needing LLINs (pending pilot results)	General population based on a pull model driven by those with uncovered sleeping spaces and seeking ITNs through a CHV system	92 out of the 112 health districts;
	Emergency Response	Distribution in response to natural disasters and emergencies	One ITN per two persons in communities most affected by natural disasters, such as cyclones	Communities most affected by natural disasters such as cyclones
Social marketing	Keep-Up	Social marketing; commercial sales of subsidized nets	Those who can afford subsidized nets	Targeted peri-urban areas among the LLIN targeted health districts

Progress during the past 12 months

With FY 2012 funds, PMI procured and distributed 2.7 million ITNs to support a mass campaign in September 2013 and cover 28 districts primarily on the West Coast that last received ITNs in 2010. Global Fund procured 3.5 million ITNs to cover 32 districts in the Fringes, the North-West and the South in October 2013. UNICEF covered the remaining district and provided 230,000 ITNs. This was the second phase of the national campaign that covered a total of 61 districts. The first phase of the mass campaign was conducted in November/December 2012, and covered the East Coast, including 19 districts and 2.1 million ITNs procured and distributed by PMI, and 1.44 million ITNs in 12 districts in the same region procured by Global Fund. The entire campaign followed the existing national policy of two ITNs per household, or the equivalent of 1 ITN per 2.4 persons. The campaign was rolled out as shown in Figure 3 below.

Figure 3: Distribution of districts targeted for rolling ITN distribution campaign



PMI procured 43,000 ITNs with FY 2013 funding in support of a pilot in the district of Toamasina II as a community-based approach to deliver ITNs on as-needed basis. The target population is pregnant women, vaccinated children, and households with uncovered sleeping spaces such as new couples, immigrants, and households with destroyed ITNs. The approach relied on CHVs and local leaders to manage the distribution of ITNs to these target populations. PMI is awaiting the results of the pilot evaluation for guidance on the best strategy for scale up to the 31 additional districts on the East Coast that last received ITNs during the 2012 universal campaign. If results from the pilot are positive, PMI will support with FY 2014 funding the development of a community-based channel for delivery of ITNs to pregnant women that will be launched in as many of the 92 malaria endemic districts targeted for IPTp as feasible. The effectiveness will be evaluated to determine whether high, equitable coverage of ITNs can be maintained between mass campaigns. To complement these free distribution channels, PMI has supported social marketing of highly subsidized ITNs, at a price of approximately $1.30 per net to the end user. The social marketing approach is focused on peri-urban areas on the East Coast.

Table 5: ITN Gap analysis

Calendar Year	**2014**	**2015**[1]	**2016**[1]
Total Targeted Population	16,233,632	16,704,407	17,188,835
Continuous Distribution Needs (list by channel, calculate need as defined by national policy)			
Channel #1 (typically ANC)[2]	438,308	690,351	798,391
Channel #2 (typically EPI)[3]	569,800	673,092	691,939
Channel #3 (CHVs and local leaders-replacement and uncovered sleeping spaces)[4]	340,906	0	360,965
Channel #4 (Epidemics response)[5]	114,300	114,300	114,300
Channel #5 (Social marketing)	300,000	300,000	300,000
Estimated Total Need for Continuous	1,763,314	1,777,743	2,265,595
Mass Distribution Needs *(list and quantify need as defined by national policy (typically targeted population divided by 1.8 ITNs)*			
2015 mass distribution campaign, entire 92 districts	0	10,653,567 (all 92 ITNs districts in late 2015)	0
Estimated Total Need for Campaigns	0	10,653,567	0
Total Calculated Need: **Routine and Campaign** *(Total Continuous Need + Total Mass Need)*	1,763,314	12,431,310	2,265,595
Partner Contributions *(specify if limited by distribution channel—e.g. Global Fund is for campaign only)*			
PMI (estimated contributions by year)	700,000	5,675,000	2,000,000
Global Fund NSA2	359,000	6,147,000	0
Estimated Total Partner Contributions	1,059,000	11,822,000	2,000,000
Surplus/Carried over ITNs from previous year *(if needed))*	0	0	0
Total ITNs available in calendar year *(Total Contributions + Total Surplus)*	1,059,000	11,822,000	2,000,000

Total ITN Surplus* (Gap) *(Total Need-Total ITNs Available)*	(704,314)	(609,310)	(265,595)

*Surpluses are carried over into the next year, but deficits are not.
1. 2.9% population increase yearly
2. ANC: 4.5% population, 60% consultation; 10% annual increase (NMCP target)
3. EPI: 3.9% population, 90% coverage (NMCP target)
4. 14% population and 15% reach
5. 45000 households every year and 2.54 LLIN per household

PMI started monitoring the durability of three brands of ITNs distributed as part of the mass campaigns in 61 districts in 2013. Three thousand ITNs are being tracked during periodic assessments of three indicators of ITN durability: survivorship/attrition, fabric integrity, and bio-efficacy. The assessment is being implemented at 6 sites in rural and urban areas, and in the different malaria transmission zones. Results will allow the NMCP of Madagascar and its partners to better define the serviceable life of an ITN in the Madagascar setting, thereby better informing program decision making around timing of distribution and replacement of ITNs. Monitoring of the durability of nets may also allow local assessment of different ITN products to support procurement decisions, identify key care and repair strategies/messages to improve durability, and more accurately supply routine channels for ITN distribution between campaigns.

Plans and justification

Routine and continuous distributions:
FY 2015 funds will be used to support routine distribution in all 92 districts and continuous distribution of ITNs in the higher burden districts in the East Coast, including 92 districts benefiting from ITN mass campaign distribution supported with FY 2014 funds, and one additional MIP district. Continuous distribution will start within a year after the universal mass campaign planned for the last three months in 2015 and will target pregnant women, vaccinated children, and households with uncovered sleeping spaces such as new couples, immigrants, and households with destroyed ITNs. As data from Madagascar continue to show the need to support delivery of ITNs between campaigns to maintain high coverage, PMI will provide a proportion of the ITNs needed to cover the 92 districts for routine and continuous distribution.

PMI will also continue to monitor the durability of ITNs including physical integrity, survivorship and efficacy in all three brands of ITNs distributed in 2013 if still appropriate.

Proposed activities with FY 2015 funding ($7,452,000)

1. *Procure ITNs for 2016 distribution:* To procure about 2.0 million ITNs for distribution to 92 districts that last received long-lasting insecticide-treated nets (LLINs) through a mass campaign in late 2015. Assumes a cost of $3.60/ITN with delivery from port to central warehouse, and includes the cost of warehousing. *($7,340,000)*

2. *Support for continued assessment of net durability*: Includes monitoring the physical durability of different brands of ITNs that were distributed as part of mass campaigns in 2013. This supports the second-year data collection. *($100,000)*

3. *Technical assistance to ITN activities:* PMI will provide one Centers for Disease Control and Prevention (CDC) staff TDY to provide TA for monitoring and evaluation of ITN activities. *($12,000)*

2. Indoor Residual Spraying

PMI and NMCP objectives

The current national strategy recommends IRS in the epidemic-prone CHL, as well as the Fringe districts and southern part of the country. The national strategy calls for four years of blanket spraying before a shift to focalized spraying, based on health facility malaria cases and RDT positivity rates, and epidemic alert reporting. In the most recent IRS round, PMI supported focalized spraying in the CHL and Fringe districts, which was conducted November–December 2013, and blanket spraying in the South, which was conducted January–February 2014. Global Fund, in coordination with PMI, has traditionally provided additional support for IRS in the CHL and Fringe districts; however in the 2013–2014 IRS campaign, the Global Fund was unable to support any spraying due to grant disbursement issues.

PMI supports the national IRS strategy, which has historically been done by shifting away from its program objective of prioritizing 'high burden' (*viz.* with highest malaria prevalence) regions, e.g. the East Coast. Therefore, beginning in 2014, PMI has proposed to shift IRS to the East Coast for two to three years, to see if IRS can impact these areas of higher malaria prevalence. The East Coast was selected by in country stakeholders (including the NMCP, PMI and the Africa Indoor Residual Spraying project; AIRS) due to its high malaria burden, despite universal LLIN coverage. The combination of IRS and LLINs is expected to better control malaria in this area of high population density. The central highlands and surrounding areas, as well as the South of the country, all historical IRS targets, currently have a lower malaria burden. IRS historically has not been used in the East Coast, due to the lack of longer lasting insecticides on the market. With the WHO Pesticide Evaluation Scheme approval of the longer lasting organophosphate, Madagascar will try to better control malaria in the East. The NMCP has agreed to the change, and is planning to also conduct a research pilot to study the addition of IRS to ITNs in Madagascar's high prevalence areas. Although the timing of the research pilot has not been established, PMI will begin to collect both epidemiological and entomological surveillance data in high prevalence locations during the 2014 IRS campaign. HMIS data will be reviewed to look for similar trends based on measures of confirmed cases.

PMI will support one more round of focalized IRS in the CHL and Fringe areas in 2014, and starting in 2015, PMI will only support IRS in the East Coast. The NMCP plans to include IRS in the CHL as part of the Global Fund New Funding Model Concept Note, as a way to maintain IRS coverage in the CHL. In 2015, PMI will support an active case detection operational research activity in the CHL to better address the risk of a malaria resurgence in the CHL (see the Operation Research (OR) section for more details). In the South, where IRS will also be withdrawn, ITN distribution, as well as malaria diagnosis and treatment activities will be strengthened.

In addition to supporting IRS operations, PMI will continue to support routine entomological evaluation of IRS impact and vector-insecticide susceptibility monitoring to inform IRS insecticide class selection.

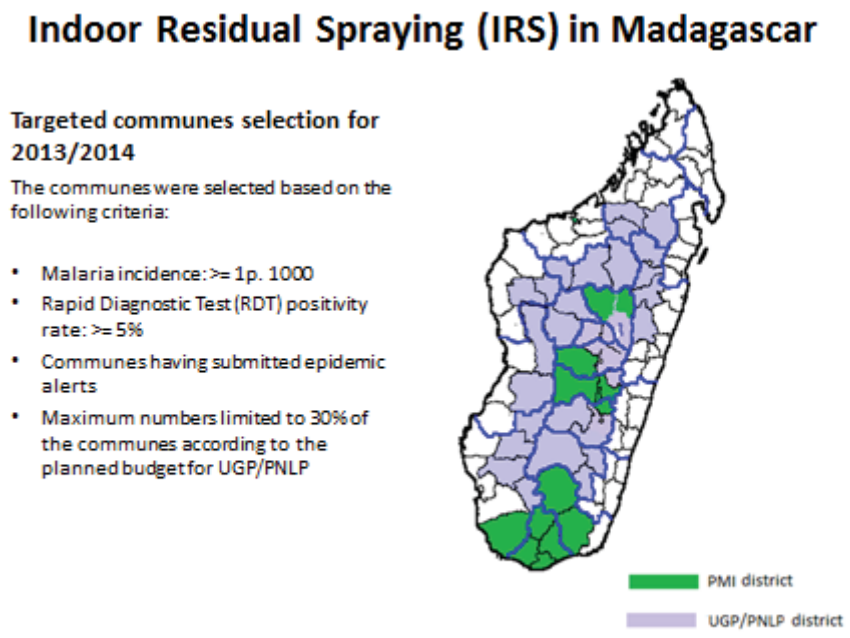
PMI IRS program accomplishments

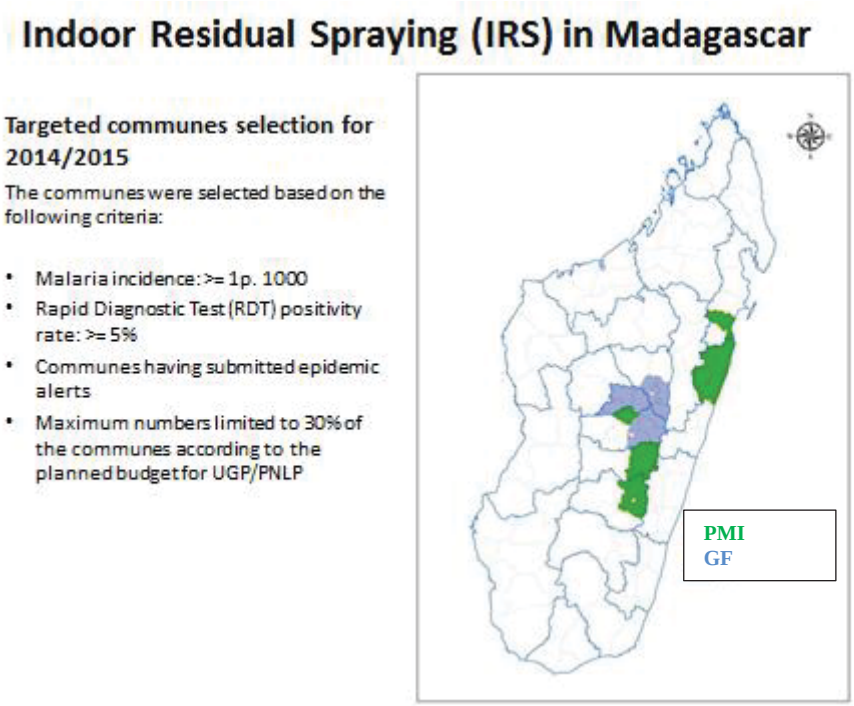
Table 6. PMI-supported IRS rounds by year, geographic area, underlying strategy and class of insecticide

