

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 2013 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



## PRESIDENT'S MALARIA INITIATIVE



**PRESIDENT'S MALARIA INITIATIVE**

**Madagascar**

**Malaria Operational Plan – FY 2013**

## TABLE OF CONTENTS

ACRONYMS .....	3
I. EXECUTIVE SUMMARY .....	4
II. STRATEGY .....	
1. Introduction .....	8
2. Malaria Situation in Madagascar.....	8
3. National Malaria Control Plan and Strategy .....	12
4. Global Health Initiative and PMI .....	14
5. Integration, Collaboration, Coordination.....	14
6. Goals and Targets of PMI .....	15
7. Current Status on Malaria Indicators .....	15
8. Challenges, Opportunities, and Threats .....	17
9. PMI Support Strategy and Expected Results .....	19
III. OPERATIONAL PLAN .....	
1. Insecticide-Treated Nets.....	20
2. Indoor Residual Spraying.....	27
3. Malaria in Pregnancy.....	30
4. Case Management: Diagnosis .....	34
5. Case Management: Pharmaceutical and Commodities Management .....	35
6. Case Management: Treatment.....	39
7. Behavior Change Communication .....	42
8. Capacity Building.....	44
9. Monitoring and Evaluation.....	44
10. Staffing and Administration.....	51
11. Tables.....	52

## ACRONYMS AND ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AS/AQ	Artesunate-amodiaquine
CDC	United States Centers for Disease Control and Prevention
CHW	Community health worker
CSB	<i>Centre de Santé de Base</i> (primary health facility)
DHS	Demographic and Health Survey
FBO	Faith-based organization
FY	Fiscal year
Global Fund	The Global Fund to Fight AIDS, Tuberculosis and Malaria
GoM	Government of Madagascar
HMIS	Health Management Information System
IEC/BCC	Information, education, communication/Behavior change communication
IPM	<i>Institut Pasteur de Madagascar</i> (Pasteur Institute)
IPTp	Intermittent preventive treatment of pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated net
LLIN	Long-lasting insecticide-treated net
M&E	Monitoring and evaluation
MIS	Malaria Indicator Survey
NGO	Nongovernmental organization
NMCP	National Malaria Control Program ( <i>Programme National de Lutte contre le Paludisme [PNLP]</i> )
NMS	National Malaria Strategy
NSA	Global Fund National Strategy Application
PCV	Peace Corps Volunteer
PMI	President's Malaria Initiative
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SALAMA	Madagascar Central Medical Stores
SP	Sulfadoxine-pyrimethamine
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

## I. EXECUTIVE SUMMARY

Malaria prevention and control are major foreign assistance objectives of the U.S. Government (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through the GHI, the United States will help 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 5-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 has now been extended through FY 2014 with the goal of reducing malaria-related morbidity and mortality by 70% compared to pre-initiative levels in the original 15 PMI countries. 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.

In December 2006, Madagascar's selection as a PMI country was announced, with full implementation beginning 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, and the West Coast has one 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. In the most recent large-scale epidemic in the late 1980s, an estimated 30,000 people died.

In recent years, Madagascar has been the recipient of several Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) grants: a Round 7, 5-year, \$69 million malaria grant signed in August 2008; a \$64 million Rolling Continuation Channel 4 grant signed in October 2009; and a \$73 million Round 9 National Strategy Application for 2010 to 2013 signed in 2010. In addition, Madagascar was selected as a pilot country for the Global Fund-managed Affordable Medicines Facility-malaria, which began in 2010. The United Nations Children's Fund has played a major 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 at the community level. The World Health Organization, the Clinton Foundation, and the Principality of Monaco have been important sources of technical assistance to the *Programme National de Lutte Contre le Paludisme* (National Malaria Control Program; NMCP).

Following the political crisis and *coup d'état* in March 2009, all U. S. Government support to the current government, from the central level to the primary care health facility level, was suspended. The suspension will remain in effect until a freely and fairly elected government is in place. The FY 2013 Malaria Operational Plan has been developed based on the assumption that U.S. Government suspensions will remain in place. Planning for FY 2013 was carried out in Madagascar in May 2012 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 planning team met with implementing and international partners to better coordinate PMI activities; the team also met with NMCP and other Government of Madagascar personnel. The proposed FY 2013 PMI budget for Madagascar is \$25.92 million.

The suspension of all activities that require direct collaboration with the Government has impeded full application of the fundamental tenets of the GHI. Nevertheless, over the past three 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. The following major activities will be supported with FY 2013 funding:

**Insecticide-treated nets (ITNs):**

PMI is supporting the Ministry of Health goal of universal coverage with of one long-lasting ITN per 2 persons in 93 of the 112 health districts where seasonal or perennial malaria transmission occurs. PMI supports free mass distribution campaigns to achieve equitable coverage as well as keep-up strategies including continuous distribution methods at the community level targeting pregnant women and children under five, distribution of replacement ITNs after natural disasters such as cyclones in affected areas, and social marketing of highly subsidized ITNs in limited peri-urban areas.

PMI supported a rolling mass ITN distribution campaign from November 2009 to November 2010 and contributed 3.6 million long-lasting insecticide-treated nets (LLINs) representing 49% of the nets distributed. By 2011, household ownership of at least one ITN had increased to over 94% and ITN use to 82% in targeted zones. However, the average number of ITNs per household was 1.8, falling short of the previous national goal of two per household (Malaria Indicator Survey 2011). With FY 2011 and FY 2012 funding, PMI will procure approximately 4.8 million ITNs (45%) of the 10.2 million planned for free distribution in the 2012-13 campaign to replace ITNs distributed in 2009-10.

With FY 2013 funding, PMI will procure approximately 1.8 million ITNs for distribution to meet between campaign keep-up needs such as ITN loss and the natural increase in expected population growth. PMI will support continuous distribution strategies including free community distribution through nongovernmental organizations; community health worker (CHW)-based distribution targeting pregnant women and children under five years old; free distribution in response to epidemics and natural disasters such as cyclones; and highly subsidized sale (social marketing) in targeted peri-urban areas where ITNs are a strategy.

**Indoor residual spraying (IRS):** The 2011 MIS showed 79% of households in the 54 districts that received blanket IRS in 2010 reported being sprayed sometime during the 12 months preceding the survey, and 82% of children under five years, 78% of pregnant women, and 82% of all individuals in the IRS-targeted districts reported sleeping in households protected by IRS. The 2013–2017 National Malaria Strategy calls for targeted IRS in the Central Highlands, Fringe, and South and West extension zones previously covered by three to four years of blanket spraying (National Malaria Strategy 2008-12). The strategy calls for targeted IRS in 2013 and 2014, covering up to 30% of communes in previously sprayed zones and prioritizing high-risk communes identified using clinical case data with evidence of the highest transmission. This strategy will be coupled with epidemic surveillance to ensure rapid detection and response to malaria outbreaks.

With FY 2013 funds, and in coordination with Global Fund-supported IRS activities, PMI will support targeted IRS in 15 districts in the Central Highlands, Fringe, and the South, covering up to 30% of the population in these districts, approximately 805,000 individuals. PMI will also continue its environmental mitigation measures, improve monitoring and supervision, as well as expand its support for entomologic monitoring and evaluation.

**Intermittent preventive treatment of pregnant women (IPTp):** IPTp using sulfadoxine-pyrimethamine was adopted as a national policy in late 2004 in the 93 districts where stable malaria transmission occurs. The 2008/2009 Demographic Health Survey (DHS) showed that 86% of pregnant women reported making at least one antenatal care (ANC) visit. Despite this high rate of ANC attendance, the percentage of women in zones who reported receiving at least one dose of sulfadoxine-pyrimethamine during an ANC clinic visit was only 15%, and only 8% reported receiving two or more doses (DHS 2008-9), increasing to 31% and 20% by 2011 (MIS 2011). The causes for the poor uptake of IPTp are unclear. 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 information, education, communication (IEC) at the community level to promote early and frequent ANC clinic attendance and to improve the understanding among the population of the benefits of IPTp. With FY 2013 funding, PMI will continue to support client-targeted IEC/behavior change communication (BCC), focusing on malaria in pregnancy services using trained CHWs. PMI will coordinate with the NMCP, the Directorate of Child and Maternal Health, and Reproductive Health and partners, to link malaria interventions for pregnant women with integrated antenatal health services.

**Case management:** Results from the 2011 MIS show that among children under five with fever in the two weeks preceding the survey, only 44% sought any kind of treatment and only 2% were treated with an artemisinin-based combination therapy (ACT) within 24 hours of fever onset. 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 nongovernmental organizations and faith-based organizations. PMI has supported community-based treatment for 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 5,000 CHWs in malaria case management including use of RDTs for diagnosis. PMI has also supported training and RDT use among 176 nongovernmental and faith-based organization providers in 147 private health facilities and reinforced training and supervision in malaria microscopy diagnosis in 48 health facilities. In collaboration with implementing partners PMI has set up 933 supply points at the commune level to serve the CHWs.

With FY 2013 funding, PMI will strengthen the supply chain for CHWs and procure sufficient RDTs and ACTs to fill the gap nationally for community case management of malaria. PMI will also ensure the supply of RDT and ACTs to approximately 300 clinics run by nongovernmental and faith-based organizations. PMI will continue its support and expand the network of CHWs for the use of ACTs and RDTs at the community level and CHW training for integrated case management of malaria, pneumonia, and diarrheal diseases.

**IEC/BCC:** PMI continues its support for the *Champion Commune* approach, which works with the Ministry of Health, nongovernmental organizations, and Roll Back Malaria partners to establish an innovative community empowerment and mobilization program. PMI supports a variety of IEC/BCC strategies to promote healthy behaviors including radio spots, mobile videos with local actors, and print materials.

In FY 2013, PMI will coordinate with the NMCP and partners to strengthen IEC/BCC approaches for malaria prevention and treatment at the community level by emphasizing interpersonal communication methods. This will include expansion of the *Champion Commune* approach, with a particular focus on an integrated community management of pneumonia, diarrheal diseases, and malaria. PMI will be a major contributor to IEC/BCC activities supporting the national LLIN and IRS campaigns. PMI will also collaborate with the Peace Corps on activities to improve treatment-seeking and prevention behaviors.

**Monitoring and evaluation (M&E):** The NMCP, Global Fund, and other partners, has developed a National Malaria M&E Strategy and Plan. PMI contributed to the nationwide 2008/2009 DHS and has continued support for fever surveillance at 15 sentinel sites. PMI provided support for the 2011 MIS and is working with partners to strengthen M&E for community-based interventions.

With FY 2013 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 of the Millennium Development Goal survey in 2012-13 which will be conducted instead of a DHS. A MIS is being planned for 2015 to collect malaria biomarkers. PMI will also continue to support high-quality data reporting of malaria indicators from the 15 sentinel sites.



## **II. STRATEGIC PLAN**

### **1. Introduction**

The President's Malaria Initiative (PMI) is a core component of the 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 has now been extended through fiscal year (FY) 2014 and, as part of the GHI, the goal of PMI is 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).

Madagascar was selected as a PMI country in FY 2006. The FY 2013 Malaria Operational Plan 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 to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) Rolling Continuation Channel 4, Round 7 and National Strategy Application grants.

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 2013 activities.

Despite the latest development towards the resolution of the political crisis, which began with the February 2009 coup d'état, the FY 2013 MOP has been developed on the assumption that suspension of United States Government (USG) assistance will remain, limiting PMI's technical assistance and development interventions.

### **2. Malaria Situation in Madagascar**

Madagascar has an estimated population of 21.8 million in 2012, with an estimated 19% children under five years of age and 4.5% pregnant women.<sup>1</sup> One of the poorest countries in the world, the average per capita income in Madagascar is just \$430; 24% of the population 15-49 years old is illiterate; 77% of the population lives below the poverty line, an increase from 69% in 2005; and 50% of children under age five are malnourished.<sup>2</sup> In 2011, malaria was the second leading cause of death among children under five reported from hospitals.<sup>3</sup> Life expectancy hovers at 64 years for women and 61 years for men. The last decade has witnessed marked health improvements in Madagascar, especially among children. According to the most recent

---

<sup>1</sup> INSTAT, 2012

<sup>2</sup> Demographic and Health Survey, 2008/9

<sup>3,3</sup> Annuaire Statistique 2010

Demographic and Health Survey (DHS) in 2008-2009, infant and child mortality fell from 159 per 1000 live births in 1997 to 72 per 1000 live births by 2008. 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%, respiratory infections by approximately 87%, and the proportion of moderately or severely anemic children fell by 59%.

Despite recent improvements in child health indicators, Madagascar still faces major health challenges, which threaten social and economic development. Health service quality is substantially below standard and basic medicines and supplies are often in short supply. The capacity of the public and nongovernmental sectors to plan and manage health programs is limited, particularly in the areas of financial and administrative management, as is the use of data for program planning and monitoring. 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 are having 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 down to the health facility level resulting in stockouts. 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.

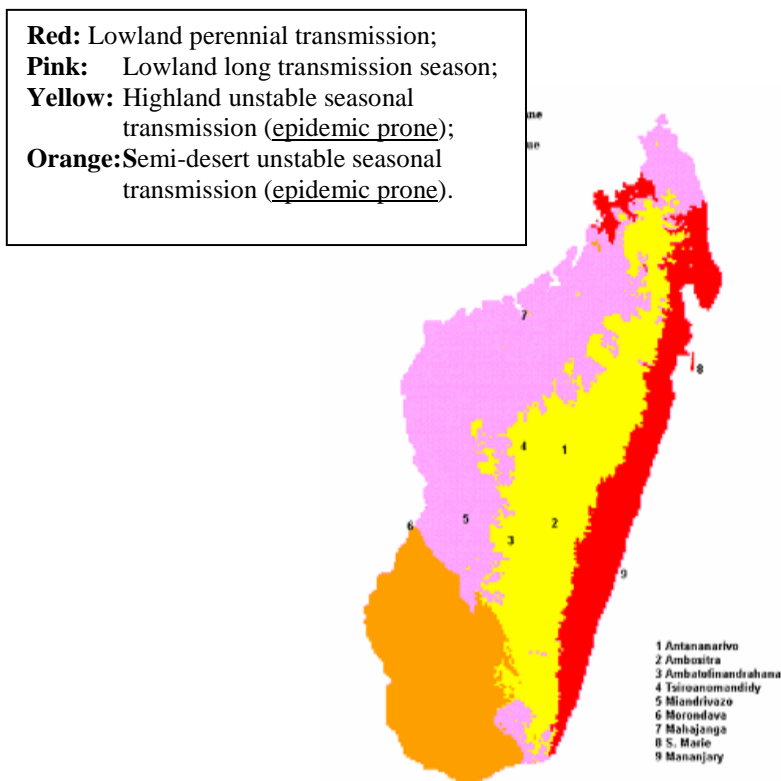
Administratively, Madagascar is divided into 22 regions, 112 health districts (119 administrative districts), approximately 1,579 communes, and 17,485 fokontany, which is the smallest administrative unit.

