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.

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PRESIDENT'S MALARIA INITIATIVE

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Malaria Operational Plan (MOP)

Rwanda FY 2013

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ABBREVIATIONS

ACT	artemisinin-based combination therapy
ANC	antenatal clinic
AQ	amodiaquine
AL	artemether-lumefantrine
ASM	*Agents de Sante Maternelle* (specialized maternal community health workers)
BCC	behavior change communications
BEST	Best Practices at Scale in the Home, Community and Facilities
CAMERWA	*Centrale d'achat des Medicaments Essentiels, Consumables et Equipements Médicaux du Rwanda* (now the Medical Procurement and Distribution Division [MPDD])
CBO	community-based organization
CCM	community case management
CDC	Centers for Disease Control and Prevention
CHD	Community Health Desk
CHW	community health worker
DfID	Department for International Development
DHS	Demographic and Health Survey
EIR	entomologic inoculation rate
EPI	Expanded Program for Immunization
ESR	epidemic surveillance and response
FANC	focused antenatal care
FY	fiscal year
FBO	faith-based organization
G2G	government (U.S.) to government (Rwanda)
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, TB, and Malaria
GOR	Government of Rwanda
HBMF	home-based management of fever
HCC	Health Communication Center
HMIS	health management information system
iCCM	integrated community case management
IDSR	Integrated Disease Surveillance and Response
IMCI	integrated management of childhood illnesses
IPTp	intermittent preventive treatment of malaria in pregnancy
IRS	indoor residual spraying
IST	intermittent screening and treatment
ITN	insecticide-treated bed net
IVM	integrated vector management
LLIN	long-lasting insecticide-treated bed net
MCH	maternal and child health
MDG	Millennium Development Goals

MIP	malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	malaria operational plan
MOPDD	Malaria and Other Parasitic Diseases Division (equivalent to National Malaria Control Program)
MPDD	Medical Procurement and Distribution Division
NGO	non-governmental organization
NRL	National Reference Laboratory
PEPFAR	President's Emergency Plan for AIDS Relief
pHI	proportional hole index
PLWHA	people living with HIV/AIDS
PMI	President's Malaria Initiative
PMTCT	prevention of mother-to-child transmission (of HIV)
QA/QC	quality assurance/quality control
RBC	Rwanda Biomedical Center
RBM	Roll Back Malaria
RDT	rapid diagnostic test
SIS-com	community information system
SP	sulfadoxine-pyrimethamine
SPR	slide positivity rate
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

EXECUTIVE SUMMARY

Malaria prevention and control is a major foreign assistance objective of the U.S. Government (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a multi-year, comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through GHI, the United States will help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns, and children. Rwanda is selected as a GHI Plus country.

The President's Malaria Initiative (PMI) is a core component of the GHI. 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. With passage of the 2008 Lantos-Hyde Act, funding for PMI has now been extended through FY 2014. 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. Rwanda officially became a PMI country in FY 2007, although the USG had been supporting malaria control activities for several years before that.

Rwanda has made significant achievements in scaling up malaria control interventions. During an intense 15-month campaign, Rwanda distributed over 6.1 million long-lasting insecticide-treated bed nets (LLINs) and was one of the first African countries to reach universal net coverage in February 2011. The indoor residual spraying (IRS) program has expanded each year. The last spray round, conducted in August through October 2011, and protected 358,804 structures. Progress in case management is equally impressive. Less than two years after the MOH directed that all presumed malaria cases be laboratory confirmed, reports indicate that 95% of all malaria cases are confirmed by microscopy or rapid diagnostic tests. Community health workers (CHWs) continue to play a pivotal role in malaria case management and half of Rwanda's extensive network of 45,000 CHWs are being trained and mobilized to implement integrated community case management.

The results of these efforts were seen in the Demographic and Health Survey (DHS) of 2010. Survey results include a net ownership rate of 82% (compared with 57% in the interim DHS of 2007/2008) and usage rates by children and pregnant women of 70% and 72% (compared with 58% and 62% in 2008). National prevalence estimates in children under five continue to decline, from 2.8% in 2007/2008 to 1.4% in 2010. Malaria control efforts, combined with significant improvements in maternal and child health, vaccinations, and HIV/AIDS, have reduced all-cause under-five mortality by 50%, from 152 deaths per 1,000 live births in 2005 to 76 deaths per 1,000 live births in 2010.

The FY 2013 Malaria Operational Plan for Rwanda was developed in close consultation with the Malaria and Other Parasitic Diseases Division (MOPDD) (equivalent to National Malaria Control Program), and with the participation of all national and international partners involved with malaria prevention and control in the country. The activities that PMI is proposing to support with FY 2013 funding are based in part on recommendations from the Malaria Program Performance Review conducted in 2011, align with the vision of the draft 2012-2017 National Malaria Control Strategy and Plan to achieve pre-elimination by 2017, and will build on investments made by PMI and other partners to improve and expand malaria-related services. The proposed FY 2013 PMI budget for Rwanda is $18 million. Based on discussions and meetings with the MOPDD and partners, the following major activities will be supported:

Insecticide-treated nets (ITNs): MOPDD achieved universal long-lasting ITN (LLIN) coverage, defined as one net for every two people, in February 2011. PMI has been collaborating with MOPDD in 2012 to maintain universal coverage for all age groups. The main delivery channels include free mass distribution during integrated health and vaccination campaigns, and routine distribution of free nets through antenatal care (ANC) and Expanded Program for Immunization (EPI) clinics in all health centers. In 2012, PMI planned to procure 500,500 LLINs to support routine LLIN coverage. However, PMI received an emergency request from the Minister of Health in March 2012 to procure an additional 500,000 LLINs to fill the gap due to delays in Global Fund procurement. Using emergency procurement funds and savings from previous LLIN procurements, PMI was able to procure 1,000,500 LLINs in 2012 to ensure the maintenance of universal coverage. These LLINs are expected to arrive in country in two shipments: one in July, another one in September 2012. MOPDD is near completion of a three-year LLIN durability study supported by PMI. Preliminary results suggest that LLINs in Rwanda last for a maximum of 18 months, after which depleted insecticide and holes make the nets ineffective.

With FY 2013 funding, PMI will procure one million nets to contribute to maintaining universal coverage. These nets will be distributed through mass distribution channels. In addition, PMI will continue to support the LLIN distribution systems to district and community levels to prevent stock-outs, and is increasing behavior change communication (BCC) activities at national and community levels, particularly among CHWs, to promote correct and consistent net use.

Indoor residual spraying (IRS): PMI supports the MOPDD's strategy to reduce malaria transmission through IRS in targeted high-risk areas. In 2011, Rwanda conducted a single spray round, which covered 358,804 structures (98% coverage rate). The next IRS operation will be carried out in two rounds: the first in August 2012, and the second in February 2013.

In FY 2013, PMI will deploy IRS with continued emphasis on transition and capacity building. Spraying in 2013 will mark the first year of transitioning components of IRS activities directly to the Government of Rwanda. In FY 2013, it is envisaged that a PMI implementing partner will spray three districts (approximately 150,000 structures) and the Government of Rwanda will spray two districts (approximately 150,000 structures).

The Government will assume responsibility for most IRS activities in those two districts. The PMI implementing partner will retain responsibility for procurement of insecticide, technical assistance for supervision, quality control and assurance, and environmental monitoring in all five districts. With FY 2013 funding, PMI will also conduct technical assessments of district implementation of aspects of IRS to ensure quality.

Malaria in Pregnancy (MIP): Because of increasing parasite resistance to sulfadoxine-pyrimethamine (SP) and decreasing malaria prevalence, MOPDD discontinued intermittent preventive treatment of malaria in pregnancy (IPTp) in 2008. PMI continues to support other aspects of the prevention and treatment of MIP, including procurement of iron/folate tablets for pregnant women and LLINs for distribution at ANCs. The Maternal Child Health (MCH) Program, in coordination with MOPDD, the Community Health Desk, and the Expanded Program for Immunization, with support from PMI and other partners, has developed an integrated approach to deliver quality health care for pregnant women. The services provided by these units, in addition to fetal growth monitoring and birth preparation, make up the focused antenatal care package, which is now available nationwide.

With FY 2013 funding, MOPDD, PMI, and partners will implement and scale up of intermittent screening and treatment (IST) during ANC attendance at the health center with RDTs, given results from a rapid assessment of the malaria burden during pregnancy. MOPDD will implement IST in three high malaria burden districts and monitor and evaluate impact of this novel approach in reducing the burden of MIP in Rwanda. PMI will continue to support MCH and MIP interventions by providing technical assistance for MIP strategy development and coordination for implementation of the strategy at the national level and resources for trainings as needed at the district level. PMI, in coordination with USG MCH programs and the MOH, will also continue to facilitate supervision of MCH-focused CHWs (known as ASMs) by health center supervisors, contribute to their training, evaluate performance of community outreach to pregnant women, and strengthen linkage between ASMs and health facilities to promote LLIN use and ANC attendance by pregnant women.

Health Systems Strengthening, Capacity Building, and Transition: As evidenced by the 2010 DHS Survey results, Rwanda has made a strong commitment to improve the health of its citizens through a wide range of health systems strengthening efforts. Consistent with GHI principles, PMI has contributed to health system strengthening by supporting seconded positions within MOPDD, strengthening the Health Management Information System, the Epidemic Surveillance and Response System, the National Reference Laboratory and the pharmaceutical management system, and facilitating integration of service delivery within other programs, such as MCH and EPI.

As a part of GHI, PMI and the Rwandan government are supporting integrated service delivery, including integration of malaria control with MCH and community-based health service delivery. In 12 districts, PMI is supporting the integrated community case management (iCCM) approach and partners with the MCH program to ensure children under five years of age have access to treatment of malaria, diarrhea, and pneumonia through CHWs and health facility staff.