	Geographic Area	**IRS Strategy**	**Insecticide Used**	**Number of Structures Sprayed**	**Population Protected**
2011	CHL & Fringe (8 districts)	Blanket	Pyrethroid & Carbamate	222,026	1,324,525
	South (7 districts)	Blanket	Carbamate	280,671	1,261,147
2012/13	CHL & Fringe (40 communes)	Focalized	Pyrethroid & Carbamate	87,081	522,292
	South (7 districts)	Blanket	Carbamate	284,310	1,259,689
2013/14	CHL & Fringe (40 communes)	Focalized	Pyrethroid & Carbamate	82,091	48,301
	South (7 districts)	Blanket	Organophosphate	261,379	1,106,837
2014*	CHL & Fringe (~40 communes)	Focalized	Pyrethroid & Carbamate	82,000	105,000
	East Coast (3 districts)	Blanket	Organophosphate	150,000	TBD
2015**	East Coast (3 districts)	Blanket	Organophosphate	150,000	TBD

* planned with FY2014 funds
** planned with FY2015 funds

Figure 4. Current (2013–2014) and proposed (2014–2015) PMI and GF-supported IRS target districts.





A Global Fund award under the New Funding Mechanism, anticipated in 2015, will continue support for IRS in the CHL. Given successful harmonization of both PMI and Global Fund IRS

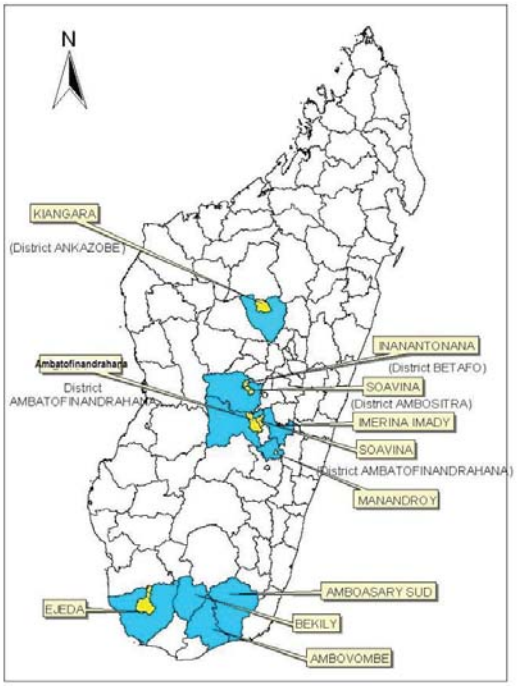
programs in the past, a return to wide-spread IRS coverage in the CHL is possible in 2015, as well as PMI–supported IRS in higher burden East Coast districts.

Entomological Monitoring
The PMI supported entomological monitoring has occurred at ten sites: seven in the Central Highlands and three in the South, as the table and map below indicate.

Table 7: 2013 Entomological Monitoring sites supported by PMI

Spray Area	District	Sentinel Site	Insecticide Sprayed at Site	Notes
CHL	Ankazobe	Kiangara	Carbamates	Located in AIRS Madagascar IRS campaign area covered by Long-Lasting Insectidal Nets (LLIN)
CHL	Betafo	Soavina	Carbamates	Located in AIRS Madagascar IRS campaign area covered by LLIN
CHL	Betafo	Inanatonana	None (Control)	Located in an area that was not covered by IRS. Served as a control site. Site is covered by LLIN.
CHL	Ambatofinandrahana	Soavina	Carbamates	Located in AIRS Madagascar IRS campaign area covered with LLIN
CHL	Ambatofinandrahana	Ambatofinandrahana	None (Control)	Located in an area that was not covered by IRS. Served as a control site. Site is covered by LLIN.
CHL	Ambositra	Imerina Imady	Pyrethroids	Located in IRS campaign area not covered by LLIN
CHL	Ambohimahasoa	Manandroy	Pyrethroids	Located in IRS campaign area not covered by LLIN
South	Ambovombe	Ambovombe	Organophosphates	Located in AIRS Madagascar IRS campaign area covered by LLIN. Replaced Amboasary Sentinel Site, due to insecurity in the area.
South	Bekily	Bekily	Organophosphates	Located in AIRS Madagascar IRS campaign area covered by LLIN
South	Ampanihy	Ejeda	Organophosphates	Located in AIRS Madagascar IRS campaign area covered by LLIN

The geographic location of the sentinel sites and of the IRS target districts (blue) are shown below.



The PMI-supported IRS entomology monitoring activity, which tracks vector-insecticide susceptibility data to support IRS decision making, will move to some new sentinel sites, reflecting the new IRS focus, while also continuing to monitor entomological indicators in former IRS sentinel sites. A key indicator will continue to be vector susceptibility to pyrethroid and organophosphate insecticides. Pyrethroid susceptibility is of interest due to the use of ITNs in the new IRS areas. Change in organophosphate susceptibility will support the decision to use this insecticide class for IRS. The number of surveillance sites for entomology monitoring will remain constant, to continue monitoring the vectors in areas where IRS is withdrawn. Additionally, efforts to better characterize emerging pyrethroid resistance, specifically the level of resistance intensity, will be supported in order to document the expectation that organophophate insecticides will modulate the rate at which pyrethroid resistance, a threat to ITN efficacy, is emerging.

Based on the insecticide susceptibility monitoring data collected following the 2013–2014 IRS campaign and analyzed using WHO thresholds[14], *Anopheles gambiae s.l.* and *An. funestus*, the major malaria vectors, remain totally susceptible to two of the four WHO-approved classes of insecticide, carbamates and organophosphates. Both classes are, therefore, 'potentially' eligible for use in future PMI IRS rounds. There is also increasing evidence in these results that pyrethroid resistance is emerging. This includes reduced mortality in susceptibility test results

[14] April, 2014. Madagascar Vector Susceptibility Testing Report 2014. Africa IRS (AIRS), Abt Assoicates Inc. www.abtassociates.com. 3. Results, page5.

for most of the pyrethroid compounds tested, with the exception of deltamethrin, as well as to organochlorine class insecticides, which can cross to pyrethroid resistance. The relatively short duration of insecticidal effect associated with carbamates, in Madagascar and elsewhere (two to three months) argues against the further use of this class for IRS in the proposed target areas, which see perennial transmission. Therefore organophosphate-class insecticides, specifically the longest-lasting organophosphate formulation, is recommended for use in the East Coast targets proposed for 2015.

Anopheles arabiensis is the main biting vector, raising the possibility that outdoor transmission may reduce the impact of IRS and LLINs, 'indoor' insecticide-based interventions. The most recent surveillance data was collected prior to (baseline) the 2014 IRS campaign (December 2013-January 2014) , as well as after IRS was completed (to document impact). Results show that, as expected, IRS is associated with significant declines in: vector biting, vector density, and vector longevity (older mosquito populaitons are epidemiologically more dangerous). Vector-insecticide susceptibility testing showed that vector populations at all sentinel sites remained susceptible to carbamate and organophosphate class insecticides. Additionally, there was little evidence of reduced susceptibility to pyrethroid-class insecticides suggesting that LLINs (treated with this class of insecticide) remain insecticidal. Resistance to organochlorine class insecticides was observed at 6/8 sites. IRS residual effect (duration of IRS insecticidal effect) was three to five months for carbamate class insecticides, five months for pyrethroid-class insecticides, and at least four months in the case of organophosphate class insecticides (however data collection is still on going).

Plans and justification

PMI will redeploy IRS, targeting selected communes in East Coast Districts, where the malaria burden, based on lines of evidence from epidemiological surveillance, remains stubbornly high despite the introduction of ITNs, and consistent high ITN coverage and use. At the same time, there will be renewed emphasis on IRS-related capacity building at the NMCP, as it continues to support (Global Fund) IRS for epidemic control in the CHL.

The lifting of restrictions on USG support to the GoM will, once again, present an opportunity for more complete harmonization of NMCP and PMI IRS activities. While the NMCP will continue to manage IRS activities in the CHL (funded by Global Ffund) including: transportation, staff services, warehouse management, and information, education and communication (IEC)/behavior change communication (BCC) mobilization activities,

Proposed activities with FY 2015 funding ($5,272,000*)*

- *Conduct IRS in the East Coast:* Support spraying of approximately 150,000 structures, located in three high-burden East Coast districts, as determined by HMIS data with organophosphate insecticide Funds going to the PMI IRS implementing partner will be used to provide operational, logistical and technical assistance as in the past. Entomologic monitoring, described under the General Vector Control Section of this plan, will continue to guide decision-making on IRS moving forward.($5,000,000)

- *Support entomological monitoring:* Continue to support the collection of entomological monitoring data in up to nine sentinel sites across the country. Indicators will include standard PMI entomological indicators, as well as residual efficacy data for IRS. Cost assumes an annual cost of $25,000 per site. *($225,000)*

- *Environmental monitoring visit:* Conduct an independent environmental compliance monitoring visit of IRS areas. *($35,000)*

- *Technical assistance for IRS*: CDC staff will conduct one TA visit to assist with entomological monitoring of IRS. *($12,000)*

3. Malaria in Pregnancy (MIP)

NMCP and PMI objectives

The NMCP supports a three-pronged approach to MIP including uptake of IPTp with SP, provision and use of ITNs, and prompt diagnosis and treatment of malaria during pregnancy. As part of the national strategy to prevent and limit morbidity associated with malaria during pregnancy since 2004, IPTp is currently implemented in 93 lowland and coastal districts where malaria transmission is stable or seasonal. The decision to implement IPTp in one additional district (Itasy), as compared to the ITN targeted districts was made in 2011 by the RBM stakeholders. The policy excludes the remaining 19 districts in the Central Highlands, which are epidemic prone. This strategy includes the provision and promotion of ITN use during pregnancy and early, frequent ANC visits to increase chances of completing IPTp, which is delivered as a package at ANC clinics. The NMCP supports SP administration to pregnant women at each scheduled ANC visit, with the first dose being administered as early as possible after quickening in the second trimester and the second dose of SP provided at least one month apart. The NMCP recommends that IPTp be administered as directly observed treatment and free-of-charge. In addition, iron and folic acid is recommended in the National Protocol for the fight against micronutrient deficiency: 60mg of iron and 400µg of folic acid (low dose) for 180 days (six months) without interruption during pregnancy, to continue after delivery if need be. PMI will work to ensure the NMCP and Reproductive Health Program are coordinating on the provision of iron and low dose folate as an essential component of comprehensive ANC services.