*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 2011. Overall, hospital deaths attributed to malaria fell from 17% in 2003 to 7% in 2011. In 2011, malaria was responsible for an estimated 4% of all reported outpatient visits, and 5% of all children under five years of age admitted to a hospital were diagnosed with severe malaria<sup>4</sup>. In spite of this, 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 length and intensity of malaria transmission: the West Coast including the North; the Central Highlands; the East Coast; and the South, roughly corresponding to the bioclimate 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 subsequent increased malaria transmission is as long as nine months. Cyclone season extends from December to April; cyclones result in flooding and increased risk of malaria and communicable diseases.

**Figure 1: Madagascar Malariometric Stratification**

---



On the East and West Coasts malaria transmission is stable. The East Coast has perennial transmission and the West Coast has seasonal transmission that typically runs from May to October (> six months) with decreased 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 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 and killed an estimated 30,000 people. The Fringe districts of the Central Highlands are those geographical 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 geographically organized the country into three geographic zones based on the local

epidemiology and coverage of malaria interventions: control, consolidation, and pre-elimination zones.<sup>5</sup> Strategy implementation of malaria interventions is organized by zone.

While *Plasmodium falciparum* is the predominant species of malaria parasite in all areas, *P. vivax*, *P. malariae*, and *P. ovale* together may make up as much as 10-15% of all cases, especially in the Highlands. The two primary vectors are *Anopheles gambiae* (East and West Coasts) and *An. funestus* (Central Highlands and South). *An. arabiensis* is also 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 which occurred 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* is also present in the Central Highlands, but 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.

Following the national scale-up of malaria prevention interventions from 2006 – 2010 and accompanying decline in malaria morbidity, the Malaria Indicator Survey (MIS) conducted from April-May, 2011, during the high transmission season, showed lower-than-expected parasitemia prevalence among children under five years old. The overall prevalence of malaria parasitemia among children under five was 6 % nationally with the following point estimates: 1% in the Central Highlands, 1% in the bordering Fringe zone, 1% in the South, 4% on the West Coast, and 16% on the East Coast.

In spite of these gains, a dramatic resurgence of malaria cases occurred in late 2011 and the first quarter in 2012 on the endemic southeast coast of Madagascar with 2.5-10 times the number of cases reported from 2008-2010, occurring among all age groups with variable rates of rapid diagnostic test (RDT) positivity rates. These findings suggest that the area is in transition from a typically endemic zone with near year-round transmission to an epidemic-prone zone. Initial findings from an investigation suggest that the combination of decreased malaria immunity and decreased long-lasting insecticide treated net (LLIN) ownership and use rates between 2011 and 2012, just over two years after a universal LLIN distribution campaign, are among the contributing factors. HMIS data show overall in Madagascar a 180% increase in cases during the first four months of 2012 compared to the same time period in 2011. This underscores the need to maintain high levels of malaria prevention coverage between campaigns and improve access to prompt case management.

In addition to PMI, major partners working with the NMCP include the Global Fund, United Nations Children's Fund (UNICEF), UNITAID, World Health Organization (WHO), and the Principality of Monaco. Key implementing partners include numerous local and international nongovernmental organizations (NGOs) and faith-based organizations (FBOs).

---

<sup>5</sup> WHO *Malaria Elimination: A field manual for low and moderate endemic countries*

### 3. National Malaria Control Plan and Strategy

Madagascar's current National Strategic Plan covers the period between 2008 and 2012. The revision of the recently completed 2013-2017 National Strategic Plan is based on recommendations from the Malaria Program Review in 2011 and included strategic discussions involving malaria stakeholders.

*ITNs:* In 2008, a major strategic change regarding ITN distribution occurred, moving from targeted distribution of vulnerable groups to universal coverage, defined in the National Strategy 2008-2012 as two nets per household. The goal of two nets per household is applicable to all 112 epidemic-prone health districts, except 20 (out of 112) health districts of the Central Highlands that receive IRS and where epidemic surveillance systems are 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 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. Madagascar has prioritized free ITN distribution through mass campaigns as the primary approach to scaling up to universal coverage. In addition, three "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, free targeted distribution to communities most affected by natural disasters, such as cyclones, and the sale of highly subsidized ITNs in limited peri-urban communities.

Under the 2013-2017 National Strategic Plan, Madagascar has adopted the universal coverage strategy of one LLIN for every two persons to achieve universal coverage. In this plan the ITN-targeted area was also expanded by one district, where MIP interventions are a strategy, bringing the total to 93 of 112 health districts. 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.

*IRS:* The current national malaria strategic plan calls for IRS in three geographic zones: the Central Highlands; the Fringe, the area bordering the Central Highlands; and districts to the west and south of the Fringe. Blanket IRS was coupled with free mass LLIN distribution in 37 out of the 54 districts that received universal IRS in 2010-2011. This included all IRS districts except for those in the Central Highlands. The previous National Strategic Plan (2008-2012) included blanket IRS for three to four years, followed by a targeted spraying in communes with the highest transmission and improved malaria surveillance and response planning. At the end of the 2011 spray round, the Central Highlands and Fringe districts (33 districts) completed four consecutive years of universal IRS coverage. By the end of the 2012 spray round, the extension to the South and West (21 districts) will have received three consecutive years of blanket IRS coverage and all 54 districts will be transitioning to targeted IRS. Targeted IRS includes only the highest transmission communes for spraying and relies on vigilant malaria surveillance and response planning to prevent epidemics. Up to 30% of all communes will undergo spraying prioritized based on clinical and entomological data that show the highest levels of ongoing transmission.

*IPTp:* IPTp has been implemented since 2004 in 93 lowland and coastal districts where malaria transmission is stable or seasonal. The policy excludes the remaining 19 districts in the Central

Highlands, which are epidemic prone. The malaria in pregnancy strategy includes the provision and promotion of LLIN use during pregnancy and early, effective IPTp, delivered as a package during ANC visits. The IPTp policy calls for two doses of sulfadoxine-pyrimethamine (SP) taken at least one month apart — the first dose after quickening and the second dose one month later. Administration of IPTp should be directly observed and free-of-charge. Although there are currently no plans to involve community health workers (CHWs) in the delivery of IPTp, these workers play an essential role in promoting the use of antenatal services. All focused antenatal care (FANC), including tetanus vaccination and malaria prevention activities, is integrated at the level of the primary health facility (*Centre de santé de base* or 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 malaria in pregnancy activities, including IPTp. To further promote malaria in pregnancy (MIP), the NMCP has included IPTp as part of 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 vitamins and deworming medicines to children, 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; however, because of production and packaging delays as well as delays in availability of coformulated artesunate/amodiaquine (AS/AQ), community-level ACTs for treatment of fever by CHWs were only introduced in late 2008. The NMCP policy requires that, where possible, all cases of malaria be diagnosed by microscopy or RDT, including the community level. Where 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 new 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 control/consolidation phase districts and of 100% in pre-elimination-phase districts. The plan also calls for correct case management, including RDT diagnosis, of at least 80% of fever cases among children under five evaluated and treatment at the community level.

PMI has supported the training of more than 5,000 CHWs in integrated community case management in rural communities more than five kilometers from the nearest health facility, covering about one-third of those communities nationwide. The Global Fund and UNICEF are also supporting the scale up of CHWs and together these donors, by the end of 2012, aim to cover all remote villages nationwide. More than half of PMI-trained CHWs have been equipped for case management of malaria, including the use of RDTs. They are also trained in integrated case management of diarrhea and pneumonia, with oral rehydration salts plus zinc and cotrimoxazole, respectively. Results from the 2011 MIS show that among children under five with fever in the two weeks preceding the survey, only 44% sought treatment of any kind and 3% were treated with an ACT within 24 hours of fever onset.

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 more than a week over the previous three months
- At least 95% of health facilities do not experience any week-long stockouts of SP or LLINs 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.

#### **4. Global Health Initiative and PMI**

Malaria prevention and control is a major foreign assistance objective of the 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 will help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns and children. The GHI is a global commitment to invest in healthy and productive lives, building upon and expanding the USG's successes in addressing specific diseases and issues.

The GHI aims to maximize the impact the United States achieves for every health dollar it invests in a sustainable way. The GHI's business model is based on: implementing a woman- and girl-centered approach; increasing impact and efficiency through strategic coordination and programmatic integration; strengthening and leveraging key partnerships, multilateral organizations, and private contributions; encouraging country ownership and investing in country-led plans and health systems; improving metrics, monitoring and evaluation (M&E); and promoting research and innovation. The GHI will build on the USG's accomplishments in global health, accelerating progress in health delivery and investing in a more lasting and shared approach through the strengthening of health systems. Framed within the larger context of the GHI and consistent with the GHI's overall principles and planning processes, BEST (Best practices at scale in the home, community and facilities) is a United States Agency for International Development (USAID) planning and review process that draws on the best experience in Family Planning, Mother and Child Health and Nutrition to base our programs on the best practices to achieve the best impact.

#### **5. Integration, Collaboration, and Coordination**

With FY 2013 funding PMI/Madagascar will 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 and malaria is an example of support of GHI. Since malaria prevention and control activities have been implemented as part of integrated maternal and child health services, PMI will make a significant contribution to strengthening capacity to deliver these services. PMI/Madagascar 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. PMI will continue to support universal coverage of ITNs via various keep-up distribution methods.

Several donors and partners support malaria interventions in Madagascar, including PMI, the Global Fund, UNICEF, the Clinton Foundation, 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. RBM partners have worked closely in the past year to oversee and conduct the MIS 2011, plan and design the Malaria Program Review (July 2011), organize and facilitate a national conference on pre-elimination to inform the new 2013-2017 National Strategic Plan, and coordinate technical assistance as needed at all levels.

## **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. By the end of 2014, 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 will own at least one ITN;
- 85% of children under five will have slept under an ITN the previous night;
- 85% of pregnant women will have slept under an ITN the previous night;
- 85% of houses in geographic areas targeted for IRS will have been sprayed;
- 85% of pregnant women and children under five will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the 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; and
- 85% of children under five with suspected malaria will have received treatment with ACTs within 24 hours of onset of their symptoms.

## **7. Current Status of 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. Additional 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.

The results from the 2011 MIS showed that all bed net coverage indicators have increased substantially since the 2008/2009 DHS. Among the previous 93 ITN-targeted districts (National Malaria Strategy 2008-12), ownership increased from 72% of households reporting they owned at least one ITN to 94% in 2011. In the same target districts, reported use of an ITN the previous night increased from 58% to 89% among children under five and from 58% to 85% among pregnant women between 2008/2009 and 2011.

The 2008/2009 DHS data showed that 90% of women who had a pregnancy in the last two years reported at least one ANC visit (86% with a trained provider) and 87% had two or more visits.



Among the 93 targeted districts for IPTp, only 15% of women who had been pregnant within the previous two years reported receiving at least one dose of SP during ANC visits and only 8% reported receiving two doses of SP. By 2011, more than 95% of women reported having made at least one antenatal visit and IPTp coverage had increased moderately to 35% and 22% having received at least one and two doses of SP during ANC visits, respectively. In contrast, facility-based data collected by the NMCP estimate that 73% of pregnant women attending at least one ANC visit received at least one dose of SP for IPTp and 55% received at least two doses during their pregnancy in 2011; however, these data are based on partial reporting (district-level reporting completeness of 75-80%) and reflects information from health facilities regarding pregnant women who have access to ANC services.

ACTs and RDTs were rolled out in public health facilities between late 2006 and early 2008; however, because of production and packaging delays, ACTs for treatment of fever by CHWs were only introduced in late 2008. The 2008/2009 DHS reports that only 0.4% of children with fever in the previous two weeks received treatment with an ACT within 24 hours of fever onset. The 2011 MIS found an increase but only to 3%. Among children with fever in the previous two weeks, only 44% sought any treatment for their fever. Health facility utilization is low and chloroquine and SP are still widely available on the market for self-treatment and prescription by private providers. Furthermore, many providers treat uncomplicated malaria with intramuscular injections of quinine, which are not free of charge (ACTWatch Surveys 2010, 2011).