Case Management: All health facilities officially transitioned to artemether-lumefantrine (AL) as the first-line treatment for uncomplicated malaria in October 2006. In November 2009, MOPDD revised its treatment policy to require diagnostic confirmation of all fever cases regardless of age. The Global Fund to Fight AIDS, Tuberculosis, and Malaria (the Global Fund) continues to finance all artemisinin-based combination therapy (ACT) needs and provides other antimalarials and diagnostic support for all health facilities. In line with GHI principles, PMI has helped develop human resources and systems for integrated community case management of fever, as well as strengthening laboratory diagnostic training and supportive supervision systems in the private sector. All 12 PMI-supported home-based management of fever districts have completed transition to iCCM. To promote timely treatment seeking and proper use of AL, PMI has funded BCC activities.

With FY 2013 funding, PMI will continue to strengthen efforts to ensure prompt and effective case management of malaria at health facilities and at the household/community level by CHWs through scale-up of integrated community case management. PMI will procure ACTs and RDTs to help fill gaps in community case management commodities. At the health facility level, PMI will concentrate on strengthening an integrated and decentralized national quality control system for microscopy and providing continued training for malaria diagnostics including RDTs.

Monitoring and evaluation (M&E): Both PMI and PEPFAR have contributed to strengthening Rwandan M&E systems, and HMIS data are sufficiently complete, accurate, and timely to be used for routine program monitoring. MOPDD staff analyzes these data and produces maps and charts showing the geographic distribution and trends in malaria cases.

With FY 2013 funding, PMI will continue to support the MOPDD to strengthen evidence-based decision making throughout the health system. PMI will also support strengthening the capacity of personnel in M&E in the areas of data quality, analysis, and data-based programmatic decision making. The GOR has prioritized decentralization, and with a decreasing malaria burden and a transition from stable to unstable malaria transmission, the ability of districts to analyze and respond to upsurges in malaria is pivotal. Therefore, PMI will support the MOPDD to strengthen decentralized M&E capacity and support Rwanda's goal of achieving pre-elimination by 2017.

STRATEGY

1. Introduction

The President's Malaria Initiative (PMI) is the United States Government's response to malaria prevention and control in sub-Saharan Africa. PMI was launched in June 2005 as a five-year program with funding of $1.2 billion and a goal to reduce malaria-related mortality by 50%. The strategy for achieving this goal was to reach 85% coverage of the most vulnerable groups – children under five years of age and pregnant women – with evidence-based preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated bed nets (ITNs), intermittent preventive treatment during pregnancy (IPTp), and indoor residual spraying (IRS). Owing to PMI's progress, in 2008 the Lantos-Hyde Act extended funding for PMI through FY 2014 with the revised goal of a 70% reduction in malaria-related mortality by 2015.

Rwanda was selected as a PMI country in FY 2007. Large-scale implementation of ACTs and LLIN distributions began in mid-2006 and has progressed rapidly with support from PMI and other partners. Since 2006, ACTs have been available and are being used in all public health facilities nationwide. To date, more than nine million long-lasting ITNs have been distributed to households with the target of providing one LLIN for every two people.

This FY 2013 PMI Malaria Operational Plan presents a detailed implementation plan for the seventh year of PMI in Rwanda based on gaps and priorities addressed in the Malaria Performance Review of 2011. A new five-year National Malaria Control Program Strategy (2012-2017) has been drafted and is expected to be finalized in September 2012. The new strategy aims at achieving pre-elimination by 2017. This document briefly reviews the current status of malaria control policies and interventions, describes progress to date, describes challenges and unmet needs if the targets of MOPDD and PMI are to be achieved, and provides a description of planned FY 2013 activities. The activities that PMI is proposing to support in FY 2013 are aligned with the 2012-2017 National Malaria Control Strategy and Plan and build on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund single stream funding mechanism. The total amount of PMI funding requested in FY 2013 for Rwanda is $18 million.

2. Country Malaria Situation

Rwanda is a small, land-locked country in the Great Lakes region of eastern Africa, bordered by Uganda, Burundi, the Democratic Republic of the Congo, and Tanzania. It has a population of approximately 11.4 million in 2012, making it the most densely populated country in continental Africa. Administratively, the country is made up of 30 districts which are divided into sectors, cells "cellules," and 14,953 "umudugudus" (villages of 50-100 households). The entire population is at risk for malaria, including an

estimated 2 million children under five and 488,000 pregnant women/year (2002 Census, 2013 projection).

The country is divided into two malaria ecologic zones based on altitude, climate, level of transmission, and disease vector prevalence. Malaria is mesoendemic in the plains and epidemic-prone in the high plateaus and hills. The Malaria and Other Parasitic Diseases Division (MOPDD) in Rwanda has classified 19 of the country's 30 districts as endemic and the remaining 11 as epidemic-prone. Malaria transmission occurs year-round with two peaks (May-June, November-December) in the endemic zones following distinct rainy seasons. In addition to climate and altitude, other factors that influence malaria in the country include high human concentration (e.g., boarding schools in proximity to marshlands); population movement (especially in the areas of low transmission to high transmission area); irrigation schemes (especially in the eastern and southern parts of the country); and cross-border movement of people (especially in the eastern and southeastern parts of the country). However, given the significant decline in the burden of malaria in Rwanda accompanying high coverage of malaria control interventions nationwide, MOPDD intends to stratify based on the changing malaria epidemiology and update the malaria risk map.

3. National Malaria Control Plan and Strategy

Drafted in 2008, Rwanda's National Malaria Control Strategy outlines priority malaria control interventions through 2012. The strategy time period and goals and objectives are aligned with three of the Government of Rwanda's primary strategic documents: Vision 2020, the overarching strategy used to guide long-term development in Rwanda; Economic Development and Poverty Reduction Strategy for 2008–2012; and Rwanda's mid-term development plan, which in turn serves as the framework for the national Health Sector Strategic Plan II for 2009–2012. The MOPDD, in collaboration with RBM, WHO, Global Fund, PMI, and partners, is currently developing a new National Malaria Control Strategy (2012–2017), which will address challenges and gaps identified in a Malaria Program Review, completed in March 2011. The Malaria Program Review resulted in specific recommendations by each intervention area to assist the program to refine or redefine the strategic direction and focus.

With the significant reduction in malaria cases over the last ten years, the GOR/MOPDD articulated a new vision of a Rwanda free from malaria as a way to contribute to socio-economic development. It has articulated a new goal to achieve pre-elimination status nationwide by 2017, by reducing malaria morbidity to pre-elimination level of less than 5% test positivity rate and mortality by 50% from the 2011 baseline level. This goal is elucidated in the new five-year Malaria Control Strategy 2012–2017, which provides distinct objectives, addresses gaps observed in the implementation of Rwanda's previous strategies, and provides detailed approaches to achieving malaria-related results and targets. This strategy aims to sustain progress, to scale up the most effective malaria control and prevention activities from the health facility to the community level, and to involve all partners (including the private sector) in supporting health care delivery in Rwanda.

Under the 2012–2017 Rwandan Malaria Control Strategy, MOPDD assumes the lead coordination role and takes responsibility for the decentralization of malaria control and prevention activities throughout the country. This coordination role includes all health partners, donors, and private sector stakeholders.

MOPDD sets the following objectives to reach by 2017:

- Ensure that 95% of the population has correct knowledge of malaria prevention and treatment.
- Reduce the number of cases of severe malaria by 70% of the 2011 level.
- Strengthen national and international partnerships, including cross-border malaria control initiatives aimed at harmonization and coordination of interventions.
- Treat 95% of malaria cases in accordance with the national malaria treatment guidelines.
- Ensure that 90% of the population at risk is effectively protected by at least one appropriate preventive measure.
- Control 100% of malaria epidemics within 2 weeks following their onset.

Strategic Interventions of the New 2012-2017 Malaria Strategic Plan

Integrated Vector Management (IVM)

Following a vector control needs assessment conducted in 2010 and the Malaria Program Review in 2011, Rwanda has adopted an IVM strategy that will provide a comprehensive framework for vector control interventions. In particular, it will guide selection of vector control options and optimal application of these interventions based on knowledge of the local vector ecology, disease epidemiology, and other socio-economic and operational factors. The use of long-lasting insecticide treated nets (LLINs) and indoor residual spraying (IRS) remains the cornerstone vector control methods featured in the IVM strategy. Larval source management methods, for which the feasibility remains to be determined, will be incorporated on a case-by-case basis.

Achievement and maintenance of universal coverage of LLINs

Rwanda achieved universal LLIN coverage, defined as one net per two people, in February 2011 with the distribution of 6.1 million bed nets during rolling campaigns from 2010 to early 2011 and 9.8 million bed nets by the end of 2011. The MOPDD plans to maintain universal coverage levels of LLINs by developing a long-term LLIN procurement and distribution plan to ensure a continuous supply of replacement nets and identifying additional targeted populations and new delivery channels. This plan also calls for sustained financing to ensure the predictability and availability of resources, establishing country-specific net replacement guidelines that include addressing LLIN disposal issues, continuing to monitor the lifespan of insecticide efficacy and net durability, strengthening procurement mechanisms to avoid delays, and quarterly monitoring and reporting on net use through community health volunteers. A longitudinal three-year LLIN study began in late 2010 to gather field information about LLIN durability and insecticide decay rates and to monitor insecticide resistance as part of the development of the IVM strategy. *(See ITN section for more information.)* In addition, DfID is negotiating a public-to-private agreement with the GOR that will focus on

prevention interventions, including potential support for the development of in-country LLIN production capacity. There will be on-going efforts for BCC to sustain high LLIN utilization rates.

Evidence-based focused IRS

The IVM strategy supports targeted IRS based on malaria burden as measured by health facility epidemiological case data and, when available, entomological inoculation rates. Eight spray rounds with a synthetic pyrethroid have been conducted with PMI support since 2007. Although the most recent insecticide resistance data from 14 sentinel sites across the country show high efficacy of pyrethroids (99.5% mosquito mortality for lambdacyhalothrin and 96.8% for deltamethrin), delayed knock-down, high prevalence of knock-down resistance gene (*kdr*), and decreasing mortality indicate that resistance to pyrethroid may be emerging. Advanced entomological testing is planned to identify resistance by mechanism and to further elucidate insecticide resistance status. To preserve the effectiveness of LLINs, which rely solely on pyrethroids, in future IRS rounds (August 2013 and beyond), the MOPDD is considering changing the insecticide used in IRS to non-pyrethroids based on evidence.