Overall uptake of IPTp2 has remained constant between two recent MIS surveys (22% in 2011 and 21% in 2013). The 2013–2017 National Strategy objective targets 85% coverage of IPTp2 by 2017 among pregnant women attending ANC. The NMCP revised the monthly HMIS reporting form to capture the number of women who receive two doses of SP for IPTp to monitor progress towards this goal. Currently, the new WHO guidelines for improved IPTp uptake have not been incorporated into the national malaria strategy; however the NMCP is aware of the need to change the policy and has already begun programming for monthly doses of IPTp at each ANC starting in the second trimester. Due to limitations in providing direct support to the Government, PMI was unable to provide technical assistance to support national policy change but will now engage at this level with the lifting of USG restrictions.

The use of ITNs remains high among pregnant women at 68% in 2013, although this figure represents a decrease from 85% ITN use among pregnant women reported in 2011. The NMCP

prioritizes provision of ITNs to pregnant women at their first ANC visit. According to national guidelines, pregnant women who are diagnosed with uncomplicated malaria should receive treatment with quinine in the first trimester and an ACT is recommended for treatment during the second and third trimesters.

Starting in 2004, the MoH trained health workers at CSBs on the provision of IPTp. CHVs play an essential role in promoting the use of antenatal services, including encouraging pregnant women to seek IPTp at each ANC visit (after first trimester) and to sleep under an ITN. All focused ANC services, including tetanus vaccination and malaria prevention activities, are integrated at the level of the CSB. The NMCP works closely with the *Direction de la Santé de l'Enfant, de la Mère et de la Reproduction* (Directorate of Child and Maternal Health and Reproductive Health) to plan and implement MIP activities, including IPTp and ITN promotion. The NMCP and Directorate of Child and Maternal Health and Reproductive Health participate on the national ANC working group which recently proposed the adoption of a new IPTp policy in line with the recent WHO recommendation. To further promote MIP interventions, the NMCP has included IPTp as part of integrated ANC services promoted during biannual outreach activities during the mother and child health promotion weeks in April and October. During these biannual health weeks, vitamin A and deworming medicines are distributed, mass immunization campaigns for children are conducted, ANC sensitization messages are provided to pregnant women, and health promotion messages are disseminated. Program surveillance data shows that IPTp uptake peaks during and right after the mother and child health weeks.

Progress during the past 12 months

In FY 2013, PMI funding supported MIP activities through more than 3,593 trained CHVs delivering BCC MIP messages on the importance of seeking antenatal care (early and frequent visits), taking monthly doses of IPTp, and consistent use of ITNs. In addition, 4,582 PMI-supported CHVs were trained on case management including the importance of referring pregnant women to health facilities for prompt diagnosis and treatment of malaria during pregnancy. PMI-supported CHVs have promoted healthy motherhood through education and community sensitization by promoting ITN use and encouraging pregnant women to seek ANC services. In addition, PMI is procuring 450,000 treatments of SP for approximately 300 NGO and FBO clinics that are currently part of a USAID Maternal Child Health program network to expand IPTp to the private sector, thereby contributing to the annual need in 2014.

Despite the high reported rate of ANC attendance (90% of pregnant women attend ANC at least once) and relatively early attendance during the course of the pregnancy (DHS 2008-2009), IPTp uptake remains low. It is unclear what obstacles are responsible for the poor uptake of IPTp. Stockouts may not be the main obstacle. Inadequate supervision, lack of refresher training, and staffing shortages have been reported. Furthermore, some women attend ANC services at private clinics which do not regularly promote IPTp. In response to the reported low uptake of SP for IPTp, the NMCP, with partners, has employed alternative strategies such as using CHVs to deliver targeted messages for the prevention of malaria in pregnancy to pregnant women and encouraging them to attend ANC early and often and demand IPTp during their visits. CHVs also play an important role in planning, organizing, and conducting health promotion outreach activities, including IPTp for pregnant women, during the biannual mother and child health

campaign weeks. With the lifting of sanctions in May 2014, PMI intends to re-engage at the health facility level and strengthen MIP activities including ensuring availability of SP and ITNs.

Commodity Gap Analysis
The *Service de Santé de District* (SSD or District Health Office) is responsible for assigning the estimated amount of SP needed by each CSB. CSB staff or community members are responsible for transporting the SP from the District Health Office to their local CSB. Due to the USG suspension of direct support to the GoM since March 2009, PMI and other donors have been unable to support ANC services at CSBs including provision of SP.

In 2015, an estimated 3.14 million SP doses are needed to protect approximately 785,596 pregnant women expected to attend ANC clinics in the 93 malaria-endemic health districts where MIP interventions are a part of the malaria prevention and control strategy. Global Fund will provide approximately 882,123 doses of SP for IPTp and ensure delivery to the district level. The NMCP estimates approximately four treatments per pregnant woman are needed each year. With FY 2014 funding, PMI will procure approximately 1.8 million treatments (or 57%) needed in the IPTp focus districts in 2015.

Table 8: SP gap analysis

SP Needs and Contributions	**2014**	**2015**	**2016**
Estimated population in 93 target districts	16,426,910	16,903,291	17,393,486
Total number of potential pregnant women attending ANC (estimated at 4.5% of total population)	739,211	760,648	782,707
Total SP doses needed (4 doses per pregnant women)	**2,956,844**	**3,042,592**	**3,130,828**
SP from PMI	450,000	1,800,000	2,800,000
SP from Global Fund	2,138,000	882,123	TBD
SP from GoM/MoH	0	0	0
Total SP available	**2,588,000**	**2,682,123**	**2,800,000**
Surplus/Gap in SP	**(368,844)**	**(360,469)**	**(330,828)**

Plan and justification
With FY2014 funding, PMI will continue to support progress made at the community level through the CHVs as well as re-launch efforts at the public health facility level to strengthen MIP practices focusing on improving IPTp uptake and ANC attendance. PMI will also support the NMCP with any revisions needed to malaria and maternal health policy guidelines, aligning them with updated WHO IPTp recommendations and ensuring consistent guidelines between the two national program documents.

With FY 2015 funding, PMI will continue to support strengthening of MIP activities both at the community and public facility levels. PMI will procure approximately 2.8 million treatments of SP for use at ANC, thereby contributing to the annual need in 2016. Although quantities are not

yet specified, the NMCP intends to request additional SP treatments through the Global Fund New Funding Mechanism (concept note to be submitted in January 2015). PMI will also continue to support community BCC activities led by the CHVs who encourage pregnant women to attend ANC services and request SP for IPTp.

Proposed activities with FY 2015 funding ($486,000)

1. Procure SP: PMI will procure approximately 2.8 million treatments of SP for IPTp in line with WHO IPTp guidelines for pregnant women at ANC (at health facilities). ($336,000)

2. Strengthen MIP at public facility level: PMI will support MIP activities at the facility level, including strengthening and improving IPTp uptake, ITN use, and ANC attendance. Support includes necessary revisions to update malaria and maternal health program training curriculum, support training for midwife and ANC health facility staff on MIP, and ensure updated MIP policy guidelines are available at facility level for providers. ($150,000)

4. Case management: Diagnostics

NMCP and PMI objectives

The national policy on malaria case management states that all suspected malaria cases should be confirmed parasitologically. If RDTs are not available, treatment with an ACT should be given based on clinical diagnosis, after eliminating all other causes of fever. Confirmation using RDTs was introduced by the MoH starting mid-2006 and reached all primary health care facilities by the end of 2008, along with the introduction of ACTs. In 2010, the national iCCM curriculum was revised to include RDT testing of all fever cases among children under five years of age managed by CHVs at the community level.

Under the 2013–2017 National Strategic Plan, the goal in the control/consolidation phase is to correctly diagnose and treat at least 95% of malaria cases seen at public health facilities and at least 80% of all fever cases among children under five years of age seen by CHVs. In pre-elimination areas, the goal is to correctly diagnose and treat 100% of malaria cases seen at public health facilities and >80% of all fever cases among children under five years of age seen by CHVs.

Currently RDTs are used at all government primary health care facilities. The National Strategy calls for expansion of RDT use to hospital urgent care and outpatient clinic settings and to the private sector. Although microscopy is supposed to be used when available, in reality RDTs are used even at hospital level, as the fee for microscopy is quite high for patients and RDTs are free. Madagascar uses combination RDTs (HRP2/pLDH) to detect falciparum infections, other infections, and mixed falciparum/other infections.

The National Laboratory has a Quality Assurance/Quality Control (QA/QC) program for malaria microscopy. Each month districts collect and send five possibly positive and five negative slides from all facilities performing microscopy in the district to the regional reference laboratory, which will perform a blinded reading on them. Any discordant slides are sent on to the national-level NMCP lab, where they are read every quarter. Additional QA/QC is conducted every

trimester with the National Institute of Communicable Diseases in Johannesburg, South Africa. National Institute of Communicable Diseases sends positive and negative slides to the NMCP lab for blinded reading. Results are sent back to National Institute of Communicable Diseases and feedback provided to NMCP.

Progress during the past 12 months

Due to restrictions on working with the government from 2009 to mid-2014, PMI has focused during this time exclusively on supporting diagnostics among CHVs and FBO and NGO facilities. With FY 2013 and FY 2014 funds, PMI procured RDTs for CHVs and FBO/NGO facilities. PMI also supported ongoing training, supervision, and use of RDTs by CHVs and private clinics. Out of about 300 NGO/FBO run health facilities, 168 were targeted for malaria diagnostics reinforcement, 38 health workers were trained in RDTs or microscopy in FY 2013. In addition, for 2014 and 2015, PMI plans to train 100 and 200 health workers from NGO/FBO health facilities, which were the only health facilities that PMI could support until restrictions were lifted on May 27, 2014. Going forward, PMI will be able to engage with public sector health facilities and will work on putting together an assessment and robust plan for re-engaging with the public sector in terms of training, supervision, and other support. A 2012/2013 PMI assessment of FBO/NGO clinics found very high (97%) testing rates of fever cases but gaps in prescription of ACTs to RDT-positive patients (only 46%) and with stockouts of RDTs (44% of private facilities experiencing recent stockouts). With FY 2014 funds, PMI is supporting an assessment of malaria case management quality in health facilities. Since the lifting of government restrictions, the scope of this assessment has been expanded from FBO/NGO clinics only to include public facilities as well. The assessment will provide valuable baseline information on the current gaps in case management quality.

Plans and justification

With lifting of USG restrictions on engaging directly with the Malagasy government, PMI will increase its support for malaria diagnostics in FY 2015. Funds will support the purchase of RDTs for use at both the CHV and public and private health facility levels. In addition, PMI will invest significantly more funds than in previous years in its two health service delivery bilateral projects to support malaria case management refresher training, supportive supervision, and use of M&E systems at the community level, where PMI has focused most of its case management resources, as well as at health facilities, which were not able to benefit from PMI support from 2009–2014. PMI will also directly support diagnostics QA/QC at the national level by providing technical assistance to the national lab and support for carrying out QA/QC activities. The current diagnostics QA/QC program focuses primarily on microscopy and not on RDTs.

Gap analysis

Malaria stakeholders conducted a gap analysis of key malaria commodities in May 2014, which included the entire country. Malaria cases are based upon NMCP 2013 data from the HMIS included into the Global Malaria Programme malaria country profile used to characterize malaria cases per 1,000 persons in the pre-elimination zone (Central Highlands) and the control zones of Madagascar, by year, assuming declines of ~ 10% each year. RDT needs are based upon an assumed positivity rate of 1 in 3.2 at health facilities (from routine data) and of 1 in 4 at community level (from CHV data). It is assumed that approximately 70% of malaria cases will be diagnosed and treated at community level and 30% at health facilities. Regarding the surplus

stock of RDTs and ACTs in 2014, the committee who conducted the recent gap analysis of malaria commodities felt it was necessary to add a surplus stock to 2014 to mitigate any potential delays with Global Fund procurements planned for subsequent years under the New Funding Model. If Global Fund procurements are late, the security stock could be used in place of planned procurements. If Global Fund procurements are on time, the security stock would be rolled over to subsequent years.