**Table 1: Nationwide household survey results, Madagascar 2008-2011**

Indicator	2008/2009 DHS (PMI baseline)	MIS 2011
Proportion of all households with at least one ITN	73%	94%
Average number of ITNs per household <sup>1</sup>	1.1	1.8
Proportion of households with at least one ITN for every two people (NEW RBM Indicator) <sup>1</sup>	23%	37%
Proportion of population with access to an ITN within their household (NEW RBM Indicator) <sup>1</sup>	44%	67%
Proportion of individuals who slept under an ITN the previous night (NEW RBM Indicator) <sup>1</sup>	48%	82%
Proportion of children under five years old who slept under an ITN the previous night <sup>1</sup>	58%	89%
Proportion of pregnant women who slept under an ITN the previous night <sup>1</sup>	58%	85%
Proportion of women who received two or more doses of IPTp during their last pregnancy in the last two years <sup>2</sup>	9%	24%
Proportion of houses sprayed with IRS in the 12 months preceding the survey <sup>3</sup>	Not available	79%
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 <sup>4</sup>	87%
Proportion of children under five years old with	Not available	6%

fever in the last two weeks who had a finger or heel stick		
Proportion of children under five years old with fever in the last two weeks for whom advice or treatment was sought from a health facility or provider (New RBM Indicator)	41%	34%
Proportion receiving ACTs among children under five years old with fever in the last two weeks who received any antimalarial drugs (New RBM Indicator)	21%	20%
Proportion receiving first line treatment, among children under five years old with fever in the last two weeks who received any antimalarial drugs (New RBM Indicator)	20%	Not available <sup>5</sup>
Proportion of children under 5 years old with fever in the last 2 weeks who received treatment with ACTs within 24 hours of onset of fever	0.4%	3.0%

<sup>1</sup> Among 92 targeted districts receive LLINs per the national strategy 2008-2012

<sup>2</sup> Among 93 districts targeted districts benefit from IPTp

<sup>3</sup> Among 54 targeted health districts that benefit from IRS per the national strategy 2008-2012

<sup>4</sup> The DHS 2008/20099 did not collect information on IRS

<sup>5</sup> MIS data collection did not allow for information to be collected on chloroquine due to a tablet programming error

**Table 2: Impact indicators**

Indicator	2008/2009 DHS (PMI baseline)	MIS 2011
All-cause under five mortality rate (Direct method)	72/1000 live births	Not available
All-cause under five mortality rate (Indirect, Brass method)	83/1000 live births	91/1000 live births
Proportion of children aged 6-59 months with malaria parasitemia	Not available	6.2%
Proportion of children aged 6-59 months with a hemoglobin measurement of <8 g/dL	2.5%	1.4%

## 8. Challenges, Opportunities, and Threats

Due to the political constraints related to working with the Government of Madagascar (GoM) since March 2009, PMI and a few other donors have not been able to support malaria control activities or capacity building in the public health sector. 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. In response to the reported low uptake of SP for IPTp, the NMCP along with partners has employed alternative strategies such as using CHWs to deliver targeted messages for the prevention of

malaria in pregnancy and encouraging pregnant women to attend ANC early and often and demanding IPTp during their visits; however, results of these efforts have not yet been evaluated and are likely to be limited given the weak health system and services.

A parallel supply chain system exists 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 is weak, delays due to late financing, and inadequate stock management and information systems lead to stockouts. Better coordination is needed and supply chain strengthening is essential for both systems.

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, potentially promoting conditions favorable for the development of drug resistance.<sup>6</sup> 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 remain.

## **9. PMI Support Strategy and Expected Results**

Within a year after release of FY 2013 funding:

### Prevention:

1. PMI will have supported targeted IRS in 15 districts, protecting a population of approximately 805,000 people.
2. PMI will have procured approximately 1.8 million LLINs to help reach and sustain universal coverage in 93 districts in Madagascar.

### Case management:

1. Home-based management of malaria will continue to reach over 50% of all communes located more than five kilometers from a health facility nationwide, providing diagnosis with RDTs and treatment with an ACT to more than 35% of children under five with fever. This will be done as part of an integrated approach that will also provide treatment as needed for acute respiratory infections and diarrhea.
2. PMI will have procured approximately 3.8 million RDTs: approximately 3.5 million for trained CHWs and 300,000 for FBOs/NGOs. In addition, PMI will have procured approximately 880,000 ACT treatments for trained CHWs, and approximately 100,000 ACT treatments for NGO and FBO providers.

---

<sup>6</sup> EPM 2010; Malaria Indicator Survey 2011

There are several partners, including PMI, working in parallel to train and rapidly scale up integrated community case management of children under five. With support from the Global Fund National Strategy Application (NSA) grant, Madagascar has trained over 19,000 CHWs on community integrated management of childhood illness since the beginning of 2011. Efforts have been made to standardize the training curriculum, data recording, and reporting tools; however, there are several implementation challenges including ensuring adequate CHW starter kits and on-going medication stocks; and providing adequate technical supervision and oversight. CHW incentives have not been standardized and coordination among partners needs improvement. The national community health policy is currently being revised and an implementing guide is under way to help provide guidance. This guide will be used as a basis to coordinate community health service provision among different programs and partners.

Malaria transmission in Madagascar has been decreasing over the last decade with the scale-up of prevention and case management activities. In the first half of 2012 an epidemic of malaria occurred in a historically endemic zone of Madagascar. The epidemic had 2.5-10 times the number of malaria cases seen in recent years and affected all age groups. An investigation showed that net ownership and use declined in the affected zone only 2.5 years after the last free mass distribution campaign and was associated with an increased risk of malaria infection that may have been exacerbated by decreased malaria immunity in the population. These findings underscore the need for maintaining high malaria prevention coverage and improving surveillance and epidemic preparedness. The survivorship and physical integrity of ITNs in Madagascar are currently being monitored to help inform ITN keep-up and replacement needs between campaigns.

The current Global Fund grants end in 2012-2013 and a recent NSA Global Fund Grant has been submitted for additional partial funding through 2015. Large program resource gaps remain and funding levels are uncertain in the upcoming years.

### **III. OPERATIONAL PLAN**

#### **1. Insecticide-Treated Nets**

##### *NMCP and PMI Objectives*

Under the 2013-2017 National Strategic Plan, Madagascar has adopted the universal coverage strategy of one LLIN for every two persons to achieve universal coverage. Scaling up ITN ownership and use is underway through free mass distribution campaigns at the community level, free routine ITN distribution through ANC and Expanded Program on Immunization (EPI) clinics targeting pregnant women and infants, and free targeted distribution to communities most affected by natural disasters, such as cyclones. To complement free distribution, Madagascar continues to promote highly subsidized social marketing of ITNs for sale at approximately \$1.50 per net to the end user. This approach is focused on peri-urban areas, where some segments of the population can more easily afford to purchase nets. The 2013-2017 national strategy stipulates routine free distribution to children between one and five years of age during clinic visits, prioritizing those with diagnosed malaria. The NMCP and RBM partners will discuss and pilot new and better methods as an overall effort to improve keep-up activities to date. One example that will be evaluated is a strategy recently used during urgent distribution in response to cyclones and epidemics with limited ITNs: ITNs were distributed from health facilities prioritizing children under five with fever or history of fever that have a positive RDT result at the time of consultation as these children and possibly other family members were clearly at risk for malaria. This approach, in conjunction with IEC messages emphasizing correct net use for the prevention of malaria at the time of consultation, appears to be effective at changing behavior.

Madagascar's multi-pronged approach for ITN distribution is summarized below.

**Table 3: Madagascar's national ITN distribution strategies**

<b>Type of ITN Distribution</b>	<b>Strategy</b>	<b>Approach</b>	<b>Target Population</b>	<b>Geographic Areas</b>
Free Distribution	Catch-Up	Mass Campaign	One ITN per 2 persons in 93 of the 112 health districts	Universal coverage in 93 out of the 112 health districts
	Keep-Up	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
	Keep-Up	ANC visits and child clinic visits	Pregnant women and children < five years old	Routine delivery through health facilities in 93 target districts)
	Keep-Up	Alternative free distribution strategies through NGOs, community organizations, and CHWs	General population targeting households with low ITN access as a result of ITN loss between mass distribution campaigns	93 target districts
Social marketing	Keep-Up	Social marketing; commercial sales	Those who can afford subsidized nets	Targeted peri-urban areas among the 93 districts covered in ITNs

PMI contributed almost 49% of all nets and associated logistics and IEC/BCC costs during the 2009-2010 free mass distribution campaign. This resulted in high ownership and use with 94% of households reporting ownership of at least one ITN six months after the campaign compared to 72% in 2008/2009.<sup>7</sup> These results were similar by geographic zone, household economic status, and households with and without children under five. The campaign achieved equity in ownership among the general population for the first time in Madagascar. There is a culture of net use in Madagascar, high community awareness, and a high demand for ITNs. Furthermore, 82% of all individuals sleeping in the household the night before the survey reported sleeping under an ITN compared to 48% in 2008-9. ITN use was even higher among children under five and pregnant women (89% and 85% respectively) and was similar among households of different sizes.

However, only 59% of households reported ownership of at least two ITNs, well below the NSP 2008-12 goals of 80%. As expected, ITN use increased with ITN ownership, with more than 88% of individuals reporting ITN use in households with two or more ITNs versus 75% among households with only one ITN. The proportion of individuals living in a household with a ratio

<sup>7</sup> DHS 2008/9

of a least one ITN per two persons increased from 44% in 2008-9 to 67% in 2011, but still falls short of the 80% target of the 2013-17 National Strategic Plan.<sup>8</sup>

To date PMI has prioritized nets only in large free mass campaigns because of unmet campaign gaps. Global Fund Round 7 has only partially covered routine and social marketing ITN needs. Information on the effectiveness of ITN keep up strategies in Madagascar is very limited, but it is clear that the impressive results of the mass campaigns have not been matched by keep-up activities. The number of nets distributed via routine and social marketing channels does not effectively or equitably cover anticipated yearly ITN losses across the general population.

Data collected from Madagascar during a limited WHO Pesticide Evaluation Scheme (WHOPES) evaluation of Permanet 2.0 in 2008 showed after one, two, and three years, the percentage of nets with residual insecticide below the detectable limit was 19%, 52%, and 82%, respectively and the average numbers of holes were 27, 47, and 55, respectively. The WHOPES report noted that among Permanets collected from Madagascar 14%, 25%, and 83% failed to meet the cone bio-assay WHO efficacy criteria after years one, two, and three respectively.<sup>9</sup> Currently there is no information on the performance of other types of nets in Madagascar nor is there any information on survivorship and physical integrity. M&E of nets distributed in 2009 is currently underway to assess survivorship and physical integrity of ITNs distributed in 2009. Results are expected in October 2012.

The constraints on successful routine delivery through ANC and EPI clinics in Madagascar include an inadequate supply of ITNs, inconsistent stock and a weak delivery system to the *Centre de Santé de Base* (primary health facility, CSB) level especially in the most remote and difficult to access sites. In the past, because of bed net campaign gaps, nets allocated for routine distribution were prioritized for free distribution during campaigns. As part of the 2013-2017 National Strategic Plan, additional free keep-up strategies, such as school-based or FBO- AND NGO-supported community distribution, will be explored and adopted, if effective.

#### *Progress during the past 12 months*

With FY 2011 funds PMI has procured and will deliver 2.1 million LLINs to 19 districts on the East Coast that last received LLINs during the 2009 mass campaign. This is also the region where large malaria outbreaks occurred in late 2011 and early 2012. Through the Stomp Out Malaria PMI-Peace Corps initiative, PMI has also promoted IEC/BCC activities and campaign planning support with the extensive network of Peace Corps volunteers in Madagascar.

#### *Plans and Justification*

*Distribution of ITNs during the 2012-2013 free mass distribution campaign:* With FY 2011 and FY 2012 funds, PMI will have contributed 4.8 million LLIN towards the free 2012-13 mass distribution replacement campaign, covering an estimated 58% of the 9 million nets needed to achieve universal coverage in the 93 targeted health districts. In order to meet the universal

---

<sup>8</sup> DHS 2008/9; MIS 2011

<sup>9</sup> WHOPES Permanet 2.0 Evaluation, 2008

coverage objective specified in the 2013-2017 National Strategic Plan, a distribution strategy to achieve a ratio of one ITN per two persons is planned (following WHO guidance, a ratio of 1 ITN per 1.8 persons will be used for quantification of nets needed). PMI will also have contributed towards logistics, planning, training, and distribution of the campaign ITNs. The campaign will be conducted in coordination with the Global Fund Rolling Continuation Channel 4 Phase II grant, which will cover remaining gaps in ITNs as well as associated logistics, supervision, and training costs. The campaign will be rolled out as shown in Figure 2 below. In 2012, 31 districts on the East Coast will be covered followed by 62 districts in 2013. With FY 2013 funds, aggressive keep-up strategies will be explored to increase and maintain coverage of at least one ITN per two persons especially on the East Coast after the first phase of the 2012-2013 universal campaign.