Malaria in Pregnancy

All pregnant women in Rwanda receive two of the three recommended malaria in pregnancy (MIP) control interventions. First, an LLIN is provided to women in their first pregnancy on their first visit to an antenatal care (ANC) clinic. Second, pregnant women with fever are tested for malaria by microscopy and then treated. Because women with placental parasitemia may be asymptomatic, their infections may be missed, and therefore WHO recommends IPTp in high transmission areas. Rwanda discontinued this intervention in 2008 based on evidence of the high therapeutic failure of SP in 6- to 59-month olds; results of an unpublished study that had found no added benefit of IPTp with SP compared to placebo with regard to maternal hemoglobin, newborn weight, and placental parasitemia; and decreasing malaria prevalence nationwide.

According to the 2010 DHS, maternal mortality in Rwanda declined 36% from 750 deaths (DHS 2005) to 476 deaths per 100,000 live births, 98% of pregnant women visit an ANC at least once (although the median gestational age at first visit is late at six months), and 35% of women make four or more ANC visits. Net usage among pregnant women rose from 17% (2005 DHS) to 62% (2007/2008 interim DHS) to 72% (2010 DHS). The MOH Maternal Child Health (MCH) Desk has coordinated with the MOPDD, the Community Health Desk (CHD), and EPI to strengthen integration of their services. The services provided by these units, in addition to fetal growth monitoring and birth preparation, make up the focused antenatal care (FANC) package, which is now available in all ANCs nationwide. Specialized community health workers (*Agents de Sante Maternelle* [ASM]) focus specifically on women in communities, including pregnant women and their newborns, and are included in the malaria in pregnancy strategy. The ASMs identify pregnant women early, distribute a first dose of iron, folic acid, and mebendazole for anemia prevention, and promote LLIN use and early and regular (up to four) ANC visits. Early ANC attendance is also encouraged by providing targeted BCC, combined with innovative community- and facility-level performance-based financing

and high enrollment (98%) in community health insurance schemes (mutuelles) that reduce ANC attendance fees.

Case Management

Malaria diagnosis

Rwanda's National Malaria Treatment Policy states that all cases of suspected malaria should be laboratory-confirmed prior to treatment with an artemisinin-based combination therapy (ACT). The policy applies to all age groups and health facilities, iCCM, and the private sector. The infrastructure for malaria diagnosis has improved in the past few years, such that 98% of health facilities currently have a functioning microscope and at least one laboratory technician (District Health Report, CHAI/MOH, 2009), and according to the HMIS, 95% of the malaria cases were parasitologically confirmed at health facilities in 2011. The draft 2012-2017 National Strategic Plan stresses the need to strengthen capacity for differential diagnosis including detection of low-level parasitemia at health facilities and at the community level.

As part of the expansion of iCCM, training in RDT use for CHWs and health center supervisors, including laboratory technicians, has been completed in all districts. The MOPDD selected First Response® as the RDT of choice. Quality assurance systems for the performance of RDTs in iCCM have been developed by the MOPDD and incorporate standardized initial training, proficiency evaluation, and periodic comparison of RDT results with microscopy.

Malaria treatment at health facilities

In October 2006, all health facilities officially transitioned from amodiaquine-SP to artemether-lumefantrine (AL) as the first-line treatment for uncomplicated malaria. Treatments are provided at a highly subsidized price at health facilities ($0.44). Oral quinine is the second-line treatment for cases of uncomplicated malaria and when AL is contraindicated. For patients who cannot tolerate oral medications, the national guidelines recommend the use of injectable artemether or intravenous quinine until the patient can take oral medications. Health centers refer cases of severe malaria for treatment to district hospitals or referral hospitals. In 2010, Rwanda participated in an 11-country, open label, randomized trial whose findings showed that artesunate substantially reduces mortality in African children with severe malaria. These data, together with a meta-analysis of all trials comparing artesunate and quinine, strongly suggest that parenteral artesunate should replace quinine as the treatment of choice for severe *Plasmodium falciparum* malaria worldwide. With these results, the MOPDD in 2011 has adopted parenteral artesunate rather than quinine as the first-line treatment for severe malaria. PMI is supporting the implementation of this policy with procurement of the first consignment of this drug to the country.

Provider acceptance of the diagnostic policy change is reflected in an increasing number of blood smears performed and a declining number of presumed malaria cases treated and reported since the policy was enforced. The MOPDD intends to continue to revise the treatment policy guidelines with the inclusion of diagnostic algorithms for RDT and smear-negative fever cases.

Malaria treatment in the community

The draft 2012-2017 Strategic Plan regards the integrated community case management of malaria and other diseases not only as a strength, but also as an opportunity for leveraging other health programs' funds. Building on the home-based management of fever (HBMF) model, the MOH Community Health Desk (CHD) has introduced and consolidated iCCM to include pneumonia, diarrhea and other components (nutrition, family planning, hygiene, and palliative care). The iCCM package is being implemented by 30,000 community health workers (CHWs) nationwide. Training of the CHWs was completed in July 2009 and included training in the use of cell phones for data reporting. PMI and the Global Fund have supported the expansion through CHW training, provision of materials (e.g., CHW kits, registries, job aids) and supervision and monitoring. All districts have introduced RDTs into the CCM package and all districts have now transitioned to the full iCCM package as outlined in the revised Community Health Strategy.

Malaria treatment in the private sector

The GOR support for treatment of children under five in private sector pharmacies and over-the-counter outlets (*comptoirs*) commenced in 2008. The private sector approach included training providers from registered pharmacies in malaria diagnosis and treatment followed by the provision of subsidized ACTs for children under five. In addition to increasing accessibility to AL, this strategy discouraged the sale and use of non-recommended antimalarials that are either no longer efficacious (e.g., SP) or that could undermine the efficacy of the newly introduced treatment by promoting drug resistance (e.g., artemisinin monotherapy). However, in 2010, the MOPDD suspended provision of the subsidized over-branded ACT "PRIMO" for treatment of children under five because of the new malaria treatment guidelines, which mandate diagnostic confirmation before any provision of ACTs; RDTs and blood smears are not available at private pharmacies or drug outlets, according to national pharmaceutical regulations.

Currently, there is little knowledge about the use of the private sector for malaria treatment or antimalarial-dispensing practices of private providers. For that reason, in 2012, PMI will support the MOPDD in conducting an assessment of the private sector to evaluate the extent of private sector utilization for malaria treatment and dispensing practices of the private providers to guide whether further support from PMI or other partners will be needed in this sector.

Drug supply and pharmaceutical management

The MOH procures antimalarials and supplies for health facilities through the Medical Procurement and Distribution Division (MPDD), formerly CAMERWA, the national medical store which sits under the Rwanda Biomedical Center. The MPDD currently procures about 60% of all facility drugs and supplies and is the only institution in Rwanda that can legally procure ACTs for the public sector. With support from PEPFAR, USAID family planning programs, and the Global Fund, MPDD is improving procurement, accounting, human resources, customer service, and storage practices to qualify as a USG direct funding recipient.

Working with the Pharmacy Task Force and with support from PEPFAR, MPDD has implemented what it calls active distribution of medicines to district pharmacies. This is a delivery mechanism whereby MPDD oversees delivery of medicines to district pharmacies on a monthly basis, outsourcing transportation to a local vendor. HIV-related commodities are also prepackaged for cross-docking at each health facility, limiting the amount of time that district pharmacies must spend receiving, shelving, and issuing products that health facilities do not buy. Health clinics then travel to the district pharmacies to pick up their order, thus decreasing opportunity costs to district pharmacies and health facilities for resupply. Active distribution has been fully implemented since September 2011 and has improved the supply chain to the level of the district hospitals.

A paper-based Logistics Management Information System (LMIS) for all program-related commodities was launched in March 2011. This harmonized the process for collecting logistics data across all programs. A joint PMI and PEPFAR assessment of the supply chain was conducted in August 2011 to evaluate the implementation of the LMIS and measure system performance including determining product availability at the facility and district pharmacy level for a variety of products. The LMIS is currently being transitioned to an electronic system co-funded by MPDD and the Global Fund. The MOH is developing the organizational structure for the Logistics Management Office (LMO) and will be in charge of all the logistics data entry, aggregation, and analysis used to make policy decisions and to aid in decision making during forecasting and quantification. The LMO will also provide supportive supervision of supply chain management to health facilities and district pharmacies. With PMI and PEPFAR funds, USAID is assisting with the establishment and training of the LMO.

The MOH created the Pharmacy Task Force in 2005 to oversee retailers and serve as the national drug regulatory authority. Its responsibilities include conducting quality control, inspection, and licensure, and ensuring a basic package of pharmaceutical products. The Rwanda Food and Medicines Regulatory Authority, awaiting approval in Parliament, will assist the task force in implementing its mandate. Its capacity is nascent and continues to require support for quality control of incoming and circulating drugs.

Monitoring and Evaluation

The epidemiology of malaria in Rwanda is shifting, as evidenced by reductions in outpatient malaria cases measured by the HMIS and drastic declines in parasitemia and anemia in children under five measured by household surveys (DHS and MIS). Although overall Rwanda is still in the malaria control phase, 19 out of 30 districts have been reporting slide positivity rates less than 5%, which is the WHO threshold for malaria pre-elimination. Pre-elimination calls for increased attention in ensuring good-quality surveillance data by requiring that all people with suspected malaria receive a diagnostic test, that cases are correctly classified according to the test result, that there is a quality management system for both microscopy and rapid diagnostic tests (RDTs), and that registration and reporting from health facilities are complete and consistent.

The following information sources guide MOH's programmatic decision-making:

- *HMIS*: The HMIS indicators and forms were revised and a new web-based platform (DHIS 2), with geospatial information system capacity, was launched in 2010. The HMIS receives data from all public health facilities, with timely and accurate reporting reinforced through performance-based financing. As of late 2010, the system provided data on only laboratory-confirmed malaria outpatient cases, inpatient cases, and deaths, as well as data by age and gender on all-cause morbidity and mortality at individual facilities. Private sector and community treatment are currently not reported. Cell phone–based reporting of the HMIS is being piloted.