Table 9: RDT gap analysis

Calendar Year	**2014**	**2015**	**2016**
RDT needs			
Health facilities	1,563,661	1,428,839	1,285,240
Community-level needs	3,643,697	3,422,756	3,164,975
Epidemic stock	260,368	242,580	222,511
Safety stock for 2014	1,301,840		
Total RDT needs	6,769,566	5,094,175	4,672,726
RDT sources – supply			
Global Fund *	5,529,566	3,104,175	3,922,726**
PMI	3,820,000	1,990,000	2,000,000
Total Estimated RDT Supply	9,349,566	5,094,175	5,922,726
RDT Gap/(Surplus)	(2,580,000)	0	(1,250,000)

*Requested from Global Fund Grant NSA 2
**Under the assumption that PMI was only contributing 750,000 RDTs in calendar year 2016. PMI is in close communication with Global Fund representatives and they plan to reduce their contribution to avoid a surplus.

Proposed activities with FY 2015 funding ($5,874,000)

1. *Procure RDTs*: Purchase approximately 2 million RDTs (at an estimated cost of $0.80 per RDT) for iCCM and for private and public clinics. Gloves and safety boxes for sharps disposal will also be procured to ensure biosafety and personal protection when using RDTs. *($1,800,000)*

2. *Refresher training and strengthening of routine supervision and M&E of CHVs and health facilities*: PMI funding will provide support for refresher training in case management and M&E, as well as supportive supervision of CHVs and public and private health facility workers. PMI funding will support refresher training for approximately 3,000 CHVs and 3,000 facility-based health workers (from a total of approximately 2,360 public and private facilities) in USAID districts. *($3,8000,000)*

3. *Support for national diagnostics quality assurance and quality control*. Building on the findings from the diagnostics assessment to be conducted in 2014 and the assistance provided to the national lab with FY 2014 funds, PMI will continue to enhance and support national capacity for diagnostics QA/QC. *($250,000)*

4. *Support for two Malaria Peace Corps Volunteers (PCVs)*: PMI, through its two bilateral implementing partners, will continue to support the Peace Corps-PMI collaboration by funding two third-year Peace Corps Volunteers. These Malaria Volunteers will focus on implementation, monitoring, and reporting of case management including iCCM and facility-based case management activities. Funding will include housing and equipment costs. *($24,000)*

4. Case Management: Treatment

NMCP and PMI objectives

According to the national case management guidelines, which were last updated in April 2013, AS/AQ combination therapy is the first-line antimalarial treatment for uncomplicated malaria in Madagascar, and artemether/lumefantrine (AL) is considered as an alternative therapy for those that cannot tolerate AS/AQ due to side effects. In pre-elimination areas, the national policy calls for the addition of a single dose of primaquine (0.75mg/kg) for transmission reduction, although this this has not yet been implemented and is planned to begin in 2016.

For severe malaria, the guidelines recommend intravenous artesunate as first-line treatment in Madagascar, with quinine as second-line treatment. The national guidelines recommend injectable artesunate or quinine or rectal artesunate for pre-referral treatment of severe malaria at the community and lower-level health facility levels. However, there are currently no approved suppliers of rectal artesunate according to Madagascar guidelines and it is not available in country.

Progress during past 12 months

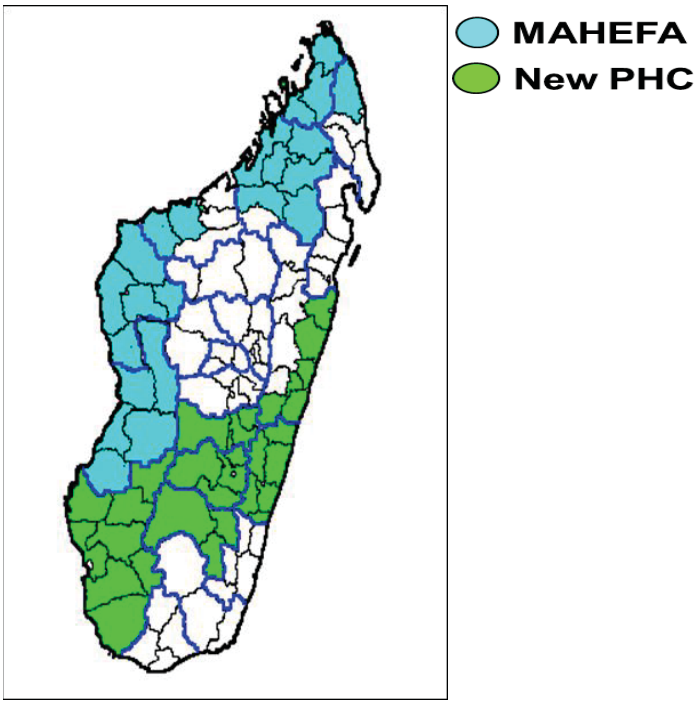
Since 2009, most of PMI's case management support has been directed at the community level given restrictions on working with public health facilities. PMI provides support to two bilateral projects that focus on community delivery of health services that include iCCM of malaria, diarrhea, and pneumonia by CHVs. Global Fund and UNICEF also provide significant support to the NMCP and the MoH for this approach. PMI implementing partners will reach about two-thirds of the more than 1,500 communes across 80 districts (of 112) in the country, supporting a total of approximately 11,000 CHVs. The previous bilateral working in the east and south of Madagascar ended support to CHVs in March 2013. The new bilateral project that took over in late 2013 conducted a situational assessment in early 2014, followed by refresher trainings of CHVs in mid-2014. The bilateral project is planning to work with about 5,000 CHVs in the east and south. The other bilateral project that has been supporting CHVs in the west and north of Madagascar had 5,145 CHVs trained in iCCM as of March 2014.

From January to March 2014 these CHVs treated a total of 16,177 cases of fever among children under five years of age. Apart from PMI-funded community health workers (CHW)/CHVs, it is unclear how many CHW/CHVs are active in Madagascar, although estimates indicate that about 34,000 CHW/CHVs have been trained since 2009.

Relatively little is known about current case management quality in public facilities in Madagascar, given the restrictions in place from 2009–2014, although anecdotal reports of drug

and RDT stockouts as well as poor quality of data reporting are commonplace. A survey of public and private health facilities funded by PMI and slated to take place in late 2014 will provide valuable information on the biggest challenges in malaria case management at health facilities.

Figure 5: CHVs in Madagascar



Plans and justification

Through its two bilateral projects, PMI will continue to support CHVs in remote areas of the West and North of the country, as well as in the East and South. Using FY 2015 funding, PMI will support routine supervision, refresher training, and correct use of data monitoring and reporting tools for the approximately 11,000 CHVs in the two bilateral project areas. Efforts will be made to integrate supervision and supply provision into the public health facility activities, for example by conducting joint supervision of CHVs with health facility staff and transitioning CHV supply points to the health facilities. There are currently national policies and guidelines (e.g., for training and supervision) for the iCCM program. Supervision is currently done primarily by the NGO personnel, but this responsibility will need to be gradually transitioned to health facilities, with NGO support. The PMI-supported integrated bilaterals will work closely with the NMCP to transition responsibilities for supervision and supply provision to health facilities.

PMI will place additional funds into both bilateral projects to support malaria case management at both public and private health facilities in the project areas. Funds will be used to support malaria case management refresher training for staff from all facilities (at least one health worker per facility), in addition to district health officers, targeting three health officers per district.

Funds will also be used to enhance supportive supervision to health facilities, with specific efforts to build capacity of district health teams to carry out supervision. Findings from the health facility assessment conducted in late 2014 will also inform specific case management areas to target with PMI support.

Gap analysis

Table 10: Gap analysis for ACTs 2014-2016

Calendar Year	**2014**	**2015**	**2016**
Health facilities	488,644	446,512	401,638
Community-level needs	895,500	818,288	736,050
Epidemic stock (5%)	69,207	63,240	56,884
Buffer stock (25%)	346,036		
Total ACT needs	**1,799,387**	**1,328,040**	**1,194,572**
Global Fund*	898,093	1,328,040	1,194,572**
PMI	750,000	0	1,200,000
Total Estimated ACT Supply	1,648,093	1,328,040	2,394,572
ACT Gap/(Surplus)	**141,294**	**0**	**1,200,000**

* Includes R7 UGP, NCE NSA, and request to be made from NSA 2.
** Demand to be made from NSA 2; will be revised in light of PMI's contribution.

The estimated ACT needs were calculated during a recent gap analysis exercise using an estimated malaria infection rate in the pre-elimination zones (Central Highlands) and the rest of the country and assuming, based on administrative data, that approximately 70% of malaria cases are treated at the community level and 30% at health facilities. The gap analysis was completed prior to determining PMI's estimated contribution for 2016 (from FY 2015 funds); therefore, Global Fund's estimated contribution will likely be revised downward.

Proposed Activities with FY 2015 funding ($1,012,000 — an additional $3,800,000 for case management support, including diagnostics and treatment, included in diagnostics, above)

1. *Treatments for uncomplicated and severe malaria.* PMI will fund procurement of approximately 1.2 million ACTs for uncomplicated malaria (estimated cost of $0.65 per treatment) and the remaining $220,000 will be used for severe malaria drugs, including injectable artesunate and possibly rectal artesunate if the NMCP develops a clear plan of how rectal artesunate should be used. *($1,000,000)*

2. *Refresher training and strengthening of routine supervision and M&E of CHVs and health facilities*: PMI funding will provide support for refresher training in case management and M&E, as well as supportive supervision of CHVs and public and private health facility workers. PMI funding will support refresher training for approximately 3,000 CHVs and 3,000 facility-based health workers in USAID districts. *($0 — costs included in Diagnostics section)*

3. *Technical assistance to support community case management*. Support for one CDC TA to support the case management of malaria. (*$12,000)*

6. Pharmaceutical and Commodity Management

NMCP and PMI objectives
Public Sector: The 2013–2017 National Strategic Plan objectives for districts in the control/consolidation phase are to ensure that at least 95% of public health facilities have no more than one week of stockouts of RDTs, ACTs, SP, and routine ITNs in the preceding three months. For districts in the pre-elimination phase, the objective is zero stockouts and the goal is to establish a functional routine quality control system in each pre-elimination phase district.

SALAMA, the national central purchasing agency, is responsible for procuring essential medicines and medical consumables for use in the public sector and a portion of the private sector and ensuring their distribution to the district level.

The drug supply system is based on a push system down to the districts. Delivery from districts to CSBs is not clearly defined, combining pull and push systems under the management of the *Médécin Inspecteur*. The absence of a clear scheme leads to frequent stockouts. At the district level, the district pharmaceutical depots are the intermediary points in the public sector supply chain. They are managed primarily by NGOs under a contract with the MoH through the Department of Pharmacies, Laboratories, and Traditional Medicine and they sell to the health facility pharmacies. All medicines dispensed at public health facilities are sold with a mark-up of approximately 35% of the SALAMA price.

The free distribution of malaria commodities through the public sector has resulted in parallel procurement and distribution channels to the district level. There are also different channels for distributing antimalarial medicines and products within districts. Free and donated malaria commodities are received and managed by the District Health Office, while the products from SALAMA are managed by the district pharmaceutical depots. In both cases, CSBs are responsible for the collection and transportation of their supplies from the district level to their respective facilities. This limits the quantities that most of them can transport at any one time, as they primarily rely on public transportation. Furthermore, some CSB are inaccessible for four to six months of the year during the rainy season, thus requiring advanced planning to ensure a reliable supply of health commodities. USG supported community health workers are currently re-supplied through a parallel system (see below), receiving their supplies from private re-supply points run by individuals, often small shops in larger towns and cities. USAID funded bilateral projects supply these private supply points with commodities. With the lifting of the USG restrictions, the plan is to transition from these private re-supply points, and to have CHVs re-supply their commodities at the CSB.

An USG supported integrated supply chain assessment, encompassing all USG supported projects, is planned for the summer of 2014, as a result of the lifting of the USG restrictions.