**Table 4: Annual ITN distribution in Madagascar, by year and method**

<b>Method</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012<sup>2</sup></b>	<b>2013<sup>3</sup></b>	<b>Total</b>
Mass distribution	1,653,215 <i>(1,000,000 PMI)</i>	5,698,462 <i>(2,579,520 PMI)</i>	0 <i>(0 PMI)</i>	3,542,314 <i>(2,100,000 PMI)</i>	6,215,320 <i>(2,700,000 PMI)</i>	17,109,311 <i>(8,379,520 PMI)</i>
Routine (ANC and vaccination clinics)	126,080	308,217	157,268	320,000	300,000	1,211,565
Emergencies and Disaster response	-	44,000	40,000	44,000	10,500	138,500
Social marketing <sup>1</sup>	291,636	163,636	120,000	21,341	399,000	995,613
<b>Total</b>	<b>2,070,931</b>	<b>6,214,315</b>	<b>317,268</b>	<b>3,927,655</b>	<b>6,924,820</b>	<b>19,454,989</b>

Notes:

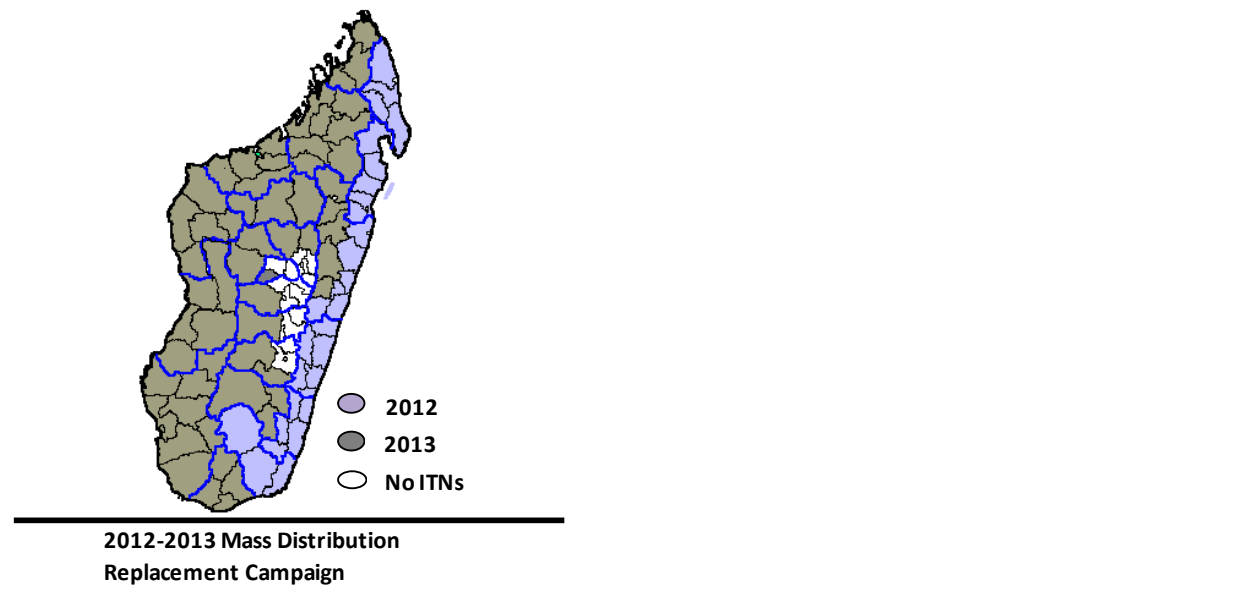
<sup>1</sup> Reflects the number distributed to retail outlets or distribution warehouses from the central level

<sup>2</sup> Reflects the expected total distribution achieved by December 31, 2012, based on current estimates and plans

<sup>3</sup> Reflects the expected total distribution achieved by December 31, 2013, based on current estimates and plans



**Figure 2: Distribution of districts targeted for rolling ITN distribution campaign, by year**



*Distribution of ITNs during disasters:* The national Office of Risk Management and Disaster Response (*Le Bureau National pour la Gestion des Risques et Catastrophes*) reports that from 2005 to 2011 Madagascar suffered from 17 cyclones destroying more than 240,000 structures during that period. In FY 2013, PMI will coordinate with other partners to ensure a stock of at least 50,000 ITNs are available for rapid distribution as part of a coordinated disaster response effort to replace lost ITNs.

*Distribution of ITNs to pregnant women and children under five through CHWs:* PMI has invested heavily in establishing a network of CHWs to provide integrated community case management of children under five with uncomplicated fever, respiratory illness, diarrhea, and malnutrition as well as promoting maternal health and providing family planning services to women in their respective communities. Free ITNs will be distributed by CHWs to promote and maintain ownership and use. CHWs will also be trained to educate community members in proper daily care, storage, and repair of ITNs to maximize the durability of ITNs.

*Continuous distribution of ITNs on the East Coast:* FY 2013 funding will focus on activities to maintain high ITN coverage following campaigns with particular emphasis on the East Coast, the region in Madagascar with the highest malaria prevalence and where nets will have been distributed during the November to December 2012 campaign. PMI will use lessons learned from the FY 2012–supported pilot activity to improve keep-up strategies through the most effective continuous distribution methods. The goal will be to develop and test continuous distribution models (for example, through NGOs, schools, and CHWs) to replace ITN loss in the target population prioritizing the neediest and maintaining high ITN possession and use post-campaign. FY 2012 pilot activities will include a planning workshop in February 2013, implementation of the pilot starting in April 2013, and expected results by September to October 2013. Procurement of FY 2013 ITNs will begin in late 2013 when funding is available and implementation in early 2014 when nets arrive in country.

Given the recent dramatic increase in malaria cases between 1.5 and 2.5 years after the last mass distribution campaign, efforts will be made with community partners to promote proper net care and repair and increase the durability and effective life of existing ITNs. PMI will support standard M&E of the durability of distributed nets following WHO guidelines for monitoring ITNs under operational conditions. This will provide valuable information for future planning, in particular to inform the timing of net replacement and to assess if promotion of repair and care activities is effective at extending the effective life of ITNs to at least three years.

PMI will procure nets and provide logistical support for a multipronged keep-up approach that includes community distribution of ITNs to pregnant women, supplemental continuous distribution on the endemic East Coast possibly through schools and community-based organizations to meet keep-up needs for the general population, and limited targeted distribution of ITNs through social marketing in peri-urban areas.

### *Challenges, opportunities, threats*

Delays in Global Fund procurement and delivery of ITNs have been a major challenge for the timing and effectiveness of mass campaigns. Until now routine distribution through health facilities has been hampered by a lack of ITNs as a result of the focus on large mass campaigns and logistic challenges in maintaining adequate stocks of nets in remote health facilities. The majority of health facilities do not have a continuous supply of nets for pregnant women and children. To maintain high population coverage and use, PMI will explore other keep-up strategies.

Results from epidemic investigations in zones covered by ITNs show dramatic decreases in malaria shortly after the mass campaign; however, follow-up studies show lower ITN ownership and use within 1.5 to 2 years. This is accompanied by higher trends in malaria infections at facilities as compared to pre-campaign levels, possibly due to decreased effectiveness of the ITNs.

Qualitative data collected during recent studies and supervision visits point to potential reasons for suboptimal use of ITNs. Some families “hoard” nets and continue to use their old net in order to ensure they have enough nets over time; other families have small houses, which makes it difficult to suspend more than one net at a time, even if they have large families. There is currently no information regarding how big a problem these factors are. PMI will work with local partners to find ways to promote appropriate ITN use in an ongoing fashion.

Gap Analysis

**Table 5: Gap analysis for keep-up needs during calendar years 2013 and 2014**

<b>Calendar Year</b>	<b>2013</b>	<b>2014</b>
Population of 93 targeted ITN districts	<b>16,250,907</b>	<b>16,705,932</b>
Pregnant women attending health facilities (2.3% of the population); 80% attendance at ANC clinics	299,017	307,389
Children < 1 year old (3.9% of the population); 90% EPI attendance	570,407	586,378
Children 12-59 months (14% of population, assumes health facility utilization of 15% by children with severe illness)	341,269	350,825
Social marketing needs (at least 200,000 per year)	200,000	200,000
Alternative continuous distribution methods (at least 5% of nets distributed to account for additional yearly losses)	400,000	400,000
<b>Total Routine ITN Needs</b>	<b>1,810,693</b>	<b>1,844,592</b>
ITNs available	705,900	0
<b>Net Gap</b>	<b>1,104,793</b>	<b>1,844,592</b>

*Proposed activities with FY 2013 funding (\$9,199,000)*

Based on these assumptions and identified needs, the specific activities supported by PMI in FY 2013 include

1. *Procure LLINs for continuous distribution:* To procure 1.6 million LLINs for: 1) continuous distribution on the East Coast using multiple channels (662,000 LLINs); 2) community distribution to pregnant women and children under five years old nationwide (900,000 LLINs); and 3) ITNs for cyclone and epidemic response (50,000 LLINs). Assumes 1.6 million LLINs at \$4 per bed net. (*\$6,450,000*)
2. *Procure LLINs for social marketing:* The purchase of approximately 200,000 LLINs for social marketing in selected urban and peri-urban settings in the 29 high-burden East Coast districts. Assumes \$4.5 per ITN, which includes branding and packaging. (*\$900,000*)
3. *Distribute LLINs to pregnant women and children under five years old through community programs:* Targeted distribution of approximately 900,000 LLINs to pregnant women and children under five years old nationwide utilizing CHWs. Assumption of \$1 distribution cost per ITN. (*\$900,000*)

4. *Continuous distribution pilot in East Coast district:* Implementation of continuous distribution of 662,000 LLINs through appropriate, evidenced-based channels in 29 high-burden East Coast districts. Options for distribution include schools, churches, traditional leaders, and others as a method of keep-up. This activity will build upon a continuous distribution strategy and pilot to be undertaken with FY 2012 funding support. Assumption of \$1.15 distribution cost per ITN. (\$800,000)
5. *Undertake activities to increase the survivorship and durability of ITNs in Madagascar:* To evaluate activities to increase the survivorship and durability (i.e., care and repair) of ITNs in Madagascar. This activity builds on various ITN durability studies in several PMI countries, along with the durability monitoring undertaken in Madagascar in 2012. (\$125,000)
6. *Support Malaria PCV:* Provide support for a PCV to promote malaria prevention and correct use and care of ITNs, as well as monitor ITN distribution activities. The volunteer will be nested with an implementing partner and funds include the cost of housing, transportation, and equipment. (\$12,000)
7. *Technical assistance for LLIN activities:* PMI will provide technical assistance for the supervision, monitoring, and evaluation of different keep-up strategies and will build partner management and process evaluation capacity. (\$12,000)

## **2. Indoor Residual Spraying**

### *NMCP/PMI Objectives*

The National Strategic Plan's<sup>10</sup> objective is to prevent *P. falciparum* malaria in areas of the country with seasonal and epidemic transmission including the Central Highlands, the Fringe areas, and the extension beyond the Fringe areas to the west and south. Currently, 54 districts in Madagascar use targeted IRS, with PMI supporting 15 targeted districts. From 2008 to 2012, 54 districts received either 3 or 4 years of blanket spraying and per the 2013-2017 National Strategic Plan, these areas will be transitioned to targeted spraying. This transition will begin with the 2012 IRS campaign, where 33 districts (seven with PMI support) will receive targeted IRS, and the remaining 21 districts (seven with PMI support, plus five communes of an eighth district) will have a third and final year of blanket spraying. By the 2013 IRS campaign, all of the 54 districts should transition to targeted IRS. Targeted IRS will cover approximately 30% of the communes in districts that previously received blanket coverage, prioritizing high-risk communes identified by clinical case data. In targeted communes, IRS activities will aim at achieving at least 85% coverage of identified structures. This strategy will be coupled with epidemic surveillance to ensure rapid detection and response to malaria outbreaks.

PMI has supported IRS in Madagascar since it became a PMI country in 2008. The table below provides a summary of PMI's investments to date:

---

<sup>10</sup> Plan Stratégique de Lutte contre le Paludisme à Madagascar, PNLP, 2008-2012

**Table 6: PMI contribution to IRS in Madagascar**

FY	2008	2009	2010	2011	2012 (planned)	2013 (planned)
No. of districts supported	6	6	16	15*	15	15
Structures sprayed	422,132	216,060	576,320	502,697	~383,000* *	~164,000* **
Population protected	2,561,04	1,274,809	2,895,058	2,585,672	~1,737,000 **	~805,000* **

*\*Formerly referred to as 13 districts, the 15 districts represent the same geographic area. One district split into two, and the 5 communes of Tolagnaro are now counted as another district*

*\*\*Assumes 30% targeting in the Central Highlands and blanket IRS in the South*

*\*\*\*Assumes 30% targeting for all 15 districts*

#### *Progress during the last 12 months*

According to the 2011 MIS, 82% of the population in IRS-targeted districts slept in a structure that received IRS in the previous 12 months.<sup>11</sup> From October to December 2011, PMI supported blanket IRS in seven districts in the Central Highlands and eight districts in the South, resulting in 502,697 structures sprayed and achieving a 92% coverage rate. A total of 2,585,672 people were protected, which includes 487,681 children under five and 57,180 pregnant women.<sup>12</sup>

The 2013-2017 National Strategy calls for insecticide rotation for IRS to prevent insecticide resistance in accordance with WHO recommendations<sup>13</sup>. Madagascar has also carefully chosen insecticides based on planned vector control interventions per geographic zone. In the overlapping area where ITNs are distributed, focalized IRS will be conducted with carbamate-class insecticides to avoid selection for vector resistance to the pyrethroid-class insecticides, which are used on LLINs, e.g. in the extension districts to the south and west. Where LLINs are not distributed, e.g. in the Central Highlands, pyrethroids are sprayed because the insecticidal effect lasts longer.

PMI supports entomological surveillance to inform and evaluate IRS. Nine of 18 entomology monitoring sites, located across the country, are currently funded by PMI. The five PMI indicators<sup>14</sup>, as well as two additional measures of mosquito infectivity (sporozoite rate and entomological inoculation rate), related to the epidemiological risk posed by the vector, are monitored. During 2010-2012, entomological surveillance documented emerging malaria vector insecticide-resistance in four districts, either to LLINs or IRS, which are supported by PMI.<sup>15</sup>

<sup>11</sup> Madagascar Malaria Indicators Survey, 2011.

<sup>12</sup> RTI End of Spray Report, 2011.

<sup>13</sup> Global Plan for Insecticide Resistance Management (GPIRM), WHO 2012.

<sup>14</sup> Technical Guidance on IRS and ITNs, PMI, 2012.

<sup>15</sup> PMI Madagascar Technical Report, 2011.