- *Community information system:* This system originally included two systems: a paper-based system with performance-based financing where CHWs linked to the HMIS by reporting to the nearest health facility and a cell phone–based system that sends data directly from CHWs to the Community Health Desk. The system has now been transitioned into the community-based SIS-com (*mUbmizima*) and includes community diagnosis, treatment, and essential drug logistic information. SIS-com is separate from the HMIS and incorporates a real time, web-based data platform. There is a minimum set of indicators, and the registers and reporting formats were designed specifically to collect community data generated by CHWs using cell phones.

- *Integrated Disease Surveillance and Response (IDSR):* Surveillance activities are coordinated and streamlined throughout all levels of the health system from the community, health facility, district hospital and central levels. The MOH has conducted a surveillance assessment and is in the process of updating the current IDSR as well as computerizing the reporting and monitoring system. Cell phone–based reporting is also being piloted for IDSR.

- *Entomological surveillance:* See Vector Control/Entomology Section.

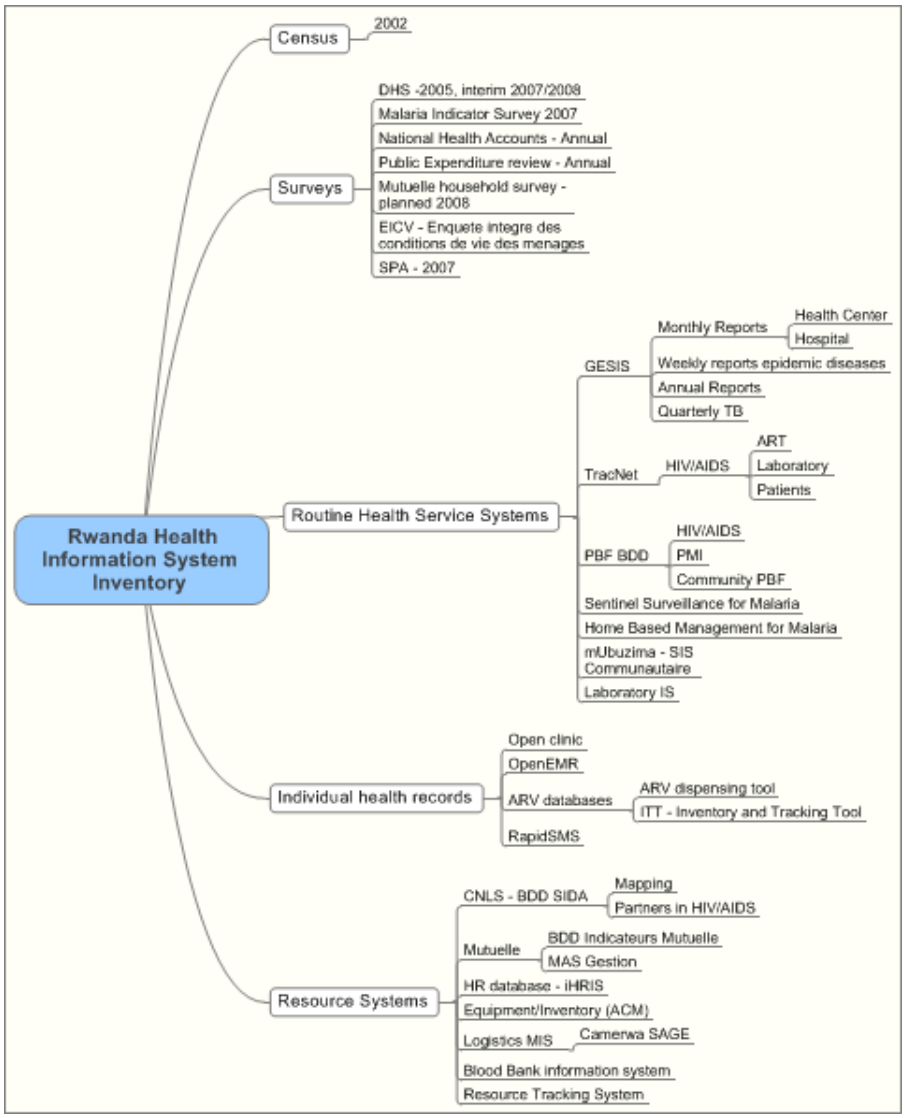
- *Logistics management information system (LMIS):* A paper-based system harmonized across all programs was launched in early 2011 and provides basic data on drug consumption, lab commodities, and stock outs at health facilities, independent of the HMIS. Reports flow from health facilities to district offices to MPDD and are used for quantification. Pending availability of resources, the LMIS will be computerized by the end of 2012.

- *DHS/MIS:* These comprehensive nationwide household surveys provide a broad range of population-based data, including bed net indicators (ownership and use by vulnerable populations), and malaria parasitemia and anemia. Population-based indicators change rapidly in Rwanda; thus, the GOR repeats surveys every two years. A full DHS was completed in 2010 and preliminary results are now available.

- *Research studies:* Research studies include surveys to track household use of LLINs, monitor LLIN efficacy, evaluate community case management, and measure insecticide resistance and efficacy of insecticides for IRS.

Rwanda has a stand-alone and costed Monitoring and Evaluation (M&E) Plan that takes into account the disease-integration effort being promoted by the MOH. However, there are still some weaknesses as identified by the Malaria Program Review and laid out in the draft 2012-2017 strategic plan; namely, limited data on malaria-related socio-economic impact, non-functional LMIS, non-functional IDSR, outdated demographic data and epidemiological stratification, no data reporting from private clinics and national referral hospitals, limited data analysis and use at district level, and delayed access to HMIS data. The Malaria Program Review proposed action points to address each of the above weaknesses, which include the strengthening of weekly analysis and use of routine data for action at national, district and facility level; building key malaria indicators into the HMIS data warehouse and dashboard; and incorporating referral hospitals and private clinics into the HMIS.

Figure 1. Health-related data sources, Rwanda, 2011*



*Management Sciences for Health

Behavior Change Communication

Behavior change communication and social mobilization play an important role in the timely and correct use of interventions to diagnose and treat and prevent malaria. In 2011, Rwanda developed and adopted a national integrated BCC strategy to harmonize the communication activities and messages for a number of interventions, including malaria and other infectious diseases, maternal health, and family planning. The strategy stresses advocacy for leadership and direction and social mobilization with a focus on positive changes in social norms and individual behaviors. These integrated BCC activities include a combination of interpersonal communication, community education and mobilization, information, education and communication, trainings, and media campaigns to influence and/or modify behaviors and environmental factors, and are carried out at the national and community levels.

Now that malaria cases and deaths have fallen so dramatically, it is important that residents are aware of the risk that malaria still poses in Rwanda, that residents with symptoms of malaria are diagnosed and treated, and measures to prevent malaria are used. Continued priorities include social mobilization around new and replacement nets, provider and caregiver acceptance of case management policy, and household acceptance of IRS. Moreover, following the Malaria Program Review, the MOPDD refined and shifted some of their BCC priorities. New focuses of BCC research include mitigating reduced malaria risk perception and increasing use of prevention methods such as LLIN and acceptance of IRS compliance. PMI Rwanda would also like to measure the effects of BCC programs and use these data to strengthen BCC strategies and emphasize those with the most impact.

4. Goal and Targets of the President's Malaria Initiative in Rwanda

The goal of PMI is to reduce malaria-associated mortality by 70% compared to pre-Initiative levels in the 15 original PMI countries. By the end of 2015, PMI will assist Rwanda 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 6 months; and
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria.

5. Progress on Indicators to Date

The primary sources of information used to track trends in malaria prevalence and coverage indicators are aggregated case reports from health facilities and national household surveys. The national health management information system (HMIS) collects monthly data on the number of reported cases of malaria and deaths attributed to malaria (presumed and confirmed) by age group from the over 450 health centers and district hospitals. Completeness of reporting is reinforced through performance-based financing and monthly data quality audits, which have demonstrated concordance between clinic registers and HMIS reports.

Based on HMIS data, Rwanda has seen an 84% decline in reported malaria cases from 1.5 million in 2005 to an unprecedented low of 227,015 in 2011, representing a significant reduction in transmission, even in the context of the change in malaria case definition.

From 2010 to 2011, there was a decline in reported malaria cases, a 45% (389/706) decline in the number of malaria deaths, and a 5% decrease in the slide positivity rates (number of positive malaria slides found among all slides tested). However, Rwanda again experienced an upsurge in confirmed malaria cases with a 300% increase from January to May 2012 compared to the same period in 2011. These data are now undergoing data quality analysis.