Private sector: In addition to ACTs, CHVs also dispense other medicines subsidized under a social marketing model financed by USAID. This includes oral rehydration salts plus zinc tablets (approximately $0.22) for the treatment of diarrhea among children under five years of age; cotrimoxazole tablets (approximately $0.09), and cotrimoxazole oral suspension (approximately $0.32) for the treatment of uncomplicated pneumonia. The current bilateral project determines the profit margin at which these items are sold to the consumers by private providers. However, the profit margin gained by the CHVs is quite small, approximately $0.02-$0.11 per product sold. PMI contributes to this parallel system by procuring and distributing commodities and by providing technical assistance to support the CHVs programs. The CHVs are also trained to provide maternal, newborn, and child health services, including reproductive health counseling, family planning services, nutrition assessments, and treatment for pneumonia and diarrhea.

An active distribution system of antimalarials exists in the commercial private sector, particularly in urban areas with at least three local manufacturers who import finished antimalarial drugs for repackaging and sales. There are approximately 33 wholesalers, 200 private pharmacies, and 2,000 pharmacy depots. Several donors support the private sector system: USAID funds help supply franchised youth oriented private clinics with RDTs. UNITAID is supporting the reinforcement of diagnostics capacity in private clinics, by training and supplying RDTs, and the Global Fund NSA-2 includes support for the private sector through the Affordable Medicines Facility – malaria initiated scheme.

Quality Assurance: The *Agence de Médicament de Madagascar*, which includes the National Medicines Quality Control Laboratory, is responsible for testing most pharmaceutical products destined for use in the country and products already on the market. The medicines quality monitoring program is designed to help the national drug authority to detect substandard and counterfeit medicines and take immediate action to remove such medicines from the market. Prior to the *coup d'état* in 2009, with USG support, the agency established seven peripheral minilab testing sites where samples of antimalarials are regularly collected and tested using portable quality testing kits. An additional 15 kits were procured in 2012 with Affordable Medicines Facility – malaria funding, thus fulfilling the goal of expanding drug quality testing sites to the 22 regional reference hospitals in Madagascar. The original plan was to have central level laboratory analysis conducted every three months; however, limited funding only allows for testing every six months.

Progress during the past 12 months

PMI continues to support the distribution of ACTs and RDTs via CHVs to the communities located in fokontany that are at least five kilometers to the nearest public health facility. As of May 2014, more than 11,000 CHVs were receiving malaria commodities and support from PMI via this parallel supply system. PMI funding procured approximately 755,580 RDTs in 2013 which have been delivered to regional warehouses that supply CHVs in PMI supported districts. In addition PMI continues to support the distribution of malaria commodities to NGO and FBO clinics. PMI funds have provided assistance to NGO/FBO partners on supply chain management and will also be supporting training on malaria consumption forecasting and commodity ordering in mid-2014.

Plans and justification

PMI and other USG funding streams will continue to support the supply chain and distribution of malaria commodities at both the community level, and now at the CSB level. In line with the national Community Health policy, CHWs are part the national health system. They are trained, supervised, equipped, and supplied in health commodities via the Basic Health Center "*centre de sante de base*". PMI and the USAID Mission established a parallel supply chain to deliver life-saving commodities at the community level because the USG sanctions. Other partners including UNICEF and Global Fund maintained collaboration with the public health system. The re-integration/consolidation of the supply chain will not be built from scratch, and some of the funds will go towards continuing the CHW distribution, while the integration process and assessment recommendations are agreed upon by stakeholders and implemented. With the lifting of USG restrictions on Madagascar in May 2014, PMI will work with other stakeholders to integrate the parallel CHV supply chain into the national system. The results of the USG-funded supply chain assessment, scheduled for mid-2014, will inform PMI and other partners as to the supply chain management activities which need strengthening. PMI will then work with other stakeholders to phase out the parallel CHV supply chain with FY 2014 funds, and support the national integrated supply chain, where CHVs would resupply with CSBs, using FY 2015 funds.

Proposed activities with FY 2015 funding ($1,400,000)

1. *Strengthen the supply chain for malaria commodities:* PMI will ensure the continuous supply of RDTs and ACTs via an integrated national supply chain system. This system will integrate the parallel CHV supply chain system, and activities will include quantification and forecasting, curriculum development, training, supervision, and LMIS support. This activity will be co-funded with other USAID Health Office programs. *($1,400,000)*

7. Behavior Change Communication

NMCP and PMI objectives

The NMCP strategic plan supports BCC as an essential component of its malaria prevention and control interventions and established a BCC working group which supports major communication events such as World Malaria Day and mass ITN distribution campaigns. The NMCP developed a five-year BCC action plan (2013-2017) with the overall objective of achieving 85% use of malaria prevention and case management services among the target population. Specific objectives include: strengthening adoption of favorable behaviors in malaria control among individuals and communities; and encouraging involvement of stakeholders and actors from different sectors in malaria control efforts. To achieve these objectives, the BCC plan calls for strengthening advocacy, BCC and social mobilization activities, reinforcing capacities of all stakeholders involved in malaria control through periodic training, and active participation of the community through CHVs, health providers, community leaders, and religious groups.

Progress since PMI was launched

At community level, each village or fokontany has identified two CHVs, one focusing on child health and one responsible for maternal and reproductive health. A total of approximately

34,000 CHVs exist nationwide to provide BCC messages and assist in community mobilization; however not all CHVs are currently active or supported by partners. PMI supports over 11,000 CHVs in 80 districts implementing community integrated management of childhood illness activities including diagnosis and treatment of malaria, as well as providing interpersonal malaria BCC messages to promote correct care seeking and prevention behaviors. With FY 2013 funding, PMI supported implementing partners to update BCC training materials for use by CHVs, including ensuring IPTp and ITNs were addressed. Between October 2013 and March 2014, more than 5,000 PMI-support CHVs participated in behavioral change empowerment training which focused on promoting and educating pregnant women as well as men on ANC, ITNs, iron and folate, and IPTp with SP. During this same period, PMI-supported CHVs in project areas reached over 1.8 million people (59% were women) through home visits, group education sessions and mass media events.

PMI also supports a third-year malaria Peace Corps Volunteer to serve as a focal point and coordinate with other PCVs in Madagascar on malaria BCC efforts. PCVs have promoted malaria BCC messages through their community development activities, participated in World Malaria Day, and highlighted BCC messages at soccer events to raise awareness about malaria control.

The 2013 Madagascar MIS collected information on knowledge and use of ITNs and knowledge on modes of malaria transmission, prevention, and treatment. The MIS results showed that 40% of household heads had heard or received messages during the 2012 ITN campaign and 58% of women aged 15-49 living in the districts covered by the 2012 campaign had heard or received messages on the ITNs before the distribution. The percentages of those who had heard or received messages on ITNs at any time during the 2012 distribution campaign were higher in rural than urban areas, whether for household heads (41% against 35%) and women (60% against 44%).

Only 15% of women aged 15-49 years received messages on IPTp in pregnant women during the 12 months preceding the interview and a further 9% of women received other types of messages on the prevention of malaria in pregnant women. The source of messages about malaria and the content of messages received by women aged 15-49, come more frequently through visits by community workers (9%) than through awareness sessions on malaria conducted in a public place (6%). Among the messages received from community workers or during public meetings, those on ITNs were the most frequently received by women (9%) with a higher incidence in rural than in urban areas (10% against 6%). Almost two-thirds (71%) of survey respondents interviewed cited fever as the main symptom of malaria; of these, only 42% said malaria is transmitted by mosquitoes and 21% cited sleeping under a ITN as an effective way to prevent malaria. Almost one-third (32%) of respondents reported an ACT was the most effective antimalarial drugs to treat children under five years of age. More than half (52%) of respondents cited children less than five years of age as the most vulnerable to malaria, while 28% of respondents cited pregnant women as those most vulnerable to malaria. Exposure to malaria messages was higher among women with a child under five years of age and pregnant women than other women, and higher among respondents living in urban areas than in rural areas.

The 2013 MIS findings show clearly the need to invest in more targeted BCC to increase knowledge and awareness about malaria interventions, improve IPTp uptake and promote prompt and appropriate care-seeking for treatment of malaria. With FY 2013 funding, PMI is also currently supporting a BCC assessment to identify the specific attitudes and beliefs that are positively associated with the following four outcomes related to malaria prevention and treatment: a) the use of bed nets, b) receipt of malaria prophylaxis during antenatal care visits while pregnant, c) use of health services when a child has an episode of fever, and d) acceptance of indoor spraying for mosquito abatement. The assessment is also intended to help inform the NMCP and malaria partners about any regional differences in community behaviors and cultural practices and guide the development and adaption of targeted malaria BCC messages for different malaria transmission zones (e.g. endemic coastal areas vs central highlands) if appropriate. The assessment findings and recommendations will be available in late 2014.Once report results are available, PMI will work with the NMCP and implementing partners to strengthen and target malaria BCC messages provided by CHVs as well as health providers.

Plans and justification

PMI will support malaria messages reaching rural areas through community-based interpersonal communication by CHVs, skits and dramas, mobile video unit shows, and radio spots. Targeted and general BCC activities will be implemented to mobilize traditional and religious community leaders and civic organizations to promote malaria prevention and control. Madagascar has strong traditional structures in place at the community level and more than 18 religious and ethnic groups in country. PMI will need to work closely with stakeholders and partners to engage these groups in malaria control. PMI will reengage health care providers at facility level to ensure they have access to and utilize BCC materials and tools available through malaria partners and help develop key malaria messages that are standardized and harmonized across all malaria partner activities. Targeted BCC activities will include promoting the use of ITNs by the general population and by pregnant women and children under five years of age in particular, promoting community acceptance of IRS, early and regular antenatal clinic attendance to ensure uptake of IPTp, and prompt diagnosis and treatment of malaria.

To complement mass media efforts, PMI will continue to support interpersonal communication and community-based behavior change interventions implemented through NGOs and CHVs. The CHVs will provide outreach to families to convey malaria prevention awareness messages and to teach personal preventive behaviors through participatory radio listening groups, small group education sessions, and home puppets, which are popular in Madagascar. Skits and dramas will also be used to convey messages and promote behaviors. Use of interpersonal communication approaches will be prioritized over the use of mass media, with the aim of approximately 70% of BCC funding to be interpersonal communication in communities where awareness of malaria is high enough for this approach to be effective.

PMI’s support to BCC activities will continue to be aimed towards empowering individuals and families to prevent and treat malaria correctly. This will be accomplished primarily through PMI’s continued support of CHVs to encourage pregnant women and women with children needing immunizations to visit ANC and EPI clinics to request free ITNs under the continuous distribution schemes that were initiated in 2013. Also, CHVs and NGOs will support the nationwide, biannual mother and child health weeks, which provide catch-up immunizations,

vitamin A supplements, deworming medicine and, at times, free ITNs for children under five years of age. The CHVs involved with distribution of socially marketed products will educate local residents on proper care and use of ITNs and on the necessity of prompt diagnosis and correct treatment with ACTs, with special emphasis on children under five years of age at the household level.

Proposed activities with FY 2015 funding ($972,000)

1. Implementation of malaria BCC activities at community and health facility levels: Support the implementation of community case management of malaria through CHVs, using integrated malaria messaging including the four key messages related to correct use of ITNs, acceptance of IRS where applicable, preventing malaria among pregnant women including promoting uptake of IPTp, and early and prompt care seeking for malaria case management. Special efforts will be deployed for the uptake of IPTp and appropriate care seeking. Support coordination of BCC messages at national level including developing a standard and harmonized package of essential BCC malaria messages. *($950,000)*

2. Support Malaria Peace Corps Volunteers: Funding will continue to support a PCV coordinator, who will facilitate malaria BCC activity implementation among Madagascar PCVs. Funds will also be used to support malaria training for all PCVs which will be integrated with other mid-service and in-service trainings. *($22,000)*

7. Operational Research

NMCP and PMI objectives
The 2013-2017 Madagascar Malaria National Strategic Plan includes a section on key operational research priorities and their priorities listed below.