**Table 7: Insecticide resistance in Madagascar, 2010-11**

District	Test Date	Insecticide	Vector	Method	Number Tested	Mortality # (%)	Control	Interpretation
Tsaratana na	03/2010	λ-cyhalothrin 0.05%	An.f.	WHO	73	71(97)	0	Suspected PYR-r in LN and IRS district
Tsaratana na	09/2010	λ-cyhalothrin 0.05%	An.g. An.f.	WHO WHO	100 100	91 97	8 ?	Suspected PYR-r in IRS &LN area
Tsaratana na	03/2011	λ-cyhalothrin (12.5µg/ bottle)	An.g.	WHO	100	92(92)	0	Suspected PYR-r in LN and IRS district
Atsimond rano	02/2010	λ-cyhalothrin 0.05%	An.g.	WHO	100	97	4	Suspected PYR-r in IRS district
Soavinand riana	01/2010	λ-cyhalothrin 0.05%	An.g.	WHO	100	96	4	Suspected PYR-r in IRS district
Manandri ana	03/2010	permethrin 0.75%	An.g.	WHO	100	95	0	Suspected PYR-r in LN district
Morondav a	02/2010	λ-cyhalothrin 0.05%	An.g.	WHO	100	53	0	PYR-r in LN district
Brickavill e	06/2010	bendiocarb 0.1%	An.g.	WHO	100	94	0	Suspected Carb-r in LN district
Brickavill e	06/2010	permethrin 0.75%	An.g.	WHO	100	82	0	Suspected PYR-r in LN district
Ankazobe	03/2011	bendiocarb (12.5µg / bottle)	An.g.	WHO	100	96(96)	0	Suspected CARB-r in LN And IRS district
Ambatofi nan-Drahana	12/2011	λ-cyhalothrin 12.5µg/bottle	An.g.	CDC	100	97(97)	0	Suspected PYR-r in IRS area
Ambosary	12/2011	λ-cyhalothrin 12.5µg/bottle	An.g.	CDC	100	95(95)	0	Suspected PYR-r in IRS area
Ambosary	12/2011	permethrin 12.5µg/bottle	An.g.	CDC	100	92(92)	0	Suspected PYR-r in IRS area
Boriziny	_/2011	deltamethrin 0.05%	An.g.	WHO	100	75(75)	0	PYR-r in IRS and LN area
		permethrin 0.75%	An.g.	WHO	100	68(68)	0	
		λ-cyhalothrin 0.05%	An.g.	WHO	100	80(80)	0	

*An.f.* = *Anopheles funestus*; *An.g.* = *Anopheles gambiae*

### *Plans and Justification*

PMI will support targeted IRS, covering approximately 30 percent of all eligible dwellings, in the 15 IRS districts. The estimated number of structures to be sprayed is 164,000. The choice of insecticide class for IRS decisions will be based on data from the entomological surveillance system. Due to the increasing threat of pyrethroid resistance, PMI will support nine entomology surveillance sites in 2013, eight existing ones plus one new site, which will be located in a non-IRS area where the major vector control strategy is the distribution of ITNs.

### *Challenges, Opportunities, and Threats*

One challenge IRS partners face is providing adequate resources to support the new National Strategy, which calls for “strengthening IRS to reach MDG pre-elimination status.” The current USG restrictions limit PMI’s involvement. Global Fund support for IRS ends in 2015 and does not completely cover the IRS resource needs per the 2013-2017 National Strategy. Although PMI will continue to support targeted IRS, RBM partners and NMCP will need to seek resources from other donors. The routine collection of comprehensive entomology M&E data to inform

IRS selection of insecticide and the management of vector-insecticide resistance continues to be a challenge.

*Proposed activities with FY 2013 funding (\$6,329,000)*

PMI will continue to support the National Strategy, which calls for IRS in 54 districts. Funding will be used to complement the Global Fund's and the NMCP's contributions to IRS in Madagascar. Specific activities to be supported by PMI in FY 2013:

1. *Support spray operations:* Support targeted IRS in 15 health districts, covering approximately 30 percent of villages in those districts. Support will include procurement of insecticide and other IRS equipment, such as personal protective equipment, training and supervision, environmental compliance, and M&E. Funding will allow for one operational round of targeted IRS in late 2013, and approximately six months of preparation for the following targeted IRS round. *(\$6,000,000)*

2. *Entomological monitoring:* PMI will support entomological surveillance and IRS assessment at nine sites: two sites in each of the four eco-epidemiological zones, with one site in an ITN only (non-IRS) zone. One of the nine sites on the East Coast will be used to monitor vector-insecticide resistance and implement ITN monitoring based on PMI ITN tracking recommendations. Funds will provide equipment, supplies, training, and supervision, as described in PMI technical guidance, in addition to supporting entomological field teams. Cost estimates are \$22,500 per site per year. *(\$225,000)*

3. *Entomological investigations:* PMI will support entomology assessments in response to malaria alerts and epidemic investigations as appropriate to investigate potential vector-related contributing factors: increased breeding possibilities; new or more efficient vectors; potential failures in vector control interventions; and insecticide resistance. Potential entomology investigations are likely to include vector species identification; and measures of vector density, vector behavior, and vector insecticide resistance; presence of larval breeding sites; and insecticide decay as appropriate, in addition to epidemiologic and clinical data as per WHO guidelines<sup>1</sup>. *(\$80,000)*

4. *Technical assistance:* PMI will support two short-term technical assistance trips for entomology surveillance and IRS M&E to focus on technology transfer related to vector-insecticide resistance assessment and evaluation of duration of impact following IRS. *(\$24,000)*

### **3. Malaria in pregnancy**

*NMCP/PMI Objectives*

As part of the national strategy to prevent and limit morbidity associated with malaria during pregnancy, IPTp has been implemented since 2004 in 92 (as of FY 2013, the focus is on 93) lowland and coastal districts where malaria transmission is stable or seasonal. The policy excludes the remaining 19 districts in the Central Highlands, which are epidemic prone. The strategy includes the provision and promotion of ITN use during pregnancy and early, effective IPTp, which are delivered as a package at the ANC clinics. The IPTp policy calls for two doses of SP taken at least one month apart: the first dose after quickening and the second dose one

month later. Administration of IPTp should be directly observed and free of charge. Starting in 2004, the MoH trained health workers at the CSBs on the provision of IPTp and plans to extend the training to the private sector with the support of Global Fund NSA funds. There are currently no plans to involve CHWs in the delivery of IPTp; however, these workers play an essential role in promoting the use of antenatal services. All FANC, 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 malaria in pregnancy activities, including IPTp. To further promote MIP interventions, the NMCP has integrated IPTp as part of integrated ANC services into the biannual outreach activity during the mother and child health promotion weeks in April and October. During these biannual health weeks, vitamins and deworming medicines are distributed, mass immunization campaigns for children are conducted, ANC activities 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.<sup>16</sup> The NMCP revised the monthly HMIS reporting form to capture the number of women who receive both doses of SP for IPTp.

The 2013-17 National Strategy objective calls for an increase in the uptake of the first dose and second dose of IPTp among pregnant women attending ANC clinics from 72% in 2011 to 80% in 2014 and 55% in 2011 to 70% 2014.

#### *Progress during the last 12 months*

Results from the 2011 MIS found that only 20% of women in the IPTp-targeted districts took the recommended two doses of SP during their pregnancy, a modest increase from 9% in 2008-9 (DHS 2008-9).

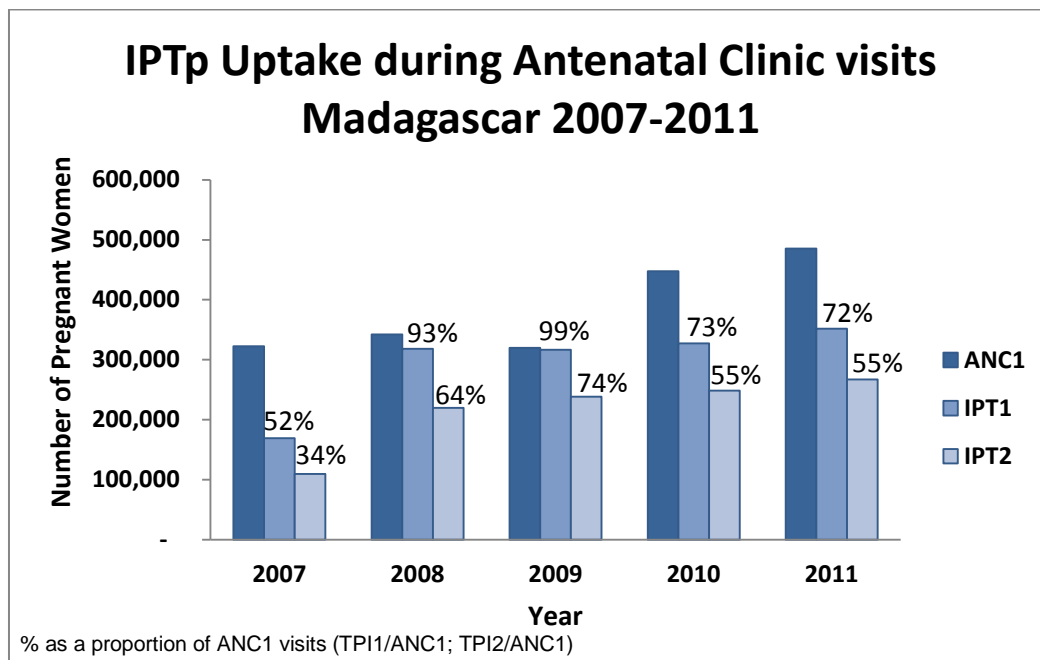
In 2011, the HMIS reports that 73% of pregnant women attending ANC clinics at public health facilities took one dose of SP and 55% took two doses, a slight increase from previous years as shown in Figure 3 below.

---

<sup>16</sup> NMCP reports, 2009-2011



**Figure 3: Number of pregnant women benefiting from IPTp 2007-2010**



*Source: HMIS and Global Malaria Program Country Profile (NMCP)*

All 2012 activities strengthening of ANC/IPTp services delivered at public health facilities continued to be put on hold. PMI funding was used to support MIP activities by using CHWs to deliver IEC/BCC messages including the importance of seeking antenatal care, taking two doses of IPTp and using ITNs. During the past 12 months more than 1,900 CHWs have been trained in IPTp promotion and delivery of an integrated package of services for the prevention of malaria in pregnancy. Over the past year, CHWs supported by PMI have promoted healthy motherhood through education and community sensitization by promoting ITN use and encouraging pregnant women to seek ANC services.

#### *Plan and Justification*

In 2013, an estimated 2.9 million SP tablets are needed to protect approximately 558,126 pregnant women expected to attend ANC clinics (80% of all pregnant women) and ensure a buffer stock of 25% for the 93 malaria-endemic health districts where MIP interventions are a strategy. Global Fund will provide the entire SP need for IPTp in 2013 and ensure delivery to the district level. The *Service de Santé de District* (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. Additionally, the Global Fund NSA grant will provide funding to introduce SP among private and NGO providers and purchase SP for this sector, although distribution strategies have not yet been identified. Resources to procure the estimated 2.5 million SP tablets (861,000 treatments) needed for 2014 have been only partially covered by donors. A gap of 945,000 SP tablets remains and has not yet been secured. PMI provided technical assistance in developing the Global Fund National Strategic Application Grant Phase II funding proposal in 2012, which has

been submitted for review and includes a request to fill the SP commodity-gap in health facilities.

PMI will continue to encourage pregnant women to attend ANC services and request SP for IPTp. PMI will also procure SP for approximately 300 NGO and FBO clinics to expand IPTp to the private sector.

#### *Challenges, opportunities, threats*

The 2003/2004 DHS reported that 86% of women made one or more antenatal clinic visits with a trained provider, while the latest 2008/2009 DHS shows this percentage increased to 90%, with 86% making two or more visits. The DHS also reported women are on average 4.8 months into their pregnancy when they first seek ANC care. Despite this high reported rate of ANC attendance and relatively early attendance during the course of the pregnancy, IPTp uptake remains low. Results from the 2011 MIS reports reported only 24 % of pregnant women took two doses of SP for IPTp among the 93 IPTp targeted districts. It is unclear what obstacles are responsible for the poor uptake of IPTp, but lack of opportunity for administration at ANC may not be the main obstacle. Furthermore, some women attend ANC services at private clinics which do not regularly promote IPTp.

Due to the political constraints related to working with GoM since March 2009, PMI and other donors have not been able to support ANC services at CSBs. As a result, inadequate supervision, lack of refresher training, staffing shortages, and stockouts have been reported; these may be factors in limiting progress in IPTp implementation. In response to the reported low uptake of SP for IPTp, the NMCP, with partners, has employed alternative strategies such as using CHWs 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. CHWs 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.

Even though the need to strengthen the package of services offered to pregnant women through the CSBs remains high, especially ensuring adequate stock of LLINs and SP, PMI is unable to provide direct technical assistance under the current USG restrictions. PMI is working with local partners to identify other funding sources such as the Global Fund NSA to help strengthen malaria in pregnancy activities at government health facilities. In addition, continued support and training of CHWs to promote demand for and utilization of antenatal services remains an important activity for PMI.

#### *Proposed activities with FY 2013 funding (\$215,000)*

1. *Procure SP*: PMI will procure SP for 300 private health facilities (NGO and FBO clinics). (\$15,000)
2. *Community-based IEC/BCC to promote malaria in pregnancy services*: Funding will support two implementing partners and IEC/BCC activities at the community level to increase use of both LLINs and IPTp at ANCs. (\$200,000)

## 4. Diagnostics

### *NMCP/PMI Objectives*

The national policy on malaria case management, including diagnosis, states that all malaria cases should be confirmed biologically. Biological confirmation using RDTs was introduced in public health facilities starting the end of 2006 through the end of 2008 along with the introduction of ACTs. If RDTs are not available, then treatment with an ACT should be given based on clinical diagnosis, after eliminating all other causes of fever. In 2010, the national integrated community case management curriculum was revised to expand RDT use to diagnose all fever cases among children under five years to the community level and include RDT testing of all fever cases among children under five managed by CHWs.

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

Currently RDTs are used at all 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. The NMCP with support from Global Fund support recently trained over 1,000 private providers in the national case management policy, which includes the use of RDTs to biologically confirm all suspect malaria cases. To date, some FBO- and NGO-supported clinics have implemented the policy in collaboration with district health authorities, where they are supplied with free ACTs and RDTs and in return provide standard monthly reports to the health system.

### *Progress during the last 12 months*

With FY 2011 and FY 2012 funds, PMI procured RDTs for the community and FBO and NGO sectors. PMI also supported ongoing training, supervision, and use of RDTs by CHWs. PMI collaborated with the largest network of FBO and NGO primary health care clinics in Madagascar, promoted correct case management according to the national guidelines, and trained staff from 146 of an estimated 300 health facilities. The FBOs and NGOs were trained in stock management, recording, and reporting.

During the first six months of FY 2011, PMI-supported CHWs reported using over 30,800 RDTs to diagnose and treat over 13,600 confirmed malaria cases with ACTs at the community level. Furthermore, PMI supported the development of standard supervisor checklists, which are used by local NGO partners to monitor CHW performance.

With FY 2011 funds, PMI also supported an assessment of the current malaria lab capacity among the same FBO and NGO partners, conducted refresher training in microscopy, and built capacity for ongoing technical supervision to improve the quality of laboratory services.