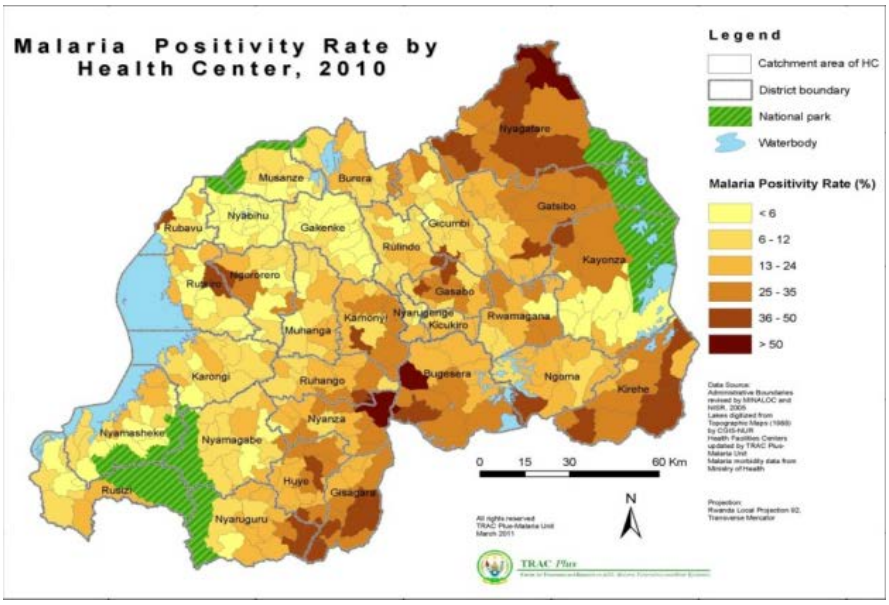
Table 2. Summary of malaria data reported through the Health Management Information System, 2008–2012[1]

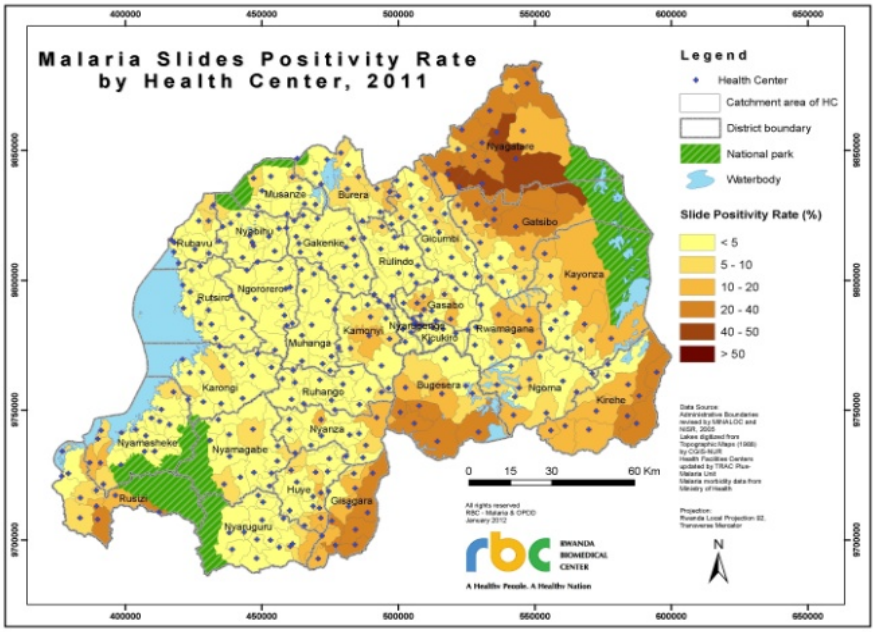
	2008	**2009**	**2010**	**2011**	**2012[1]**
Total cases reported	772,197	1,322,622	663,785	227,015	156,147
% confirmed[2]	41%	51%	96%	95%	99%
% morbidity[3]	11.8%	15.9%	7.8%	3%	
Slide positivity rate[4]	18%	25%	24%	19%	
Malaria-attributed mortality[5]	16.3%	19.2%	12.9%	3.6%	

[1]Preliminary HMIS data from the first five months in 2012 show a 300% increase in malaria compared to the first five months of 2011 (these data however are still being audited for accuracy).
[2]Laboratory confirmation by microscopy or rapid diagnostic test (RDT).
[3] Up until 2010, % morbidity relates to % of fever cases with malaria. In 2011 it represents *proportional morbidity* (confirmed malaria new cases as a percentage of all outpatient new cases).
[4]Slide positivity rate: malaria positive slides divided by total slides.
[5]Up until 2010, malaria-attributed mortality in all age groups represented the proportion of deaths attributed to malaria by laboratory confirmation. In 2011 this indicator reflects % of patients admitted for malaria who died, which is the same as *case-fatality rate*.

The HMIS also collects slide positivity rates on an annual and monthly basis. In 2008, 41% of presumed malaria cases were diagnostically confirmed, with a slide positivity rate of 18%. In 2009, these figures were 51% and 25%, respectively. Following the revision of the treatment policy to require diagnostic testing in late 2009, 96% of cases reported in 2010 were diagnostically confirmed with a slide positivity rate of 24%; these figures were 99% and 19% in 2011, respectively. The figure below illustrates a remarkable change in the epidemiology and burden of malaria from 2010 to 2011, as measured by slide positivity rates from health centers throughout the country. Given such high confirmation rates, the MOPDD plans to use slide positivity rates instead of parasite prevalence to stratify malaria burden by district and monitor the impact of their interventions.

Figure 2. Malaria slide positivity rates by health center, Rwanda, 2010 and 2011





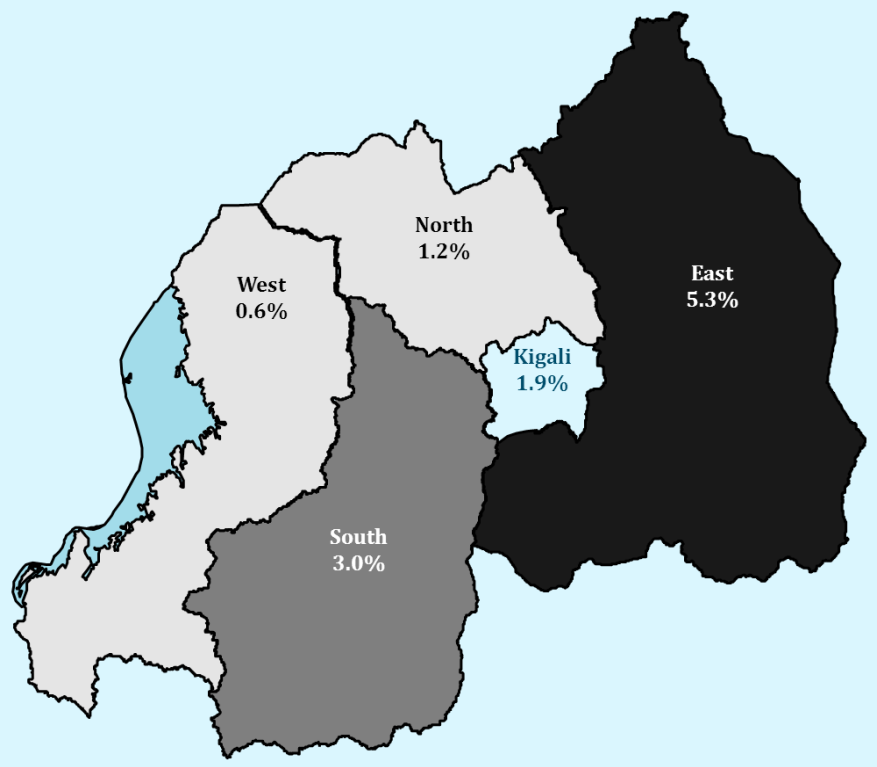
Rwanda conducted a full DHS survey in 2005, an interim survey in late 2007-early 2008, and a full DHS survey in 2010. The MOPDD also conducted a National Malaria Indicator Survey (MIS) in mid-2007. These surveys show marked improvements in key prevention indicators, as summarized below. For example, in 2005, 15% of households owned an ITN, and 13% of children under five years and 17% of pregnant women had

slept under one the night before. The 2010 DHS showed that 82% of households owned at least one ITN, and that 70% of children and 72% of pregnant women had slept under one. It is important to note that 2.5 million LLINs were distributed after the DHS data collection and therefore an MIS is planned in 2013 to update LLIN ownership and use rates in Rwanda. These gains in bed net ownership and use parallel the reductions in malaria parasitemia observed in children under five over the same period: from 2.6% in 2007/2008 to 1.4% in the 2010 DHS.

Indicator	**DHS 2005**	**Interim-DHS 2008**	**DHS 2010**
Proportion of households with at least one ITN	15%	57%	82%
Proportion of children under five years old who slept under an ITN the previous night	13%	58%	70%
Proportion of pregnant women who slept under an ITN the previous night	17%	62%	72%
Malaria prevalence in: Children under five Women of childbearing age	N/A (not available)	2.6% 1.4%	1.4% 0.7%
Under five all-cause mortality (per 1,000 live births)	152	103	76

Sources: Rwanda 2005 DHS; Interim-DHS 2008, DHS 2010 (preliminary results)

Figure 3. Parasite prevalence in children under five, by province, 2010

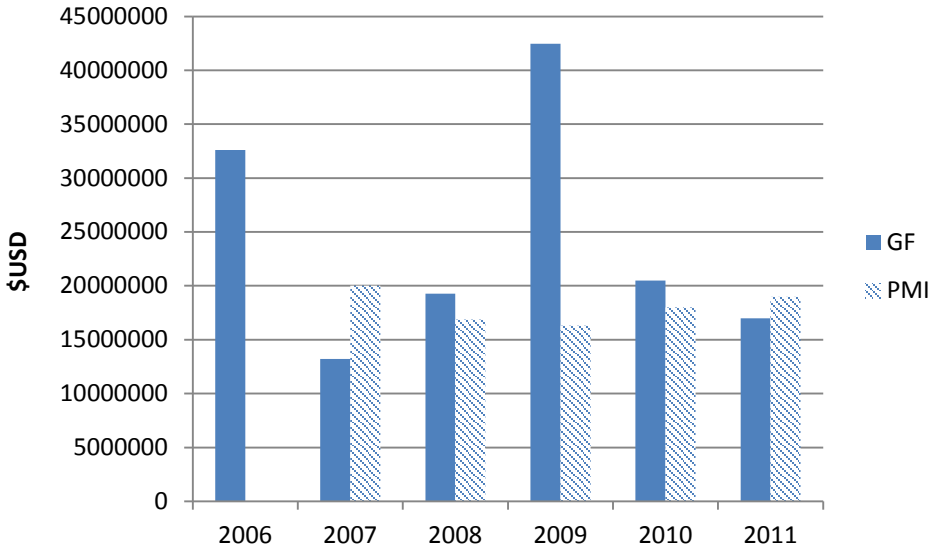


Source: DHS 2010

6. Integration, Collaboration, and Coordination

In addition to PMI, other development assistance for malaria comes from the Global Fund, Roll Back Malaria (RBM), WHO, UNICEF, and DfID. Rwanda has two active Global Fund malaria grants: Round 3 (now in phase 2 of Rolling Continuation Channel) and Round 8 (Phase 2 started in July 2011). In July 2011, all Global Fund malaria grants were consolidated into a single source funding stream that will run until June 2014. Global Fund grants support the expansion of community case management with RDTs, antimalarials for treatment at health facilities and in the community, procurement of LLINs, support to strengthen monitoring and evaluation systems, and resources for health communications. The MOPDD did not apply to the Global Fund's Transition Funding Mechanism because the only gap in essential commodities was 500,000 LLINs, which was covered through reprogramming of PMI funds. The MOPDD plans to apply for the next Global Fund call for proposals.