Table 11: Operational research priorities according to Madagascar National Strategic Plan

Area	Research area(s)
Vector control (IRS, ITNs, entomology)	• New insecticides • Mechanisms of insecticide resistance • Integrated vector control • Larviciding • IRS vs. ITNs (cost-effectiveness and impact)
Case management and malaria in pregnancy	• Prevalence of G6PD deficiency for radical cure of *P. vivax* and *ovale* • Resistance to antimalarials • Resistance to SP for IPTp • Chemoprophylaxis among children • IPTp in low-transmission areas • Case management in public health facilities • Cost-effectiveness of case management and IPTp • Adherence of health workers to RDT results

	• Adverse events of antimalarials at hospital level
Epidemiological surveillance	• Pilot studies in 4 pre-elimination districts on new strategies for surveillance and response • Meteorological stations in prediction zones • Evaluation of surveillance systems
IEC/BCC	• Behavioral and socio-cultural research on different malaria control strategies and appropriate messages

Progress during the past 12 months

School-based serology survey:The Central Highlands and Fringe areas of Madagascar have low malaria transmission, estimated to be 1% according to a recent household survey that tested children under five years of age. This area has a long history of receiving IRS in the 1990s and 2000s. With funding from PMI and Global Fund, the Central Highlands received four years of blanket spraying (all communes in the supported districts) from 2008 to 2012 and transitioned to focalized spraying, targeting the communes in selected districts with the highest malaria incidence, in 2013, according to the national strategic plan. Communes have been targeted for spraying by calculating estimated malaria incidence from health facility data. However, concerns about the completeness and accuracy of health facility data are compounded by low rates of care-seeking in the formal sector in Madagascar, and have raised questions about the validity of the current approach to estimating transmission intensity and prioritizing communes for IRS. As a method to validate facility-based data, as well as other approaches (e.g., school absenteeism data) for prioritizing malaria interventions, an operational research study is being carried out using serological markers among primary school children and their parents to estimate malaria transmission in each commune. The survey began in May 2014, and preliminary data are expected to be available in fall 2014.

Table 12: OR Table

Ongoing OR Studies			
Title	Start Date	End Date	Budget
School-based serology study	December 1, 2013	Jan 30, 2015	$280,000 (FY 2013)
Proposed OR Studies FY 2015			
Title	Start Date (est.)	End Date (est.)	Budget
Evaluation of active case detection in the Central Highlands	Dec 1, 2014	Dec 30, 2016	$150,000 (FY 2014) + $300,000 (FY 2015)

Proposed activities with FY 2015 funding ($325,000)

1. *Continue operational research study on active case detection methods:* In 2015, PMI will no longer spray in the Central Highlands but will support IRS on the higher-transmission

east coast of Madagascar. The Central Highlands and parts of the Fringe areas are slated to transition to pre-elimination areas, according to Madagascar's national strategic plan for malaria. To help the NMCP determine the most effective approaches to further reducing and maintaining malaria transmission at low levels, PMI will fund an operational research study to assess the effectiveness and costs of various approaches to active case detection, e.g., active case detection of all persons, active case detection of symptomatic cases only, reactive case detection of a passively detected malaria case. FY 2014 funds ($150,000) were recently reprogrammed to initiate the active case detection operations research study in late 2014, and FY 2015 funds will be used to continue the study for a second year. Funds will also include $13,000 to support one Peace Corps Volunteer who will provide dedicated support to the ACD pilot in the CHL. *($313,000)*

2. *Technical assistance to support active case detection study*. Support for one CDC TA to support the active case detection operational research study. (*$12,000)*

8. Monitoring and Evaluation Plan

NMCP and PMI objectives
The Madagascar M&E strategy for malaria has been developed to facilitate the collection, analysis, and quality assurance of data from health centers, partners, communities, sentinel sites, and household surveys. A comprehensive National M&E Plan was written for 2008–2012 and has recently been updated for the period 2013–2017.

The 2013–2017 National Strategy for Epidemic Surveillance and Response objectives include:

For control and consolidation zones:
- 100% of epidemics are detected and controlled properly within 15 days
- Assure the quality of at least 80% of data reported from health facilities on malaria

For pre-elimination zones:
- 100% of epidemics are detected and controlled properly within 15 days
- Assure the quality of at least 90% of data reported from health facilities on malaria

M&E technical working group: the group was created within the RBM partnership and includes staff from the NMCP M&E Unit, and representatives from PMI, WHO, and implementing organizations. The M&E unit is currently supported by Global Fund grants and consists of an epidemiologist, three physicians, a data base manager, data entry assistants, and 2 IT specialists. The staff of the central M&E unit train regional staff and have created a network of 22 regional and 112 district malaria program-specific staff who assist in monitoring and supervision, data collection, and analysis. Sites are equipped with a computer and office equipment and use the same database as the central level.

Current M&E System: The current M&E system for malaria is comprised of: 1) the national HMIS, which reports malaria cases and deaths monthly from health facilities; 2) a malaria-specific district-level surveillance system (originally for 36 epidemic-prone districts and weekly monitoring of confirmed malaria cases and deaths); 3) an integrated fever sentinel surveillance

system, which provides highly accurate and rapid reporting of data from 34 individual sentinel health facilities and 73 CHVs; and 4) population-based surveys such as DHS and MIS.

The national M&E plan calls for integration of community-based malaria surveillance information through CHVs, who diagnose and treat children under five years of age with fever. The current system is fragmented, only partially functional, and is neither timely nor complete. Data collected through this system must be triangulated to assess progress in malaria prevention and case management. Additional M&E data are available, including insecticide resistance monitoring, therapeutic efficacy studies conducted approximately every two years (in 2006, in 2008–9, 2010, 2012, 2014), and pharmacovigilance monitoring.

Enhanced surveillance for Epidemic-Prone zones: The current epidemic surveillance monitoring system (*Postes de Surveillance Sentinelle)* or Sentinel Surveillance Sites) was established in 1997 with eight original districts. It was then increased to 12 and later expanded to cover 36 districts at risk for epidemics in the Central Highlands and South by 2005. At present, however, only 15 districts have functioning systems. This system was established with support from Global Fund Round 3 and it initially supported 12 dedicated malaria surveillance staff working at the district level to report suspected and confirmed malaria cases weekly from all health facilities in their respective districts. The staff are trained in surveillance, data analysis, and interpretation of malaria epidemic investigation and response efforts; they are also provided with a motorcycle for transport and computers. District-level and central-level databases have been established and report suspect and confirmed malaria cases and deaths on a weekly basis. Data reported from these districts are generally of better quality and timelier than those from districts without dedicated malaria surveillance staffs, which also rely on the general HMIS reporting system.

Multiple interruptions in financing due to administrative delays between grants and between phases have led to an interruption of funding to support dedicated surveillance staff. As a result, the system experienced a decline in data quality and a 100% turnover in the past five years. Dedicated malaria surveillance staff provide invaluable support when the system is working, as demonstrated by the early detection, investigation, and management of malaria outbreaks, including sentinel surveillance site requests for assistance and mobilization of resources to respond to multiple malaria epidemics identified in 2012 and early 2013.

In addition to the above surveillance system, the NMCP has adopted the Malaria Early Warning System framework, which is functional and includes analysis of climate data for predicting epidemics.

PMI currently supports a fever surveillance system managed by a bilateral project at 34 sentinel sites that also provides weekly data on fever causes. This system uses syndromic surveillance coupled with confirmation by diagnostic testing to systematically classify all fever cases as a laboratory-confirmed malaria case, a suspected case of an outbreak-prone disease (i.e., arbovirus, influenza, malaria), or other fever. In 2007, 13 sites were established in CSBs across four malaria epidemiological zones with support from World Bank. PMI began supporting this system in 2009 with a total of 15 additional sites by April 2010. Aggregate data on the number of fever cases is transmitted daily to the central level from each site using short message service phone technology, including demographic information, clinical symptoms, RDT results, and history of

antimalarial treatment before clinical consultation. Weekly feedback on reported data is provided to the fever sentinel sites, and a monthly newsletter summarizing the reported cases and trends is distributed to the RBM partners and other stakeholders. Promptness of reporting and quality of data are very good, and the aggregate reports are received daily >95% of the time. On average, fewer than 5% of reports require correction of errors. In addition, reporting and analysis are comprehensive, timely, and complete and provide trends of confirmed cases of malaria since 2007. A once-yearly RDT quality control system for the sentinel sites has been established to monitor RDT quality, storage and use. During supervision visits, RDT storage areas are visited and the temperature of the storage area is taken. Health staff are observed performing RDTs over two days, and a second RDT, a microscopy slide, and dried blood spot are collected from each patient seen with a fever. Health staff are given feedback on RDT use and their RDT readings are compared to a control RDT and microscopy.

Several fever surveillance sites are also part of the network of sites used in monitoring antimalarial drug efficacy and are undergoing activity integration to be more representative. First-line antimalarial drug (AS/AQ) efficacy monitoring is done every two years. The 2009 study conducted in Maevatanana showed 100% efficacy of AS/AQ; subsequent studies at two sites in 2010, Vatomandry and Miandriavazo, showed 98.8-100% efficacy. PMI is currently funding therapeutic efficacy studies (TES) in four fever surveillance sites in 2014, with Global Fund supporting TES in two additional sites.

Indicator reporting: Coverage data for malaria interventions and program indicators are captured from several sources. NMCP, in collaboration with WHO, has developed a central database that receives data from regional and district levels, which augment HMIS' routine reporting. District and regional staff have been trained on database utilization.

Compilation of malaria data reported through the HMIS is completed with the assistance of a data manager supported by Global Fund grants. All reports starting in 2008 have been entered into the central database and are available for use by the NMCP. The NMCP is developing a format for sharing program progress. The NMCP is currently publishing a quarterly bulletin that includes key malaria morbidity and mortality indicators. The NMCP has also created a website for sharing program information: http://www.pnlp-madagascar.mg.

Household Surveys: The baseline national household survey for PMI is the 2008-2009 DHS. Follow-up national surveys include the 2011 and 2013 MIS. In addition, a large household survey to measure progress toward the MDGs in Madagascar was funded by United Nation partners and health donor partners, including PMI. The MDG survey was completed in January 2013 and replaces the 2013–14 DHS survey. This household survey used a combination of two large standard household survey questionnaires: the DHS questionnaire and Living Standards Measurement Survey questionnaire. The survey estimated child mortality at 62 per 1,000 live births, a small decrease from 2009, but with a stagnant and high maternal mortality rate of 479 deaths per 100,000 live births.

The table below summarizes some of the key monitoring and evaluation data sources for malaria in Madagascar, including national-level surveys, routine and specialized surveillance systems, and other data sources.