In the first half of 2012, an epidemic was declared in the southeast part of Madagascar and stocks of ACTs and RDTs were depleted by early February. PMI responded on an emergency basis through a notwithstanding authority approved by the Africa Bureau Assistant Administrator upon the mission's request and provided RDTs urgently to health facilities in the affected area.

### *Plan and justification*

In order to avoid future commodity stockouts PMI will procure RDTs for community level and NGO and FBO health centers.

PMI will continue to provide emergency commodities, but work closely with partners, such as Global Fund, which can directly provide commodities to the GoM to ensure stocks are available. PMI will also continue to support refresher training for CHWs and strengthen technical supportive supervision.

### *Challenges, opportunities, threats*

Reliable data on the consumption of ACTs and RDTs at the community level is limited. Commodity gaps are calculated based on morbidity estimates. Additionally only limited funding sources have been identified to purchase antibiotics and oral rehydration salts to treat pneumonia and diarrhea as part of integrated community case management of fever. These resources only cover an estimated one fourth of the national need. Furthermore, in 2011 there were widespread stockouts of ACTs at the community level because of Global Fund and UNITAID delays. While these issues have been recently resolved, ongoing stock procurement and management remains a challenge for Madagascar.

Several partners are working at the community level with CHWs to implement various programs including CCM, child growth monitoring and nutrition programs, community directly observed treatment for tuberculosis, water and sanitation, and family planning programs. Coordination is challenging because of different streams of funding and special interests of different programs and partners leading to incomplete geographic coverage in some areas and duplication of services in other areas. Efforts have been made to standardize the training curriculum, data recording, and reporting tools; however, there are several implementation challenges including ensuring adequate CHW starter kits and ongoing medication stocks, and providing adequate technical supervision and oversight. CHW incentives have not been standardized and coordination among partners needs improvement. The national community health policy is currently being revised and an implementation guide is underway to help provide guidance. The policy and guide will be used as a basis to coordinate community health service provision among different programs and partners.

### *Gap analysis*

Based on limited consumption data, we estimate that each CHW trained in RDT use will require a starter pack of 40 RDTs and will use on average 12 RDTs per month for suspect malaria cases in children under five in their communities. We anticipate over 10,000 CHWs in PMI-supported programs will be using RDTs to diagnose malaria by the end of 2012.

**Table 8: RDT gap analysis**

Calendar Year	2012	2013	2014
<b>RDT needs</b>			
Public health facilities	1,540,508	1,589,562	1,906,301
Community-level needs	2,200,000	3,520,000	4,523,200
Private sector needs	*	258,399	531,269
<b>Total RDT needs</b>	<b>3,740,508</b>	<b>5,367,961</b>	<b>6,960,770</b>
<b>RDT sources - supply</b>			
Global Fund and UNITAID	1,449,000	2,782,533	500,000
PMI	778,000	1,000,000	3,820,000
<b>Total Estimated RDT Supply</b>	<b>2,227,000</b>	<b>3,782,533</b>	<b>4,320,000</b>
<b>RDT Gap*</b>	<b>1,513,508</b>	<b>1,585,428</b>	<b>2,640,770</b>
*Based on the most recent GAP analysis in August 2012 - morbidity method			

*Proposed activities with FY 2013 funding (\$6,074,000)*

1. *Procure RDTs:* Purchase approximately 3.82 million RDTs; 3.52 million for CCM and 300,000 for NGO and FBO clinics. This procurement will completely cover some of the CCM RDT gap, considering that Global Fund financing will be limited. Gloves and safety boxes for sharps disposal will also be procured to ensure biosafety and personal protection when using RDTs. *(\$3,900,000)*
2. *Refresher training, M&E, and routine supervision of CHWs:* PMI funding will provide support for refresher training in all aspects of integrated community case management, strengthening M&E, and providing routine supervision of CHWs on the appropriate use of RDTs and treatment with ACTs. Funding will support at least 10,000 CHWs. *(\$2,000,000)*
3. *Diagnostics support:* Provide technical support for malaria diagnostics using RDTs to the network of approximately 300 NGO and FBO clinics nationwide. *(\$150,000)*
4. *Support a Malaria Peace Corps Volunteer:* PMI will continue to support the Peace Corps-PMI collaboration by funding a Peace Corps Volunteer, who will work with an implementing partner to focus on implementation, monitoring, and reporting of case management including integrated community case management activities. Funding will include housing, transportation, and equipment costs. *(\$12,000)*
5. *Technical assistance:* Support one U.S. Centers for Disease Control and Prevention (CDC) technical assistance trip for diagnostics implementation at community level. *(\$12,000)*

## 5. Pharmaceutical and Commodity Management

### *NMCP/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 per quarter. 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.

Madagascar Central Medical Stores (SALAMA), the national central purchasing agency, is responsible for procurement of essential medicines and medical consumables for use in the public and a portion of the private sector and ensuring their distribution to the district level. SALAMA is an autonomous, nonprofit organization established in 1997 with the support of various donors. SALAMA finances its activities from the resources generated by sales.

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 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 alternative procurement and distribution channels to the district level for these products. There are also different channels for distributing antimalarial medicines and products within districts. Free and donated malaria program 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.

In response to the multiple procurement and parallel distribution systems in use, the MoH, with support from UNICEF, developed a plan to integrate and streamline supply chain management for all essential medicines including malaria commodities. This project is called *Programme d'Action pour l'Intégration des Intrants de Santé*. Planning was initially completed in 2008; however, since the political crisis began, little progress has been made in implementation.

An assessment of the national pharmaceutical management capacity in 2008 highlighted the following constraints: (1) lack of trained pharmacists in public pharmacies; (2) insufficient pharmaceutical policies and guidelines; (3) low capacity and inadequate human resources for pharmaceutical management in the health-care system; (4) multiple vertical programs lacking integration and coordination; and (5) logistics and distribution challenges at the peripheral level. These constraints remain.

*Private sector:* The Global Fund-supported highly-subsidized ACTIpal<sup>®</sup> (the socially-marketed ACT for children under five years old; approximately \$0.04 per treatment) is distributed to CHWs through various NGOs, private sector pharmacies, pharmacy depots, and private doctors, by pharmaceutical wholesalers contracted by Population Services International. In addition to ACTs, CHWs also dispense other medicines subsidized under a social marketing model financed by USAID. This includes oral re-hydration salts plus zinc tablets (approximately \$0.22) for the treatment of diarrhea among children under five years old; cotrimoxazole tablets (approximately \$0.09), and cotrimoxazole oral suspension (approximately \$0.32) for the treatment of uncomplicated pneumonia. Population Services International determines the profit margin at which these items are sold to the consumers by these private providers. However, the profit margin gained by the CHWs 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 CHWs programs. The CHWs 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.

*Quality Assurance:* The *Agence de Médicament de Madagascar* (AMM), 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, the agency established seven peripheral minilab testing sites with USG support where samples of antimalarials are regularly collected and tested using portable quality testing kits. The goal is to expand drug quality testing sites to the 22 regional reference hospitals in Madagascar. With funding from the Global Fund NSA, 15 regional hospitals will receive the portable kits and training by the end of 2012. The original plan was to have central level laboratory analysis conducted every three months; however, the limited funding only allows for testing every six months.

#### *Progress during the last 12 months*

PMI continues to support the distribution of ACTs and RDTs via CHWs to the communities located in fokontany that are at least five kilometers to the nearest public health facility. As of June 2012, more than 5,000 CHWs were receiving malaria commodities and support from PMI via this parallel supply system. In the last half of 2012, PMI will support ACT and RDT distribution to over 17,000 CHWs trained in integrated community case management. To date the total number of supply points is approximately 933 nationwide.

### *Plans and justification*

PMI and other USG funding streams will continue to support the supply chain and distribution of malaria commodities to the community level using the existing parallel system. PMI will continue to work towards the integration of malaria activities at the community level across the country.

### *Challenges, opportunities, and threats*

One challenge associated with the USG restriction not to work with the GoM is PMI's inability to respond quickly to malaria outbreaks, as the CHW distribution system is completely separate from the public distribution system, and there is limited flexibility in distributing RDTs and ACTs to the CSBs. In the event of future epidemic response needs, the USAID Mission and PMI will work with the State Department to advocate use of PMI resources, including malaria commodities, to respond to emergencies in a timely and appropriate manner as needed.

Another challenge with the parallel supply chain system is related to the forecasting and quantification of malaria medicines, with other donors. For example, one Global Fund principal recipient (PR) procures malaria commodities for the public sector, another PR procures for the community sector, and a third PR procures commodities for both the public and community sectors. Ensuring that orders are placed with sufficient time for distribution and being mindful of the issues in mixing the supply chains has proven difficult in preventing stockouts of commodities. In addition, the sustainability of the resupply system, especially at the community level, is a challenge. The link between the CHWs and the primary health facility is weak, which limits the options CHWs have to resupply their commodities.

### *Proposed activities with FY 2013 funding (\$300,000)*

1. *Strengthen the supply chain for malaria commodities at the community level:* PMI will ensure the continuous supply of RDTs and ACTs to support the timely diagnosis and treatment of malaria at the community level. This activity will be cofunded with other USG/GH funding streams. (\$300,000)

## **6. Treatment**

### *NMCP/PMI Objectives*

Under the new strategic plan for 2013-2017, the goal in control/consolidation phase districts is to correctly diagnose and treat >95% of malaria cases seen at public health facilities and >80% of all fever cases among under 5-year-olds seen by CHWs. In pre-elimination districts the goal is to correctly diagnose and treat 100% of malaria cases seen at public health facilities and >80% of all fever cases among under 5-year olds-seen by CHWs

AS/AQ combination therapy is the first-line antimalarial treatment in Madagascar, and artemether/lumefantrine (AL) is considered as an alternative therapy for those that cannot tolerate AS/AQ due to side effects.

The 2013-2017 National Strategic Plan recommends intravenous artesunate for the treatment of



severe malaria in Madagascar. This change will be phased in based on available funding to support the transition from quinine to artesunate. Prereferal rectal artesunate will be piloted and evaluated and eventually phased in at both primary health care centers and as appropriate at the community level. In pre-elimination zones, a single dose of primaquine (0.75mg/kg) will be added to AS/AQ for uncomplicated falciparum malaria as an antigametocyte medicine.

#### *Progress during last 12 months*

PMI provides support to two bilateral projects that focus on community delivery of health services that include integrated case management of malaria, diarrhea, and pneumonia by CHWs. Global Fund and UNICEF also provide significant support to the NMCP and the MoH for this approach. When fully operational, PMI implementing partners will reach about two-thirds of the more than 1,500 communes across the 80 districts in the country. Across all partners, over 19,000 CHWs have been trained in integrated community case management since 2009. In 2011 and 2012, an additional 941 CHWs were recruited and trained to replace CHWs lost to routine attrition. CHWs played an important role in assessing, diagnosing, and treating over 30,000 cases of fever among children under 5 years old over the past 12 months.

#### *Plans and Justification*

PMI will continue to collaborate with the Global Fund and UNICEF to expand community integrated management of childhood illnesses throughout Madagascar so that all children with fever are promptly diagnosed and treated, at community level. PMI will expand its coverage of CHWs in remote areas of the West and North of the country and through an expansion in areas already covered in the East and South.

PMI will continue to procure ACTs and RDTs for use by CHWs and approximately 300 FBO and NGO private sector health facilities.

## Gap Analysis

**Table 9: Gap analysis for ACTs 2012-2014**

Calendar Year	2012	2013	2014
<b>ACT needs</b>			
Public health facilities	481,409	487,363	586,344
Community-level needs	550,000	880,000	1,130,800
Private sector needs	1,000,000	750,000	500,000
<b>Total ACT needs</b>	<b>2,031,409</b>	<b>2,117,363</b>	<b>2,217,144</b>
<b>ACT sources - supply</b>			
Global Fund and UNITAID	1,662,837	671,175	0
UNICEF	100,000		
PMI	500,000	0	0
<b>Total Estimated ACT Supply</b>	<b>2,262,837</b>	<b>671,175</b>	<b>0</b>
<b>ACT Gap*</b>	<b>-231,428</b>	<b>1,446,188</b>	<b>2,217,144</b>
*Based on the most recent gap analysis in August 2012 - morbidity method; note that many 2012 ACT deliveries arrive late in 2012 and any excess will be used towards the 2013 gap			

The estimated ACT needs were calculated using both the morbidity method and annual incidence of fever calculation method and produced results similar to those shown in the above table. Currently stock reporting from health facilities and the community level is incomplete. Available monthly consumption data and reporting on stockouts is of variable quality and it is not possible to estimate national needs based on the consumption method.

### *Challenges, opportunities, and threats*

As discussed above in the diagnostics section, key challenges include ensuring a regular reliable supply of RDTs and ACTs to all levels of the health system, especially to the highly decentralized community level, and improving coordination of integrated community case management with other community health programs and among implementing partners and stakeholders.

Madagascar was selected as one of nine pilot countries to expand ACTs to the private sector through the Global Fund Affordable Medicines Facility – malaria. Madagascar imported the first subsidized ACTs in early 2011. The project has resulted in increased demand and sale of ACTs on the private market at a cost to consumers of \$0.24-\$0.48 per treatment especially in pharmacies and medicine depots.<sup>17</sup> By the end of 2011, ACTs had the leading market share in private health facilities and pharmacies. Furthermore, the availability of ACTs played a key role during the response to a malaria epidemic in the southeast in 2012. Public sector ACTs were

---

<sup>17</sup> Tracking survey April 2012, ACTWatch Outlet survey 2011

stocked out and the GoM worked with partners to purchase readily available ACTs at the central and local level from first-line buyers to respond quickly to the epidemic.

Expansion of the community-based interventions into new regions of the country through a new PMI partner will present the challenges of coordinating with the Global Fund, UNICEF, and other partners to avoid overlap in shared areas.