Figure 4. Global Fund and PMI support to Rwanda, 2006–2011



Source: www.theglobalfund.org; www.pmi.gov

7. PMI Support Strategy

The overall PMI strategy for Rwanda is aligned, complementary, and supportive of Rwanda's draft 2012–2017 Malaria Strategic Plan. The vision of the Malaria Strategic Plan is to achieve pre-elimination status by 2017. To achieve this, strategic investments should be made that leverage resources from the GOR, development partners and technical agencies.

PMI's national-level support includes health system strengthening, support to the Health Management Information System (HMIS) and Community Health Information System (SIS-COM), improvement of pharmaceutical and commodity supply chain management, and enhancement of BCC activities. Integrated interventions, including diagnostics, iCCM, malaria in pregnancy, surveillance/monitoring/evaluation, and provision of antimalarial commodities in health facilities and communities, are specific priorities that PMI will continue to support and transition aspects of this support to the MoH.

Rwanda has prioritized decentralization and PMI will support this effort with building and transitioning capacity and supporting programs at districts, health centers, and the community. Several USAID funding streams including those for HIV/AIDS, maternal and child health, and family planning will be combined with PMI resources to support this goal.

Expected Results – Year Seven

PMI and the MOPDD have agreed on the following outcomes for FY 2013:

Prevention

1. LLINs: Procure and distribute approximately one million LLINs through routine distribution channels or to new populations to contribute to maintenance of universal coverage.
2. Support the elaboration of the long-term LLIN procurement and distribution plan to maintain universal coverage.
3. IRS: Support spraying of approximately 300,000 structures in targeted districts based on epidemiologic and entomologic data.

Treatment

1. Diagnosis in the community: Procure approximately one million RDTs and safety boxes to support laboratory diagnostic confirmation prior to treatment through community case management.
2. Community case management: Strengthen community case management of fever (CCM) integrated into the full community health care package in 12 out of 30 districts.
3. Support to the case management at health facility level: procurement of AL, parenteral artesunate, and lab supplies.
4. Support the quality assurance and quality control at community level through the health facilities and district hospitals.

Surveillance, Monitoring, and Evaluation

1. Enhance decentralized surveillance to generate timely and quality data to track, analyze, and respond to malaria trends.
2. Epidemic Surveillance and Response (ESR): continue to strengthen the ESR system by developing new epidemic thresholds and developing standardized operating protocols.
3. Support the implementation of malaria pre-elimination activities in two districts.
4. Document increases in malaria indicators, reductions in malaria burden both in terms of entomology and epidemiological parameters, and measure outcome and impact through surveys.

OPERATIONAL PLAN

1. **Vector Control: Integrated Vector Management, Indoor Residual Spraying, and Insecticide-Treated Nets**

Integrated Vector Management (IVM)

MOPDD/PMI objectives

In response to the need to develop long-term strategies for slowing down and mitigating the selection for vector resistance, the MOPDD is reorienting towards an IVM approach that seeks to use evidence to improve the efficacy, cost-effectiveness, and sustainability of vector control. The IVM framework outlines five key elements in this process: (1) advocacy, social mobilization and regulatory control, (2) collaboration within the health sector and with other sectors to optimize use of resources, planning, and monitoring, (3) integration of vector control measures, (4) evidence-based decision making guided by entomological and epidemiological surveillance and evaluation, and (5) development of human resources and infrastructure at national and local level.

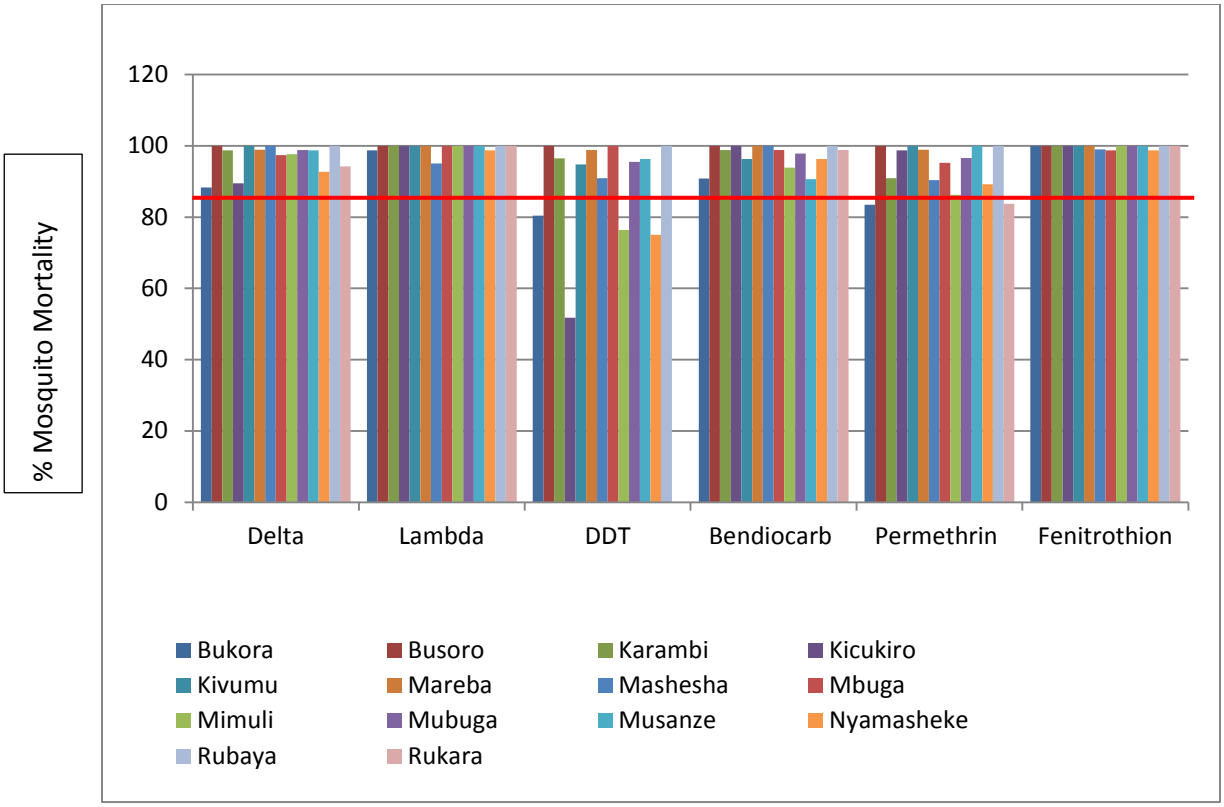
Following a vector control needs assessment in 2010 and the Malaria Program Review in 2011, an IVM strategy was developed to provide a framework that guides decisions on selection of vector control options and optimal application of these options based on local vector ecology, disease epidemiology, and other socio-economic and operational conditions. The strategy calls for continued, high-quality entomologic monitoring. The use of LLINs and IRS remain the cornerstone vector control methods featured in the IVM strategy. Larval source management is mentioned, although its feasibility will be ascertained on a case-by-case basis.

Progress during the last 12 months

In June 2012, Rwanda's 2012-2017 IVM strategy was adopted during an intersectoral stakeholder meeting. The challenge is to operationalize this plan, which includes the issuance of a ministerial statement on IVM; the establishment of a national intersectoral coordination mechanism for the implementation of IVM; the inclusion of IVM principles into district work plans; and the development of training manuals for district health teams.

With PMI support, the MOPDD maintained entomologic surveillance across 12 sentinel sites. In 2011, insecticide susceptibility studies were conducted in 14 districts (beyond the 12 sentinel sites). Data from non-IRS and IRS areas indicate warning signs of possible emerging resistance to some pyrethroid compounds, full susceptibility to bendiocarb and fentrothion, and resistance to DDT.

Figure 5. Insecticide resistance testing in 14 sentinel sites, Rwanda, 2011
Testing used WHO paper bioassay with field-caught mosquitoes exposed 24h; determine percentage mosquito mortality (y-axis))



NOTES: The sites of Bukora, Busoro, Mareba, and Mimuli are located within spray areas. Delta= Deltamethrin 0.05% (Py); Lambda= Lambda-cyhalothrin 0.75% (Py); DDT= DDT 4.0% (OC); Bendiocarb= Bendiocarb 0.1% (Carb); Permethrin= Permethrin 0.75% (Py) and Fenitrothion= Fenitrothion 1.0% (OP)
Py=Pyrethroid; OC= Organochloride; Carb=Carbamate; OP=Organophosphate

The MOPDD also conducted mosquito identification/speciation via polymerase chain reaction. Partial results for six sites indicate a high predominance of *Anopheles arabiensis* among malaria vectors and a high prevalence of the *kdr* gene among *An. gambiae s.l.*, which may explain the emerging resistance to pyrethroids.

Challenges, opportunities, and threats

Rwanda is one of the first African countries to adopt an IVM strategy, and key stakeholders–such as the Ministry of Agriculture, Ministry of Infrastructure, and other MOH departments–are eager to collaborate. However, there is lack of experience in implementation of IVM in stable malaria transmission settings in Africa, funds for IVM implementation, and national policies for vector control.

With FY 2012 PMI support, the MOPDD will draft an insecticide resistance management plan, with a potential plan to rotate insecticide compounds or classes every one or two years.

Gap analysis for vector control needs: IVM

The IVM strategy seeks to leverage existing community-based platforms for its implementation, which may decrease implementation costs. The Global Fund will assist in supporting implementation, and many of IVM's entomologic monitoring needs are covered elsewhere, and a gap analysis is not included in this section.