Table 13: Key monitoring and evaluation data sources

Data Source	Survey Activities	Year								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
Household surveys	Demographic Health Survey (DHS)*	X								
	MDG Survey					X				
	Malaria Indicator Survey (MIS)			X		X			X	
	EPI survey*									
Health Facility and Other Surveys	School-based malaria survey						X			
	Health facility survey						X			
	Service Provision Assessment survey*									
	End-use verification survey									
Malaria Surveillance and Routine System Support	Support to malaria surveillance system (community level)	X	X	X	X	X	X	X	X	
	Support to HMIS								X	
	Fever sentinel surveillance system	X	X	X	X	X	X	X	X	
Therapeutic	In vivo efficacy testing				X		X		X	
Entomology	Entomological surveillance and resistance monitoring	X	X	X	X	X	X	X	X	
Other Data Sources	Malaria Impact Evaluation									

*Not PMI funded

Progress during the past 12 months

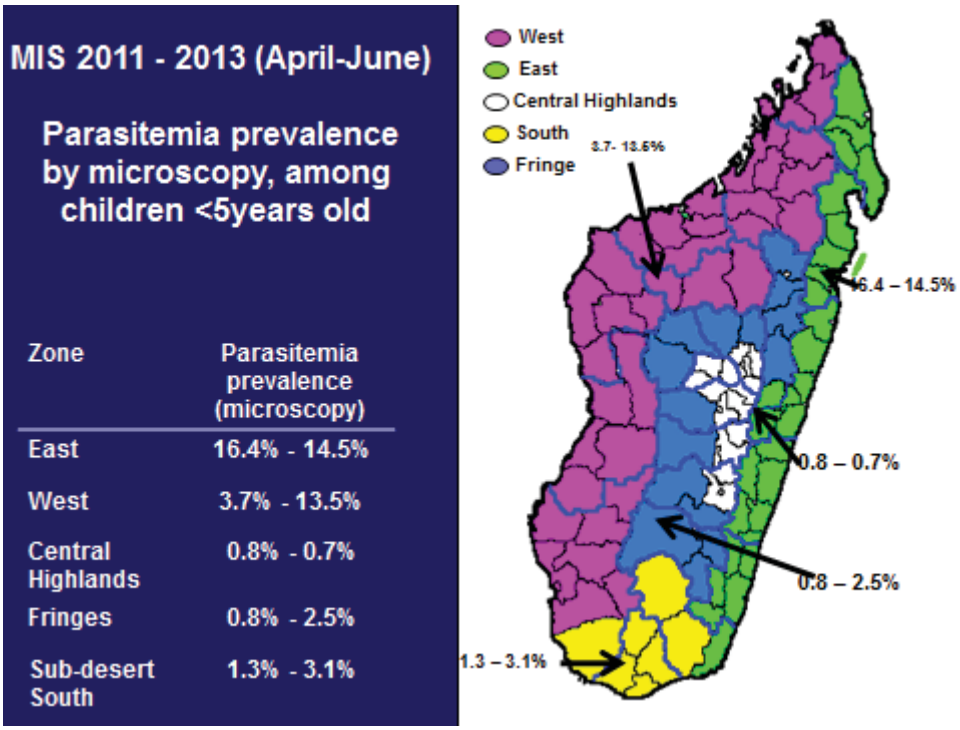
Sentinel Surveillance: PMI continues to support the fever surveillance sites. PMI started with support for 13 fever sentinel sites, and since then has added 2 sites for a total of 15 sites. The number of sites was increased without additional cost, and the per-site cost has actually gone down over the years due to increased efficiency. The sites are managed by a bilateral project that has consistently and reliably conducted quality-controlled fever and malaria case reporting to PMI for 15 sentinel sites. The bilateral project reports detailed treatment and IPTp indicators from ten sites and has funding from other donors and expanded the total number of functional sites to 34. Because of the political crisis limiting data access, the fever sentinel sites system is currently the only readily available source of timely malaria morbidity trend data available to PMI and USG. The fever sentinel site data have been used to detect and responds to potential epidemics in several regions of Madagascar in 2012 and 2013.

Community-based malaria surveillance: Reporting from CHVs is being integrated into the HMIS, although the process is far from complete. In fall 2012, PMI supported an assessment of the CHV recording and reporting system and provided recommendations for how to streamline the system and integrate it into routine reporting.

Household Surveys: The MDG survey was completed in January 2013 and provided updated malaria coverage indicators and a child mortality estimate. This survey was co-funded by PMI, which participated actively in the planning meetings and contributed to survey design and the analysis plan. The 2013 MIS is being used as the main source of malaria coverage results to be compared with the 2011 MIS, and the baseline 2008-2009 DHS.

The 2013 MIS, co-funded by PMI, has provided the second nationwide sample of parasitemia results in Madagascar. Data shows that only the East coast had a decreased in parasitemia prevalence in children <5 compared to MIS 2011. All other transmission areas showed instead an increase in parasitemia prevalence. This can be partly explained by the fact that MIS 2011 was conducted in April-May 2011, after the rolling ITN mass campaign was completed in all 93 districts in 2009 and 2010. MIS 2013, on the other hand, was conducted in April-June 2013 and at that time, only 32 East Coast districts had recently been covered with the 2012 ITN mass campaign, while other malaria transmission zones had not benefitted from an ITN campaign since 2010 or earlier. These results help confirm data from previous surveys and studies showing that access to ITNs is closely linked with parasitemia prevalence; with increased ITN access, parasitemia prevalence decreases, but with reduced access the opposite occurs. A summary of the parasitemia data is shown in the graph below.

Figure 6: Parasitemia Prevalence



Special study: Mission d'Etude des Déterminants de l'Accès aux méthodes de Lutte antipaludique et de leur Impact: Preliminary results from this major cross-sectional study conducted in 2012/13 by IPM, under Global Fund funding in 62 sites throughout the country to evaluate the efficacy and impact of malaria interventions found that ITNs has a protective effect on the population (OR= 0.65 [0.44-0.94]). However, adding IRS to ITNs in low transmission zones had no significant added value, and the protective effect of IRS in low transmission areas was still questionable. Further analyses are underway and results will be published soon.

Routine reporting: PMI has built upon the experiences of partners in Madagascar and those from other countries to introduce the use of RDTs at the community level. A simplified system for reporting confirmed malaria cases was developed to capture data from communities. Efforts are being invested in improving reporting through refresher training and supervision. As the system matures, this information will be available for monthly reporting to CSBs and also used for forecasting both ACT and RDT needs at the community level.

Challenges, opportunities, threats
Madagascar's geography results in limited access to health centers for the rural population. When capacity is built at the community level, the reach of malaria interventions can be expanded and their effectiveness increased.

To date, community level reporting is neither complete nor timely and is of variable quality. In addition, the current HMIS database includes only partial reporting of cases (malaria, diarrhea, and pneumonia) from the community level and the information is only beginning to reach the central level. Future PMI support will focus on efforts to improve technical supervision, CHV performance, and strengthen reporting.

Although working with community-based organizations and community workers as well as FBOs can be used to expand malaria control activities, the ability of these organizations to absorb the resources quickly and be able to monitor their activities appropriately may be limited. Implementing partners without sufficient technical capacity for program monitoring will need guidance from PMI to ensure that an appropriate M&E strategy is in place. PMI will continue to leverage the RBM partnership and other sources of funding to improve surveillance systems and the quality of malaria program data.

Plans and justifications
With FY 2015 funding, PMI will continue to support malaria surveillance and survey activities. This includes continued support to 15 of the 34 fever sentinel sites (FSS) collecting weekly data on fever and malaria to monitor the impact of program interventions. This support will be transitioned to MoH once national capacity is strengthened. With the lifting of restrictions, support for community-based surveillance and routine epidemic surveillance will also be provided to NMCP. the review of the national malaria monitoring and evaluation plan, in addition to health staff

monitoring and analysis at the central and district levels, and support for the development of a

Additional plans are to support the next therapeutic survey (TES) to continue monitoring efficacy of AS/AQ conducted every two years. The next MIS survey will be partially supported by PMI and is planned for April-June 2016; it will be conducted following the 2015 universal ITN mass distribution campaign.

Proposed activities with FY 2015 funding ($1,562,000)

1. *Continued support for 15 fever sentinel sites* to monitor the impact of program interventions on malaria morbidity within the same catchment areas. Develop a model for timely and high-quality community-level malaria surveillance to be implemented in geographic zones moving towards pre-elimination. *($300,000)*

2. *Support a therapeutic efficacy study:* PMI will support six sites for therapeutic efficacy studies. *($300,000)*

3. *Support preparation for the 2016 MIS*: PMI will contribute to supporting the 2016 MIS. PMI funding will complement Global Fund funding. *($700,000)*

4. *Continued support for community-based malaria surveillance, and strengthen routine and epidemic surveillance:* to continue implementation of community based surveillance activities, provide targeted support to NMCP for surveillance, epidemic detection, and strengthening of the national malaria monitoring and evaluation plan. *($250,000)*

5. *Technical assistance:* One CDC TDY and one USAID TDY for the support of PMI Madagascar M&E activities, including support for the impact evaluation. The USAID TDY will be centrally funded. *($12,000)*

9. Capacity Building and Health Systems Strengthening

*NMCP and PMI objectives:*A malaria control service was first established in Madagascar in 1921; the GoM created the current NMCP in 1998 to coordinate national efforts to fight the disease. The NMCP leads national control efforts through the formulation of policies and strategies, coordination of all partners involved in malaria control, and implementation, as secondary recipients, of most of the Global Fund malaria grants.

The NMCP coordinates the RBM partnership comprising several partners including USAID and CDC, UNICEF, WHO, private sector companies, local and international NGOs, research institutions, other government services, etc., in an effort to optimize efforts and investments in the fight against malaria in Madagascar. However, challenges for the NMCP include ensuring

effective coordination at the central down to the district level with other government directorates who have equal responsibility in disease control, epidemiological surveillance, program oversight and reporting, and training and supervision of staff who lack skills in malaria control. The directorates in charge of health districts, maternal and child health, and epidemiological surveillance are the ones who must coordinate most closely with the NMCP.

Progress since PMI was launched

Following five years of political crisis and staff hiring freeze since 2009, the MoH currently reports a critical staff shortage at all levels of the public health system, especially for service provision below the national level. In addition, health workers are not distributed evenly throughout the country. Over 40% of the populations live beyond five kilometers of a health facility, frequently in inaccessible places. The shortage of staff, both in terms of their numbers and level of training, affects the quality of service at each level of the service delivery pyramid.

In response to various human resource challenges, Madagascar adopted a national community health policy in 2008. Along with Global Fund and UNICEF, PMI helped train a cadre of community health workers, in the ratio of two per fokontany. The CHVs provide preventive services and treat uncomplicated cases of the three most common childhood illnesses: pneumonia, diarrhea, and malaria. CHVs refer severe cases to the nearest primary health facility.

Between 2003 and 2011, Madagascar made some improvements in child health indicators; nevertheless, it still faces major health challenges, which threaten social and economic development. Health service quality is substantially below standard and basic medicines and supplies are regularly in short supply. Public and non-governmental sector capacity to plan effectively and manage health programs is weak, particularly in the areas of financial and administrative management, and the collection and use of data for program planning and monitoring. National health infrastructure, information and commodity management and logistics systems are extremely weak, and much remains to be done at central, regional, and district levels to ensure sustainable health financing.

Progress during the past 12 months:

Since 2009, PMI funds were unable to directly support capacity building of NMCP staff or strengthening of the health system. With the official lifting of the USG restrictions, PMI is working with the USAID Madagascar to reprogram funds to address priority needs in capacity building and health systems strengthening, before the implementation of FY 2015 funding. PMI is planning to support a health facility assessment, a supply chain assessment, and a malaria BCC impact study to inform future PMI programming, including for FY 2015.

Proposed activities with FY 2015 funding: (costs covered in other sections)

PMI will focus on building technical and managerial capacity at all levels of the health care system, both through implementing partners and direct support to the NMCP and other government partners. PMI will work with the NMCP, Global Fund, and other partners to review and update a single national malaria monitoring and evaluation plan. PMI will support M&E activities through increased frequency of supervisory visits; additional trainings, and refresher training, reinforcement of the analytical capacity at the central and district levels, and support for the development of a system to promote the centralization and storage of data (including surveys and program reports) gathered by various NGOs, implementing partners, and other donors. (Costs referenced in Monitoring and Evaluation section). In addition, PMI will work with

stakeholders to review, update, and harmonize malaria behavior change promotion message, to ensure that key messages are consistent across the malaria epidemiological zones. PMI will support the strengthening of the skills of the NMCP communication team, build their capacity to design communication materials, to develop, implement, and evaluate BCC campaigns. (Costs referenced in BCC section).

1. *Strengthening NMCP functions:* To help the NMCP reach preventive and curative coverage targets for key malaria interventions, PMI will continue collaboration with other partners to support NMCP, specifically to increase capacity at all levels to plan, implement, supervise, forecast commodity needs; improve distribution systems; coordinate with partners; and monitor and evaluate malaria activities. PMI staff and implementing partners will continue to provide on-the-job training and support to improve NMCP management and coordination capacity. With the complexity of malaria stratification in Madagascar including management of pre-elimination and control interventions simultaneously, the NMCP must acquire adequate managerial and technical capacity to provide effective leadership and coordination within the MoH, with other Government ministries, with partners, and with different communities (Costs referenced in other MOP sections)

2. *Direct support to the NMCP priority technical interventions*: To help the NMCP update its preventive and curative interventions, PMI will work to strengthen NMCP training and supportive supervision capacity of malaria case management and diagnostics at central, regional, and districts level (costs referenced in case management section). Of particular attention, PMI will support the strengthening of the MoH pharmaceutical and commodity management system, including support to SALAMA's capacity to store, distribute and forecast commodity needs. (Costs referenced in Pharmaceutical and Commodity Management section).