*Proposed Activities with FY 2013 funding (\$1,362,000)*

1. *Purchase ACTs for community based treatment of malaria through CHWs and FBOs to help fill a gap of 880,000 for CHWs; also procure 100,000 ACTs for approximately 300 FBO clinics, including logistics and delivery of ACTs; includes a buffer stock and epidemic preparedness stock. (\$1,100,000)*
2. *Therapeutic efficacy testing.* Support for one therapeutic efficacy site (TES) in each of the five transmission zones, in collaboration with Institut Pasteur Madagascar (IPM). Efficacy studies are conducted every two years and this will follow studies supported by Global Fund in 2012. (\$250,000)
3. *Technical assistance to support community case management.* Support for one CDC TA to support the therapeutic efficacy study. (\$12,000)

## **7. Behavior Change Communication**

The Madagascar MIS conducted between March and May 2011 collected information on knowledge and use of LLINs and knowledge on modes of malaria transmission, prevention, and treatment. MIS results show that during the 12 months preceding the survey, 7 out of 10 mothers (70%) were informed about distribution of free nets in ANC clinics, and 2 out of 5 (42%) received a message on where to buy a bed net. Close to two-thirds (64%) were informed about how to hang their bed nets, 65% were informed about how to take care of the nets, and slightly over two-thirds (67%) received the message on the benefits of ITN use.

Knowledge of ITN use and benefits was found to be higher compared to knowledge of other key preventive behaviors promoted with PMI support, despite the high knowledge about transmission of malaria through mosquito bites. Among women aged 15-49 with children under five or who were pregnant, 7 in 10 (73%) cited fever as the main symptom of malaria, and 70% cited mosquito bites as the means of transmission. On the treatment side, only 1 in 5 (19%) cited AS/AQ and only 10% cited ACTipal as the most effective antimalarial drugs available for treating their children with malaria symptoms. Also among women with children under five, 58% knew a place where to buy an antimalarial. With regards to malaria in pregnancy, only 14% of pregnant women or mothers of under-fives think it is important to take IPTp; however, 71% know they should go to the health facility during pregnancy for ANC and receive a preventive antimalarial. MIS findings show clearly the need to invest into more targeted IEC/BCC to promote IPTp and appropriate care-seeking.

Targeted and general BCC activities will be implemented to mobilize traditional and religious community leaders and civic organizations to promote malaria prevention and control, with the aim of contributing to the achievement of pre-elimination, starting with districts in the Central Highlands, and consolidating control measures in the rest of the country. These activities include promoting the use of LLINs by the general population and by pregnant women and children under five 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 these mass media efforts, interpersonal communication and community-based behavior change interventions will be implemented through NGOs and CHWs. The CHWs will target families with malaria prevention awareness messages and personal preventive behaviors through participatory radio listening groups, skits and local drama, small group education sessions, and home puppets, which are popular in Madagascar. To the extent possible, use of interpersonal communication approaches will be prioritized over the use of mass media, aiming for approximately 70% of BCC to be interpersonal communication.

CHWs will encourage pregnant women and women with children needing immunizations to visit ANC and EPI clinics and request a free LLIN under the continuous distribution schemes that will be initiated in 2013 and 2014. Given the low use of IPTp, CHWs and different community leaders will be equipped with skills and tools to increase demand of SP by pregnant women when they visit ANC clinics. Also, CHWs 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 LLINs for children under five years of age. The CHWs involved with distribution of socially marketed products will educate local residents on proper care and use of LLINs and on the necessity of prompt diagnosis and correct treatment with ACTs, with special emphasis on children under five at the household level. CHWs will also educate community members in recognizing danger signs of severe malaria that require immediate attention. The 2011 MIS results showed that more than half of children with fever (56%) don't seek treatment from skilled providers. CHWs will be tasked to conduct door-to-door visits to conduct interpersonal communication with caregivers, especially with mothers, on the necessity to seek treatment at the onset of fever, without delay.

PMI's support to BCC activities will continue to be aimed towards empowering individuals and families to prevent and treat malaria correctly. Malaria messaging will focus on rural areas and will include community-based interpersonal communication, mobile video unit shows, and radio spots. The 2011 MIS results show IRS coverage of 79% in targeted districts – the coverage is lower than expected and attributed to households refusing IRS – especially in extension districts and the South. IEC/BCC will focus on community sensitization for these zones in particular. IEC/BCC messages for LLINs will promote correct use, discourage inappropriate use, encourage correct LLIN care (washing, storage) to help promote LLIN maintenance over time, and encourage people to use their new nets and replace old nets that are past their effective life span.

PMI will continue support for the National Strategic Plan goal to implement community case management of malaria, pneumonia, and diarrheal diseases in all districts.

*Proposed activities with FY 2013 funding (\$680,000)*

*1. Implementation of community-based malaria activities:* Support the implementation of community case management of malaria through CHWs, using integrated malaria messaging including the four key messages related to correct use of LLINs, acceptance of IRS where applicable, preventing malaria among pregnant women, and early and prompt care seeking. Special efforts will be deployed for the uptake of IPTp and appropriate care seeking. Funds will support grants to local NGOs that provide technical support and supervision to the network of CHWs. (\$300,000)

*2. Malaria IEC/BCC via social marketing:* Support malaria IEC/BCC activities related to social marketing of LLINs and ACTs; messages also include the promotion of early treatment-seeking behavior. (\$150,000)

*3. Evaluation of malaria IEC/BCC activities:* Conduct an independent evaluation of PMI supported IEC/BCC activities. Routine evaluation techniques, along with lessons learned and best practices for Madagascar, will be documented. (\$200,000)

*4. Support Malaria Peace Corps Volunteers:* Funding will continue to support a PCV coordinator, who will facilitate malaria activity implementation among Madagascar Peace Corps Volunteers. Funds will also be used to support malaria training for all PCVs which will be integrated with other mid-service and in-service trainings. (\$30,000)

## **8. Capacity Building and Health Systems Strengthening**

Due to the USG restrictions in Madagascar, PMI funds are unable to directly support capacity building of NMCP staff or strengthening of the health system. PMI is poised to provide support in the future and will conduct a reprogramming exercise once USG restrictions are lifted.

## **9. Monitoring and Evaluation**

### *NMCP/PMI Objectives*

The 2013-2017 National Strategy objectives include:

For control and consolidation zones:

- 100% of epidemics are detected and controlled within 15 days of an alert
- At least 90% of districts have a functional malaria surveillance system
- At least 90% of districts have entomology surveillance
- At least one therapeutic efficacy study is conducted every 2 years

For pre-elimination zones:

- 100% of epidemics are detected and controlled within 15 days of an alert
- 100% of districts have a functional malaria surveillance system
- 100% of districts have entomology surveillance
- 100% of confirmed malaria cases are investigated

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 is currently being updated for the period 2013-2017.

*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 (for 36 epidemic-prone districts and weekly monitoring of confirmed malaria cases and deaths) with plans to extend to areas at control stage in the context of the continuum towards elimination of the disease; 3) an integrated fever sentinel surveillance system, which provides highly accurate and rapid reporting of data from individual sentinel health facilities; 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 CHWs, who diagnose and treat children under five with fever. The current system is fragmented and partially functional, not timely nor complete. These data can 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 and underway this year), and pharmacovigilance monitoring.

*Enhanced Surveillance for Epidemic Prone zones:* The current epidemic surveillance monitoring system (*Postes Sentinelles de Surveillance* or Sentinel surveillance sites) was established in 1997 with eight original districts then increased to 12 and later expanded to cover 36 districts at risk for epidemics in the Central Highlands and South by 2005. This system was established with support from Global Fund Round 3 and 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 reported suspect and confirmed malaria cases and deaths on a weekly basis. Data reporting is generally of better data quality and timelier than those from districts without dedicated malaria surveillance staff, which also rely on the general HMIS reporting system. Multiple interruptions in Global Fund financing due to administrative delays between grants and between phases has led to an interruption of funding to support dedicated surveillance staff. The system experienced a decline in data quality and a 100% turnover in the past 3 years. The system is currently being rebuilt and new staff were recruited and trained in 2011 and 2012. The system has been expanded to include an additional 33 districts including the IRS extension districts (zone bordering the epidemic prone areas) and will be expanded nationwide to ensure epidemic surveillance and response capacity exists in all areas of Madagascar. Dedicated malaria surveillance staffs provide invaluable support when the system is working, as evidenced by the early detection, investigation, and management of malaria outbreaks including sentinel surveillance site requests for assistance and mobilization of resources to respond to two malaria epidemics identified during the first six months of 2012. It will likely take another one to two years for the system to become fully functional assuming resources can be found. PMI does not currently directly support the sentinel surveillance site system given the USG restrictions.

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

A complementary fever surveillance system developed by the *Direction des Urgences et de la Lutte contre les Maladies Négligées*, the NMCP, and IPM is actively collecting data on fever cases from 34 sentinel CSB sites. These sites use syndromic surveillance coupled with biological confirmation 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 these sites in FY 2008 and increased the number of sites to 15 in April 2010 using FY 2009 funding. 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 by IPM to the 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 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, and a microscopy slide and dried blood spot are collected for each patient seen with a fever. Health staff are given feedback on RDT use and their RDT readings are compared to the control RDT and microscopy. In 2010, quality control monitoring evaluated health workers conducting RDTs and collected samples from 234 patients. Results showed 100% concordance between results of RDTs read by health staff and RDTs conducted and results read by expert observers. When compared with gold standard microscopy readings, the performance of RDTs read by health staff under routine program conditions was good: 86.9% sensitivity, 97.1% specificity, positive predictive value of 76.9% and negative predictive value of 98.5%.<sup>18</sup>

Several fever surveillance sites are also part of the network of IPM 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 by IPM with funding provided by the Global Fund. 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.

*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 what is routinely reported through HMIS. District and regional staff have been trained on database utilization.

---

<sup>18</sup> Source: Routine quality control system by the PNL. IPM also participates in the quality control activities.

Compilation of malaria data reported through the routine national health information system is completed with the assistance of a data manager supported by Global Fund Round 7. 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 planning to publish a quarterly bulletin that includes key malaria morbidity and mortality indicators. The NMCP has also created a web site that will be functional by the end of 2012 and will be used to share program information.

The central M&E unit in the NMCP, consisting of an epidemiologist, a computer expert, and data entry assistants, is currently supported by the Global Fund Round 7 grant. The staff of the central M&E unit train regional staff and have created a network of 22 regional malaria program-specific staff that 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.

As a result of recommendations from a Global Fund data quality assurance evaluation conducted in 2010, the NMCP began conducting routine data quality assessments every six months with the goal of identifying problems and monitoring and improving data quality. Findings are discussed and reviewed with RBM partners regularly.

*Household Surveys:* The baseline national household survey for PMI is the 2008-9 DHS. Follow-up national surveys include the MIS 2011 and a MIS in 2015. The 2015 MIS is planned as a key survey to show program results after implementation of the first phase (two years) of the three-year Global Fund National Strategic Application grant and will include a full birth history. Recently UN partners have advocated for support to conduct a large household survey to measure progress toward the Millennium Development Goals (MDG) in Madagascar. The MDG survey is planned to start in October 2012 and will replace the 2013-14 DHS survey. Reprogrammed PMI FY 2012 funds (\$300,000) will support the survey implementation and ensure key indicators are included and that the data and database are available for secondary analysis to inform the RBM/PMI impact evaluation planned in 2014. This household survey will include two questionnaires: the DHS questionnaire and Living Standards Measurement Survey questionnaire. Currently no biomarkers are planned for this survey. UNICEF, along with other nutrition partners, are planning to include anthropometric measures as a complementary module conducted by a separate, specialized firm.

#### *Progress during the last 12 months*

As a result of suspension of activities with the GoM, most activities directly supporting M&E were reprogrammed to support other areas for FY 2010-12. In spite of this, PMI continues to coordinate with the GoM and other partners to streamline investments in priority malaria surveillance systems.

*Sentinel Surveillance:* PMI continues to support the fever surveillance sites. PMI started with support for 13 fever sentinel hospitals (FY 2008), and since then has added 2 sites for a total of 15 sites. The number of sites were increased without additional cost, and actually the per site cost has gone down over the years due to increased efficiency. The sites are managed by IPM, a non-

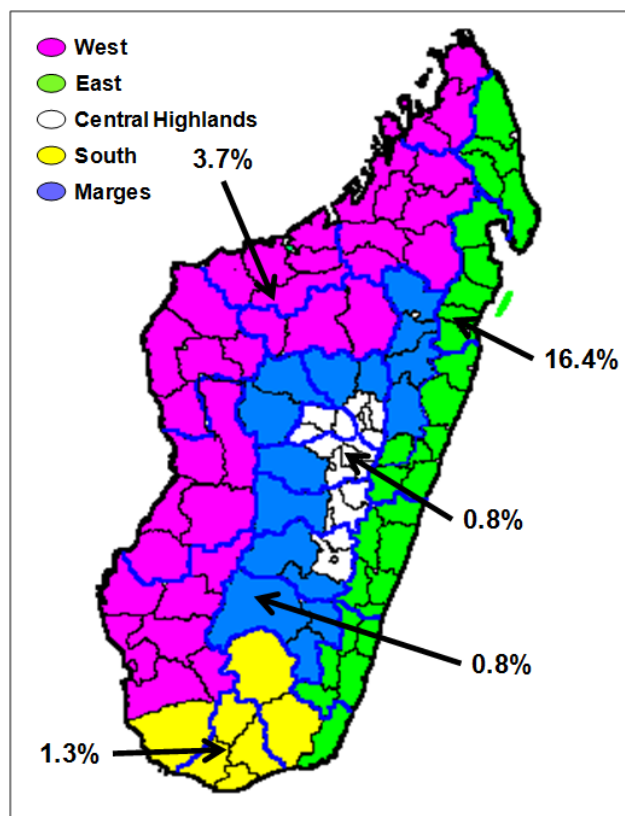


governmental organization that has consistently and reliably conducted quality-controlled fever and malaria case reporting to PMI for 15 sentinel sites. IPM reports detailed treatment and IPTp indicators from 10 sites. IPM has funding from other donors and expanded the total number of functional sites to 34. Because of the ongoing 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.