Entomologic Monitoring

PMI supports data collection and analysis of five primary indicators: malaria vector taxonomy and density, malaria vector distribution and seasonality, malaria vector insecticide susceptibility/ mechanisms of resistance, malaria vector biting time and location, and LLINs and IRS insecticidal effect at 12 sites.

Plans and justification

Following the official adoption of the IVM strategy, PMI/Rwanda plans to support critical components of the IVM strategy implementation. Tangible deliverables will be agreed upon with the MOPDD in order to maximize the use of PMI resources. PMI will continue to support routine entomologic monitoring, which will be transitioned entirely to the MOPDD through the government (U.S.) to government (Rwanda)(G2G) mechanism.

Proposed activities with FY 2013 funding ($260,000)

- Assessment of primary malaria vectors and their behavior in high malaria burden districts: PMI will contribute towards an entomological survey of primary malaria vectors and their behavior in high burden districts. This is in line with recommendations of the Malaria Program Review and will assess the continued efficacy of preventive measures such as LLINs and IRS. *($60,000)*

- Support the full entomologic monitoring package in 12 sentinel sites, including susceptibility testing, bioassays for IRS quality control and efficacy, and determination of resistance mechanisms, biting behavior, and vector density. *($200,000)*

Indoor Residual Spraying

MOPDD/PMI objectives

The MOPDD's IRS strategy is influenced in part by its Strategic Plan and in part by its IVM strategy. Specifically, given Rwanda's success in achieving universal coverage and maintaining high net use, IRS is to be utilized in addition to LLINs in areas where the

burden of malaria is greatest (as measured by health facility slide positivity rates and entomological indicators such as entomological inoculation rates). PMI supports this evidence-based approach and will continue to review HMIS and entomologic data to determine where best to deploy IRS.

Progress during the last 12 months

PMI/Rwanda has supported implementation of IRS since 2007 as detailed below:

Table 2. Coverage with IRS, 2007–2011

Round	Date	Districts	No. of structures sprayed (% coverage)
1	Aug-Sep 2007	Kigali (all three districts)	152,072 (96%)
2	Aug-Sep 2008	Kigali + Nyanza (South Province) and Kirehe (East Province)	189,756 (94%)
3	Jan-Feb 2009	Kigali, Nyanza, and Kirehe	191,051 (97%)
4	Aug-Sep 2009	Kigali, Nyanza, and Kirehe + Bugesera (East Province) and Nyagatare (East Province)	295,174 (98%)
5	Mar 2010	2 Kigali districts (Gasabo and Kicukiro)	63,395(87%)
6	Sep-Oct 2010	Kigali, Nyanza, Kirehe, Bugesera, and Nyagatare	303,659 (99%)
7	Aug-Oct 2011	Nyanza, Kirehe, Bugesera, Nyagatare, and Gisagara	358,804 (98.6%)

In 2011, there were two major changes to the IRS program. First, based on HMIS and entomological data, IRS was withdrawn from Kigali after six rounds of spraying and a new high-burden district (Gisagara in South Province) was added. Second, districts were blanket sprayed (i.e., districts were sprayed in their entirety), as opposed to focally. The 2011 round protected more than 1.5 million residents in five districts; approximately 359,000 structures were sprayed with a pyrethroid. Coverage remains high (98.6%) after seven rounds. Rwanda has five high malaria burden districts which accounted for 71.6% of the malaria burden in 2011: Nyagatare, 86,943 (41.7%); Bugesera, 17,519 (8.4%); Gisagara, 13,022 (6.2%); Kirehe, 15,725 (7.5%); and Rusizi, 16,306 (7.8%). Therefore, based on epidemiologic and entomologic indicators, the MOPDD targets IRS in high incidence sectors of these districts.

Routine bioassays have been conducted since spray application to determine the efficacy of the insecticide. At the six-month mark, more than 80% of mosquitoes exposed to wall

surfaces were killed, indicating satisfactory efficacy. The MOPDD will continue to monitor efficacy until mortality falls below the 80% threshold.

Case data from Kirehe and Rusizi showed significant declines since 2011. Therefore, the eighth round of spraying, launched in September 2012, targets approximately 240,000 structures in three districts (Nyagatare, Buguesera, and Gisagara) with a pyrethroid. Because the MOPDD plans to re-spray a portion of the structures (approximately 120,000) in February 2013, resources that were devoted to spraying in Kirehe and Rusizi were moved to support twice-yearly spraying. The decision to spray twice a year was documented in the FY 2012 MOP and was based on previous bioassay results, which showed a mortality rate below 80% at the seventh month, compared to HMIS data, which shows a transmission season of at least nine months in the targeted districts. Only the highest malaria burden sectors will be targeted in the February 2013 spray round, based on entomological and HMIS data.

Plans and justification

PMI will deploy IRS based on sound local evidence on disease eco-epidemiology, with continued emphasis on capacity building. Spraying in 2013 will mark the first year of transitioning components of IRS activities directly to the Government of Rwanda. In 2013, it is envisaged that a PMI implementing partner will spray high incidence sectors of approximately 150,000 structures and the Rwandan government will cover approximately 150,000 structures. With PMI support, the GOR will assume responsibility for implementation of IRS activities, including payment of IRS spray staff, transport, payment of services for spray staff, warehouse and site management, and mobilizer supplies. The PMI implementing partner will retain responsibility for procurement of insecticide, technical assistance for supervision, quality control and assurance, and environmental monitoring in all five districts.

Challenges, opportunities, and threats

Susceptibility studies conducted in 2011 indicate possible emerging resistance to certain pyrethroids, consistent with documented widespread pyrethroid resistance seen in neighboring countries. Given Rwanda's long malaria transmission season (nine months), there are currently no viable insecticide alternatives to pyrethroids with the same residual insecticidal duration. However, given the recent recommendations from WHO's Global Plan for Insecticide Resistance Management, the MOPDD is considering rotating insecticides within the IRS program. Some rotations will require biannual spraying, thereby increasing substantially the costs of IRS and subsequently decreasing the number of structures sprayed.

In late 2012, external partners will conduct a technical/programmatic capacity assessment of at least two districts targeted for IRS. If the assessment demonstrates adequate technical capacity, the MOPDD will work with these districts to directly implement IRS. A fiduciary risk assessment was conducted in early 2012 and a risk mitigation strategy will be incorporated into the bilateral agreement. Based on previous GOR-funded spray rounds, the MOPDD's estimated cost per structure is $10, which represents a significant cost savings and could offset the costs of biannual spraying.

Given Rwanda's high net ownership and use rates and the potential need to replace nets every two rather than three years due to durability issues, a study will be launched in 2012/13 to determine the added value of IRS, with pending FY 2012 support. Results will inform the medium-to-long term IRS strategy.

Proposed activity with FY 2013 funding ($4,935,000)

- Support spraying of a total of 300,000 structures in high malaria incidence sectors located in three to five high-burden districts based on HMIS data. Frequency of application will be determined by two factors: susceptibility testing to determine whether a pyrethroid or non-pyrethroid will be used, and bioassay results from 2011 and 2012 indicating duration of pyrethroid efficacy. Costs are based on previous expenditure analyses of both the implementing partner and the MOPDD and assume use of a pyrethroid. If a non-pyrethroid is used, then targets may be reduced. Entomologic monitoring (including routine bioassays) is covered under the General Vector Control Section. *($3,585,800 to partner; $1,300,000 to GoR)*

- Technical assistance for IRS. CDC staff will conduct two TA visits to assist with monitoring, planning, and implementation of IRS. Monitoring may include piloting colorimetric testing for residues on sprayed structure surfaces (for IRS monitoring). *($24,200)*

- Independent monitoring of compliance to environmental best practices. *($25,000)*

Insecticide-treated Nets

MOPDD/PMI objectives

Rwanda was one of the first countries in sub-Saharan Africa to achieve nationwide universal coverage (UC) of LLINs in February 2011, and the major objective is to maintain universal coverage. The MOPDD defines universal coverage as one net for every two people or three nets per household. PMI contributed to the 6.1 million LLINs provided to households and vulnerable populations during the 2010/11 household coverage campaigns (581,000 with FY 2008 funding and 388,000 with FY 2009 funding). The rolling campaigns were led by the MOPDD in collaboration with other malaria partners who assisted with distribution and transportation. Universal coverage was achieved by mass distribution of free LLINs to all population groups nationwide by using the logistic capacity of the Rwanda National Police, who transported LLINs from the central level to the health centers. Surveys were conducted by CHWs to quantify LLIN need by household. Rwanda is planning a universal coverage campaign in late 2012/early 2013. The UC campaign will target all households to replace the expired nets from the 2010/2011 UC campaign. PMI Rwanda supports LLINs for routine distribution through ANC/EPI channels.

Challenges, opportunities, and threats

In 2011, the HMIS showed unprecedented reductions in malaria morbidity and mortality with concomitant increases in LLINs. The challenge now is to maintain universal

coverage through routine distribution to new cohorts of children and pregnant women and periodic mass campaigns, and will require adequate financing, forecasting, monitoring, and distribution. The MOPDD also has to ensure proper and consistent use of LLINs in the context of reduced malaria burden and possible reduced perception of risk.

Since Rwanda is one of the first to achieve universal coverage, it has the opportunity to document best practices and lessons learned on how universal coverage was achieved and maintained. Rwanda also has the opportunity to measure the impact of universal LLIN coverage on the population (preliminary results show unprecedented reductions in malaria cases during the universal coverage mass campaign year). In three years, Rwanda will also have the opportunity to explore, through the universal coverage replacement mass campaign, whether LLIN disposal/recycling is an issue or whether people are reusing LLINs safely and effectively. Many of these issues are being discussed at the international level and Rwanda will be able to provide data and insight into these complex problems.