10. Staffing and Administration

Two health professionals serve as Resident Advisors (RAs) to oversee PMI in Madagascar, one representing CDC and one representing USAID. In addition, one or more Foreign Service Nationals, work as part of the PMI team. All PMI staff members are part of a single inter-agency 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, management of collaborating agencies, and supervision of 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 professional staff work together and oversee all technical and administrative aspects of PMI in Madagascar, including finalizing details of project design, implementing malaria prevention and case management activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance to PMI partners.

The PMI lead in country is the USAID Mission Director. The two PMI RAs, one from USAID and one from CDC, report to the Senior USAID Health Officer for day-to-day leadership, and

work together as a part of a single interagency team. The technical expertise housed in Atlanta and Washington guides PMI programmatic efforts and thus overall technical guidance for both RAs falls to the PMI staff in Atlanta and Washington. Since the CDC RA is a CDC employee (CDC USDD-38), responsibility for completing official performance reviews lies with CDC supervisor based in Atlanta who is expected to rely upon input from PMI staff across the two agencies that work closely day in and day out with the CDC RA and is thus best positioned to comment on the RA's performance.

The two PMI RAs are based within the USAID health office and are expected to spend approximately half their time sitting with and providing technical assistance to the NMCP and partners.

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

Proposed USG component: ($1,265,000)

1. In-country PMI staff salaries, benefits, travel, and other PMI administrative costs: Continued support for two PMI (CDC and USAID) Resident Advisors and one Foreign Service National staff member to oversee activities supported by PMI in Madagascar. Additionally, these funds will support pooled USAID Madagascar Mission staff and mission-wide assistance from which PMI benefits. *($1,265,000)*

Table 1: Funding Breakdown by Partner

Partner	Geographical Area	Activity	Budget ($)	%
TBD	92 districts	Procure 2 million LLINs for routine and continuous distribtuion	$7,340,000	46%
	93 districts	Procure SP	$336,000	
	Nationwide	Strengthen national capacity for supply chain management including implementing supply chain assessment recommendations	$1,400,000	
	Nationwide	Procure ACTs for malaria case management	$1,000,000	
	Nationwide	Procure RDTs for malaria case management	$1,800,000	
IRS 2 TO 6	East Coast	IRS in 3 East Coast districts	$5,000,000	20%
	9 surveillance sites	IRS entomological monitoring	$225,000	
PSI	92 districts	Undertake activities to increase the survivorship and durability of LLINs in Madagascar	$100,000	0.4%
GEMS II	East Coast	IRS environmental monitoring	$35,000	0.1%
RMNCH/ Jhpiego	Nationwide	Strengthen MIP at facility level	$150,000	0.6%
CDC/IAA	Nationwide	Technical assistance to LLIN durability and longevity activities	$12,000	1.7%
	9 surveillance sites	Technical assistance to PMI IRS activities	$12,000	
	Nationwide	Technical assistance to case management activities	$12,000	
	20 CHL districts	Technical assistance to support OR study	$12,000	
	Nationwide	Technical assistance to support M&E activities	$12,000	
	Nationwide	Staffing and administration costs	$380,000	
MIKOLO Bilateral Project	~48 districts	Refresher training and supervision of community and facility-based case management	$2,000,000	10%
	Nationwide	Support for Malaria Peace Corps Volunteers	$12,000	
	~48 districts	Implementation of malaria BCC activities at community and health facility levels	$500,000	
MAHEFA Bilateral Project	~32 districts	Refresher training and supervision of community and facility-based case management	$1,800,000	8.7%
	Nationwide	Support for Malaria Peace Corps Volunteers	$12,000	

	~32 districts	Implementation of malaria BCC activities at community and health facility levels	$450,000	
MEASURE/ DHS	Nationwide	Support MIS 2016	$700,000	2.7%
TBD	Nationwide	Strengthen routine and epidemic surveillance system	$250,000	1.0%
Malaria Care	Nationwide	Strengthening diagnostics and supporting national lab QA/QC program system	$250,000	1.0%
Peace Corps	Nationwide	Support to malaria Peace Corps Volunteers	$22,000	0.1%
IPM	Nationwide	Continue support for 15 fever sentinel sites of the fever surveillance system	$300,000	3.5%
	20 CHL districts	Continue active case detection	$313,000	
	Nationwide	Support therapeutic efficacy studies	$300,000	
USAID	Nationwide	In country staffing and administration costs	$1,265,000	4.9%
Total			**$26,000,000**	**100%**

Table 2: Planned FY 2015 Obligations

Proposed Activity	Mechanism	Total Budget	Commodities	Geographic area	Description of Activity
ITNs					
Procure 2 million LLINs for routine and continuous distribtuion	TBD	$7,340,000	$7,340,000	92 districts	Procure 2 million LLINs @ $3.6 per LLIN for routine distribution, via ANC and EPI, and continuous distribution (replacement, new households). Costs include $140k distribution and warehousing.
Undertake activities to increase the survivorship and durability of LLINs in Madagascar	PSI	$100,000	$0	92 districts	Year 3 of the LLIN durability monitoring of net distributed in 2013. This activity builds on the various LLIN durability studies in several PMI countries, along with the durability monitoring undertaken in Madagascar in 2012.
Technical assistance to LLIN durability and longevity activities	CDC/IAA	$12,000	$0	Nationwide	One CDC TDY to provide technical support for LLIN durability and longevity monitoring.
Subtotal: ITNs		***$7,452,000***	***$7,340,000***		
IRS					
IRS in 3 East Coast districts	IRS 2 TO 6	$5,000,000	$2,500,000	East Coast	Conduct blanket IRS in 3 East Coast Districts. Cost of $18 per structure to cover approximately 150,000 structures.
IRS entomological monitoring	IRS 2 TO 6	$225,000	$0	9 surveillance sites	Conduct comprehensive IRS-related vector surveillance, assess resistance and other indicators of IRS impact: vector taxonomy and density, and insecticide decay rates. Assumption of $25k per site per year, with 2 sites in 4 transmission zones, plus a additional control site where IRS will not be implemented.

IRS environmental monitoring	GEMS II	$35,000	$0	East Coast	Conduct an independent environmental monitoring visit of IRS areas.
Technical assistance to PMI IRS activities	CDC/IAA	$12,000	$0	9 surveillance sites	One CDC TDY to provide support for insecticide resistance & IRS monitoring.
Subtotal: IRS		***$5,272,000***	***$2,500,000***		
MIP					
Procure SP	TBD	$336,000	$336,000	93 districts	Procure approximately ~2.8 million treatments of SP in line with new WHO IPTp guidelines for ANC (assumes $.12/tx).
Strengthen MIP at facility level	RMNCH/ Jhpiego	$150,000	$0	Nationwide	Support stregthening MIP activities to increase IPTp uptake, LLIN use, and ANC attendance. Includes revisions to update training curriculum, support trainings for midwife and ANC health facility staff on MIP, and insure updated MIP policy availabitliy at facility level.
Subtotal: IPTp		***$486,000***	***$0***		
Case Management					
Diagnostics & Treatment					
Procure RDTs for malaria case management	TBD	$1,800,000	$1,800,000	Nationwide	Purchase ~2M RDTs for CHVs and health facilities. Assumes cost of $.80 per RDT. Costs will include $200k for ancillary supplies (gloves, safety boxes).
Procure ACTs for malaria case management	TBD	$1,000,000	$1,000,000	Nationwide	Purchase ~1.2M ACTs for CHWs and health facilities. Estimates cost at $.65 per treatment ($780k) plus $220k for severe treatment.
Refresher training and supervision of community and facility-based case management	MIKOLO Bilateral Project	$2,000,000	$0	~48 districts	Provide support to health facilities for management of CHVs. Activities will also include refresher training, M&E, and routine supervision of community health workers for appropriate use of RDTs and treatment with ACTs. PMI will support training for 3,000 CHWs, approximately 3,000 health facility workers and 240 district health officers. Activity will be co-
	MAHEFA Bilateral Project	$1,800,000	$0	~32 districts	

					funded with other USAID funding streams.
Strengthening diagnostics and supporting national lab QA/QC program system	Malaria Care	$250,000	$0	Nationwide	Provide support to build national capacity for QA/QC, including implementation of diagnostics assessment findings
Support for Malaria Peace Corps Volunteers	MIKOLO Bilateral Project	$12,000	$0	Nationwide	Support to a third-year PCV to work on implementation of malaria interventions. Funding will support 2 PCVs one each nested with the MAHEFA and MIKOLO projects. This will include housing, transport and equipment.
	MAHEFA Bilateral Project	$12,000	$0	Nationwide	
Technical assistance to case management activities	CDC/IAA	$12,000	$0	Nationwide	One TDY for CDC to provide technical support for RDT implementation at the community level.
Subtotal		*$6,886,000*	*$2,800,000*		
Pharmaceutical and Commodity Management					
Strengthen national capacity for supply chain management including implementing supply chain assessment recommendations	TBD	$1,400,000	$0	Nationwide	Support national capacity for pharmaceutical supply chain management, including quantification and forecasting, curriculum development, training, supervision, and LMIS support. Activity will be co-funded with other USAID funding streams, and will include office technical support.
Subtotal		*$1,400,000*	$0		
Subtotal: Case Management		***$8,286,000***	***$2,800,000***		
BCC					

Implementation of malaria BCC activities at community and health facility levels	MIKOLO Bilateral Project	$500,000	$0	~48 districts	Support the implementation of harmonized key malaria messages (MIP, LLIN use, prompt care seeking, etc.) at community and health facility levels.
	MAHEFA Bilateral Project	$450,000	$0	~32 districts	
Support to malaria Peace Corps Volunteers	Peace Corps	$22,000	$0	Nationwide	PMI will continue to support a third-year Malaria Volunteer to coordinate work with other PCVs in Madagascar. Funding breakdown is $12k to support 1 PCV, including housing, transport and equipment and $10k for SPA projects.
Subtotal: IEC/BCC		***$972,000***	***$0***		
Operational Research					
Continue active case detection	IPM	$313,000	$0	20 CHL districts	Continue an active case detection pilot in line with the pre-elimination strategy in the low transmission areas of the CHL. Funding also includes $13k to support one Peace Corps Volunteer working with IPM on the ACD activity.
Technical assistance to support OR study	CDC/IAA	$12,000	$0	20 CHL districts	One CDC TDY to provide technical support for active case detection study
Subtotal: Operational Research		*$325,000*	*$0*		
M&E					
Continue support for 15 fever sentinel sites of the fever surveillance system	IPM	$300,000	$0	Nationwide	Support 15 fever sites to monitor impact of program interventions on severe malaria. PMI will continue to work to transition the management of the FSS to MOH/IPM.
Support therapeutic efficacy studies	IPM	$300,000	$0	Nationwide	Continue to support 6 TES sites, to be conducted every other year. Assumes $50k per site.
Support MIS 2016	MEASURE/ DHS	$700,000	$0	Nationwide	Support for the next MIS, planned for Feb-June 2016
Strengthen routine and epidemic surveillance system	TBD	$250,000	$0	Nationwide	Targeted support to NMCP for surveillance and epidemic detection

Technical assistance to support M&E activities	CDC/IAA	$12,000	$0	Nationwide	One CDC TDY to provide technical support for evaluation, surveillance, M&E activities.
Subtotal		*$1,562,000*	*$0*		
Subtotal: M&E		***$1,887,000***	***$0***		
Staffing and Administration					
In country staffing and administration costs	USAID	$1,265,000	$0	Nationwide	Support for USAID annual staffing and administration costs, including CDC portion of ICASS.
Staffing and administration costs	CDC/IAA	$380,000	$0	Nationwide	Support for CDC annual staffing costs.
Subtotal: Staffing and Administration		***$1,645,000***	**$0**		
GRAND TOTAL		**$26,000,000**	**$12,640,000**		