*Community-based malaria surveillance:*

*Household Surveys:* An MIS was conducted from April-May 2011, during the high malaria transmission season, cofunded by PMI FY 2010 funds and the Global Fund Rolling Continuation Channel 4 grant. With RBM partners, PMI co-led the in-country steering committee, organized planning meetings, and contributed to survey design and the analysis plan. Biomarkers from more than 6,800 children under five years of age were collected and provided the first nationwide sample of parasitemia results in Madagascar. Key PMI indicators estimated from the 2011 MIS are summarized in the Strategy section (Pg. 16).

**Figure 4: Malaria parasitemia map (u<5) in Madagascar, 2011**



Source: 2011 MIS (April – May 2011)

*Global Malaria Program database:* In 2010, the NMCP with WHO/AFRO and PMI in-country staff led an evaluation of the national Global Malaria Database. Findings and recommendations from this evaluation were used in conjunction with results of a Global Fund-led data quality assurance evaluation to develop the National Plan to Reinforce Malaria Program M&E (*Plan de*

*Renforcement du Système de Suivi et Evaluation du Programme National de lutte contre le Paludisme à Madagascar*) in early 2011. Funding to support recommendations was identified and an action plan developed. Activities include ongoing supervision and a data quality assessment every six months.

*Malaria Program Review and national conference on malaria in Madagascar:* In 2011, PMI collaborated with WHO and other RBM partners to conduct a Malaria Program Review, including thematic desk reviews of each aspect of the program and a joint internal-external team review. This timely review provided an evaluation of malaria program activities at a mid-point in the implementation of the 2008-2012 National Strategic Plan, after significant scale-up of activities supported by Global Fund, WHO, UNICEF, PMI, and other partners. Malaria Program Review recommendations were written and reviewed in an inclusive fashion with all key stakeholders in order secure political commitment to implement the major recommendations. In addition, in November 2011, a national conference on moving malaria control towards a pre-elimination strategy was organized. Malaria experts were invited to review the Malaria Program Review and MIS 2011 results together, consult on the proposed strategy for 2013-17, share lessons learned from other countries, develop comprehensive recommendations, and provide the basis for the 2013-2017 national strategic plan.

*Routine reporting:* PMI has built upon the experiences of IPM 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. To date, reports are incomplete; however, 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.

#### *Plans and justifications*

With FY 2013 funding, PMI will continue to support malaria surveillance and survey activities. PMI will continue to support fever sentinel site surveillance and also support impact evaluation methodology development and analysis. A scheduled DHS will be replaced with a 2012-13 Millennium Development Goal (MDG) survey managed by UNFPA. The MDG survey will be similar to DHS, but focus on MDG targets, and will not collect biomarkers. At the time of the MOP visit, partners were trying to identify sources for the funding gap for the survey. Since the previous MIS was in 2011, a new MIS is planned for 2015. It will be important that sufficient efforts are made to ensure the quality of data collected through these surveys.

#### *Challenges, opportunities, threats*

The on-going political situation in Madagascar continues to present significant challenges for PMI. The political situation in Madagascar is expected to improve in 2013 if the scheduled election takes place and the resulting government is formally recognized by the international community. However, the lack of capacity in the NMCP and health system cannot be addressed by PMI at this time. Moreover, recent evidence of a malaria epidemic in the South highlights the precarious nature of the gains made in malaria control.

PMI's focus on CHWs, FBOs, and NGOs has resulted in increased awareness and understanding of potential benefits of using these partners and approaches for delivering malaria intervention services. 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.

More than 19,000 CHWs will have been trained in community case management by September 2012. To date, community level reporting is neither complete nor timely and is of variable quality. In addition, the current HMIS database does not yet include reporting of cases (malaria, diarrhea, and pneumonia) from the community level and the information is not available centrally. Future PMI support will focus on efforts to improve technical supervision, CHW 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.

*Proposed activities with FY 2013 funding (\$712,000)*

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. *Continued support for community-based malaria surveillance:* to implement community based surveillance activities in zones that are progressing towards pre-elimination to strengthen epidemic detection and response through CHWs. (See Case Management Section)
3. *Support the RBM/PMI impact evaluation* including preliminary work to identify key data sources, data collection, and data analysis. (\$100,000)
4. *Support preparation for the 2015 MIS:* PMI will provide support for the 2015 MIS. (\$200,000)
5. *End-use verification:* Conduct quarterly end-use verification to assess stock availability of malaria commodities at health facilities. This activity will enable stakeholders to assess the major commodity gaps and plan future support. (\$100,000)
6. *Technical assistance:* One CDC TDY and one USAID TDY for the support of PMI Madagascar M&E activities, including support for the impact evaluation. USAID TDY will be centrally funded. (\$12,000)













					Activity will build upon continuous distribution strategy and pilot to be undertaken in FY 2012.
Undertake activities to increase the survivorship and durability of LLINs in Madagascar	TBD	\$125,000	\$0	Nationwide	To evaluate activities to increase the survivorship and durability (i.e. care and repair) of LLINs in Madagascar. This activity builds on the various LLIN durability studies in several PMI countries, along with the durability monitoring undertaken in Madagascar in 2012.
Support Malaria Peace Corps Volunteer	DELIVER	\$12,000	\$0	Nationwide	Support to a third-year PCV to work on implementation of malaria interventions. Funding will support 1 PCV nested with the implementing partner and will include housing, transport, and equipment.
Technical assistance to LLIN activities	USAID	\$0	\$0	Nationwide	One USAID TDY to provide technical support for LLINs activities. <i>(Funding included in core budget)</i>
Technical assistance to LLIN activities	CDC/IAA	\$12,000	\$0	Nationwide	One CDC TDY to provide technical support for LLIN activities.
<i>Subtotal: ITNs</i>		<i>\$9,199,000</i>	<i>\$7,350,000</i>		
<b>IRS</b>					
IRS in 13 geographic areas	IRS IQC 2 Task Order 4	\$6,000,000	\$1,000,000	15 geographic areas	Conduct targeted IRS in the same 13 geographic areas PMI has previously supported. Area used to be 13 health districts, but is now considered 15: 7 Central Highland/Fringe districts + 8 southern districts. IRS implementation will follow the national strategy goal of pre-elimination using targeted IRS, and includes the procurement of insecticides (including additional funding for

					insecticide rotation as a resistance management strategy), PPE, training, environmental component, IEC/BCC, M&E, and operations. Funding also includes ~\$1M for epidemic preparedness & response with IRS, estimating support for approximately 40k structures.
Entomological monitoring	IRS IQC 2 Task Order 4	\$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 an additional control site where IRS will not be implemented.
Entomological investigations in response to outbreaks of malaria	CDC/IAA (with a sub-grant to IPM)	\$80,000	\$0	Nationwide	Support epidemic response and entomologic investigations of alerts.
Technical assistance to PMI IRS activities	USAID	\$0	\$0	15 districts	One USAID TDY to provide technical support for IRS activities. ( <i>Funding included in core budget</i> )
Technical assistance to PMI IRS activities	CDC/IAA	\$24,000	\$0	9 surveillance sites	Two CDC TDYs to provide support for insecticide resistance & IRS monitoring.
<i>Subtotal: IRS</i>		<i>\$6,329,000</i>	<i>\$1,000,000</i>		
<b>IPTp</b>					
Procure SP	DELIVER	\$15,000	\$15,000	Nationwide	Purchase of SP for ~ 300 FBOs.
Community-based promotion of MIP service	New RFA PHC Project	\$100,000	\$0	~48 districts	Support community-based IEC/BCC promotion for uptake of ITNs and IPTp at ANC clinics.
	MAHEFA	\$100,000	\$0	~32 districts	
<i>Subtotal: IPTp</i>		<i>\$215,000</i>	<i>\$15,000</i>		

Case Management					
Diagnostics					
Procure RDTs for malaria case management	DELIVER	\$3,900,000	\$3,900,000	Nationwide	Purchase ~3.82M RDTs: 3.52M RDTs for CCM + 300k RDTs for FBO clinics. Procurement will also include procurement of gloves for both CHWs + FBOs, and safety boxes for CHWs. Assumes cost of \$.80 per RDT; \$.22 per pair of gloves @ 1 pair per RDT; and \$.45 per safety box @ 17k for CHW sites.
Refresher training and supervision of community case management	New RFA PHC Project	\$1,000,000	\$0	~48 districts	Provide support for refresher training, M&E, and routine supervision of community health workers for appropriate use of RDTs and treatment with ACTs. PMI will support at least 10K CHWs.
	MAHEFA	\$1,000,000	\$0	~32 districts	
Diagnostic support for ~300 FBO/NGO clinics	Diagnostics Central Mechanism	\$150,000	\$0	Nationwide	To provide technical support for malaria diagnostics using RDTs to the network of ~ 300 FBO/NGO clinics nationwide.
Support Malaria Peace Corps Volunteer	New RFA PHC Project	\$12,000	\$0	Nationwide	Support to a third-year PCV to work on implementation of malaria interventions. Funding will support 1 PCV nested with the implementing partner and will include housing, transport and equipment.
Technical assistance to diagnostic activities	CDC/IAA	\$12,000	\$0	Nationwide	One TDY for CDC to provide technical support for RDT implementation at the community level.
<i>Subtotal</i>		<i>\$6,074,000</i>	<i>\$3,900,000</i>		
Pharmaceutical and Commodity Management					
Strengthen supply chain for malaria commodities to the community level	Social Marketing RFA	\$300,000	\$0	Nationwide	Ensure the continuous supply of malaria products to CHWs. Support will include the supervision of CHW re-supply points. Activity will be co-funded with other

					USAID funding streams.
<i>Subtotal</i>		<i>\$300,000</i>	<i>\$0</i>		
<b>Treatment</b>					
Purchase ACTs for community-based treatment of malaria through CHW and FBO clinics	DELIVER	\$1,100,000	\$1,100,000	Nationwide	880,000 ACT treatments to fill gap for CHWs; 100,000 gap for ~ 300 FBO clinics; includes a buffer stock and stock for epidemic response.
Therapeutic efficacy studies	CDC/IAA (sub-grant to IPM)	\$250,000	\$0	5 sites	Support for 1 therapeutic efficacy site (TES) in each transmission zone for a total of 5 sites, in collaboration with Institut Pasteur Madagascar (IPM). Assumption of \$50k per therapeutic efficacy study (TES) to be planned depending on last TES implementation by GF.
Technical assistance to support community case management	CDC IAA	\$12,000	\$0	Nationwide	One CDC TDY to provide technical support for community case management of malaria.
<i>Subtotal</i>		<i>\$1,362,000</i>	<i>\$1,100,000</i>		
<b><i>Subtotal: Case Management</i></b>		<b><i>\$7,736,000</i></b>	<b><i>\$5,000,000</i></b>		
<b><i>IEC/BCC</i></b>					
Implementation of community-based malaria activities through integrated CCM interventions through NGOs/FBOs	New RFA PHC Project	\$200,000	\$0	~48 districts	Support for NGO/FBO grants to expand the implementation of community-based IEC/BCC interventions and integrated malaria messaging. Approximately 70% will be for interpersonal and 30% mass communication.
	MAHEFA	\$100,000	\$0	~32 districts	
Implementation of malaria IEC/BCC via social marketing	Social Marketing RFA	\$150,000	\$0	Nationwide	Support for malaria IEC/BCC activities, related to social marketing; including LLINs, Actipal (ACT) promotion, and early treatment-seeking behavior.

Evaluation of malaria IEC/BBC activities	TBD	\$200,000	\$0	PMI supported CCM communes	Conduct an independent evaluation of PMI-supported IEC/BCC activities.
Support to malaria Peace Corps Volunteers	Peace Corps	\$30,000	\$0	Nationwide	PMI will continue to support a third-year PCV to coordinate work with other MVs and PCVs in Madagascar. Funding breakdown is \$16k to support 1 PCV, including housing, transport, and equipment, and \$14k for malaria trainings for all PCVs.
<b>Subtotal: IEC/BCC</b>		<b>\$680,000</b>	<b>\$0</b>		
<b>Capacity Building</b>					
<b>Subtotal: Capacity Building</b>		<b>\$0</b>	<b>\$0</b>		
<b>Epidemic Preparedness and Response</b>					
<b>Subtotal: Epidemic Preparedness</b>					
<i>Subtotal</i>		\$0	\$0		
<b>M&amp;E</b>					
Continue support for 15 fever sentinel sites of the fever surveillance system	CDC/IAA (sub-grant to 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 for RBM/PMI impact evaluation	TBD	\$100,000	\$0	Nationwide	Local support to work with MEASURE (centrally-funded) on RBM/PMI IMPACT evaluation.
Support preparation for a large national household survey (MIS 2015)	TBD	\$200,000	\$0	Nationwide	Assuming that the 2013 MDG survey will occur on time, an MIS may be scheduled in 2015 to collect malaria specific biomarkers.

End use verification surveys	DELIVER	\$100,000	\$0	Nationwide	Conduct quarterly end use verification to survey stock availability in public health facilities. Data will be used to inform future programming and for leverage of partner resources.
Technical assistance to support M&E activities	USAID	\$0	\$0	Nationwide	One USAID TDY to provide technical support for impact evaluation and M&E activities.
Technical assistance to support M&E activities	CDC/IAA	\$12,000	\$0	Nationwide	One CDC TDY to provide technical support for impact evaluation and M&E activities.
<i>Subtotal</i>		<i>\$712,000</i>	<i>\$0</i>		
<b><i>Subtotal: M&amp;E</i></b>		<b><i>\$712,000</i></b>	<b><i>\$0</i></b>		
<b>Staffing and Administration</b>					
In country staffing and administration costs	USAID/CDC	\$1,049,000	\$0	Nationwide	Support for USAID and CDC annual staffing and administration costs.
<b><i>Subtotal: Staffing and Administration</i></b>		<b><i>\$1,049,000</i></b>	<b><i>\$0</i></b>		
<b>GRAND TOTAL</b>		<b>\$25,920,000</b>	<b>\$13,365,000</b>		