The major threat facing malaria control and LLINs, in particular, is the emergence of pyrethroid resistance. At the moment, LLINs may be impregnated only with pyrethroids, notably permethrin and deltamethrin. Data analysis indicates that pyrethroid resistance has not dropped below the 80% threshold, although delayed knock-down, varying mortality, and high percentage of *kdr* positives indicate emerging resistance. Further studies are required to determine resistance at different concentrations and mechanism(s) of resistance. Preliminary results of the longitudinal net durability study have also shown that LLINs in the field lose insecticide efficacy and develop holes by approximately 18 months, which is significantly different from the 3-5 year duration given by the manufacturers.

Progress during the last 12 months

PMI procured and distributed a total of 1,000,500 LLINs with FY 2011 funding targeting routine distribution channels. PMI had planned to procure 500,500 LLINs to maintain universal coverage through routine distribution and provide LLINs for the last year of the net durability study. However, PMI received an emergency order at the request of the Minister of Health to fill a gap of 500,000 LLINs resulting from delays in Global Fund LLIN procurement. PMI utilized the emergency procurement fund and accessed existing pipeline from FY 2011 (generated from cost savings from previous procurements) to fill the emergency order, which is planned to arrive in September 2012. PMI also continued to strengthen the LLIN supply chain management system by supporting the logistics advisor in the MOPDD, who assists with planning, forecasting, and tracking LLINs (as well as other malaria commodities).

With the decreasing malaria burden and subsequent decreased perception of risk, PMI supports district- and community-level integrated BCC activities to continue correct and consistent use of LLINs. The MOPDD and partners have developed a national integrated BCC strategy for malaria control interventions, which includes the promotion of correct LLIN use. The PMI and the MOPDD work with local NGOs and Rwandan partner organizations, as well as the 45,000 CHWs nationwide, to carry out intensive interpersonal communication sessions, community mobilization, and sensitization

following household LLIN distributions. The CHWs also conduct LLIN enumeration and support an LLIN database at the MOPDD which is used to coordinate the maintenance of universal coverage and respond to increases in malaria cases.

Finally, PMI continues to provide technical assistance and support to the MOPDD to strengthen surveillance of LLIN insecticidal loss and physical deterioration and to monitor durability and longevity. PMI has supported a three-year longitudinal study that will end in 2013; the study has tracked 3,000 LLINs (1,500 polyester and 1,500 polyethylene) in six different villages since December 2010. In terms of LLIN retention, 10% of the LLINs were missing one month after the distribution; after 12 months, 18% were unaccounted for, which could reflect both LLIN movement as well as LLIN loss. Results from WHO bioassay showed insecticide remained effective at 12 months (84% mosquito mortality); colorimetric field testing of surface insecticide shows 50-80% depletion at six months with no change at 12 months. Nets are deemed ineffective when colorimetric field testing shows greater than 90% depletion. Durability was tested using the standardized proportional hole index and while fewer than 10% of LLINs failed at six months, 32% failed at 12 months. Indices showed site variation, with one site in particular showing 50% failure within six months. Results of this study will be analyzed with other net durability studies being conducted throughout PMI countries, and updated recommendations and a new strategy will be developed.

LLIN gap analysis for LLINs 2010/2011 – 2014/2015

The MOPDD follows the Roll Back Malaria Harmonization Working Group recommendations for LLIN procurement planning to achieve 100% coverage (or a procurement ratio adjusted for rounding of 1.8 persons per net). In order to keep up and maintain coverage levels, the MOPDD calculates a projected LLIN rate of loss since distribution, at 8% for year one (0-12 months), 20% for year two (13-24 months), and 50% for year three (25-36 months) based on Roll Back Malaria Technical Working Group (RBM-TWG) recommendations. Findings from the Rwanda LLIN longevity and durability study corroborate these estimates. To maintain high coverage levels and protect against a similar upsurge in malaria cases as was seen in 2009, the MOPDD's policy is to replace old, expired LLINs every three years through mass campaigns and to keep high net coverage levels by targeting high-risk vulnerable and new populations with new delivery channels. Other potential channels to vulnerable groups include orphanages, boarding schools, and in-patients at hospitals. The policy accounts for LLIN losses not only in households but also for newborns and pregnant women. The following table is an estimated projection of LLIN needs and gaps over the next four years (2012-15). As can be seen in the table below, the MOPDD anticipates a gap of 1.6 million LLINs in 2013/2014.

LLIN target groups and delivery channels	2009/2010	2010/2011	2011/2012	2013/2014	2014/2015	2015
Population[1]	10,745,236	11,073,944	11,414,031	11,764,863	12,125,840	12,365,180
Infants/newborns reached through health facility EPI services (4%)	429,809*	442,957	456,561	470,594*	485,033	494,607
Pregnant women reached through health facility ANC (2%)	214,905*	221,480	228,281	235,297*	242,517	247,303
Household universal campaign (1.8 LLINs per 2 people)	5,969,576			6,536,035		
RBM-TWG guidance[1]	477,566	1,193,915	2,984,788	522,882	1,307,207	3,268,018
Total LLIN requirements	**5,969,576**	**1,858,352**	**3,669,630**	**6,536,035**	**2,034,757**	**4,009,928**
Planned LLIN Contributions						
Source	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
PMI support	1,169,000		1,000,500			
Global Fund Round 8	4,816,950		767,793	4,934,442	798,687	
UNICEF			140,000			
Total LLINs	5,985,950		1,908,293	4,934,442	798,687	
Total Estimated Gap	**-16,374**		**1,761,337**	**1,601,593**	**1,236,070**	

[1]National Institute of Statistics of Rwanda, National Population Projection 2007-2022, July 2009.
[2]Loss rates of nets are calculated at 8% for Year 1, 20% for Year 2, and 50% for Year 3 since distribution of the 6.4 million LLINs in 2011 (per RBM-TWG recommendations).
[3]Replacement of net needs are calculated at 1 net for every 2 people or a ratio of 1.8 persons per net (per RBM-TWG recommendations). Total population estimated in 2013/2014 is 11.8 million.

Plans and justification

PMI will support the maintenance of universal coverage with the procurement and distribution of LLINs, support for the three-year longitudinal net durability study, and support for BCC campaigns to dispel misperceptions of malaria risk and promote usage. PMI will procure one million LLINs with FY 2013 funds (described below) to contribute to maintaining universal coverage and to address LLIN gaps/needs in 2013 and 2014, including reaching targeted vulnerable populations through specific delivery channels. Global Fund Round 8 Phase 2 support will cover procurement of an estimated 4.9 million LLINs in 2013 to replace the 6.1 million distributed in 2011 and to maintain universal coverage. However, there is a gap of approximately 1.6 million LLINs in 2013/2014. PMI will work with the MOPDD to coordinate and identify additional LLINs from other funding sources (DfID, UNICEF) to help fill this gap.

Proposed activities with FY 2013 funding ($7,115,000)

PMI will support the MOPDD's efforts to maintain universal LLIN coverage by procuring and distributing LLINs for distribution through routine and new delivery channels targeting vulnerable populations. PMI will continue to support strengthening of the supply chain management and distribution systems and explore opportunities for building longer-term capacity in the MOPDD and at district level (described under Supply Chain). Support will include focused BCC efforts at national and community levels to promote correct and consistent usage (described under BCC). Specific activities include:

- *Procure and distribute one million LLINs*: Support the procurement and distribution of free LLINs through routine distribution channels targeting first-time pregnant women and newborns. Other potential channels to vulnerable groups include orphanages, boarding schools, and in-patients at hospitals depending on the MOPDD's strategy. PMI has identified biodegradable packaging options with partners and net manufactures which will not require repackaging. *($6,000,000)*

- *Manage and distribute one million LLINs*: MPDD charges a 9% management and distribution fee for commodities procured with USG funds. The MPDD will transport the LLINs to the district warehouse; however, MPDD is not capable of transport to health centers. *($540,000)*

- Distribute one million LLINs from district warehouses to health centers: An additional $0.35 per LLIN is included to provide transportation from district warehouses to health centers for routine distribution to children and pregnant women. *($350,000)*

- *Technical assistance for LLINs*: With the achievement of universal coverage, Rwanda has questions about how to best maintain universal coverage and dispose/recycle nets once they fail. Technical assistance will be provided to assist Rwanda with such issues. *($25,000)*

- *Community mobilization and health communications for LLIN use:* PMI will support the MOPDD's efforts to work with CHWs and established local NGOs to carry out interpersonal communication sessions, community mobilization and sensitization across all malaria interventions. *($200,000)*

2. Malaria in Pregnancy

Malaria is a serious health risk for the pregnant woman, the fetus, and ultimately the newborn and infant. WHO recommends a three-pronged approach for MIP in high transmission areas: at least two doses of intermittent preventative treatment in pregnant women (IPTp) with sulfadoxine-pyrimethamine (SP), the use of LLINs, and case management for acute malarial illnesses and anemia. Rwanda discontinued intermittent

preventive treatment of pregnant women with sulfadoxine-pyrimethamine (SP) (IPTp with SP) in 2008 because of evidence of high therapeutic failure of SP in 6- to 59-month olds, and an unpublished study which showed no added benefit of IPTp with SP compared to placebo.

MOPDD/PMI objectives

An LLIN is provided to every pregnant woman on her first visit to an antenatal care (ANC) clinic. Effective case management of pregnant women with fever occurs after parasitological diagnosis by microscopy or RDTs.

With PMI support, the MOH Maternal Child Health (MCH) Desk has coordinated with the MOPDD, the Community Health Desk (CHD), and EPI to integrate and strengthen program implementation. The services provided by these units, in addition to fetal growth monitoring and birth preparation, comprise the focused antenatal care (FANC) package, which is implemented nationwide. FANC ensures the use of preventive measures, while monitoring for danger signs of possible pregnancy complications and providing a delivery plan.

Challenges, opportunities, and threats

A rapid assessment of malaria in pregnancy conducted in 2008 showed a low burden overall, with higher burden in several districts. In consultation with the MOPDD, PMI, and partners, a new malaria in pregnancy approach has been developed that includes intermittent screen and treat (IST), in addition to LLINs and effective case management to reduce the burden of malaria in pregnancy in Rwanda. The IST approach has been proven effective in similar malaria settings yet its effectiveness will be monitored and evaluated in Rwanda.

Progress during the last 12 months

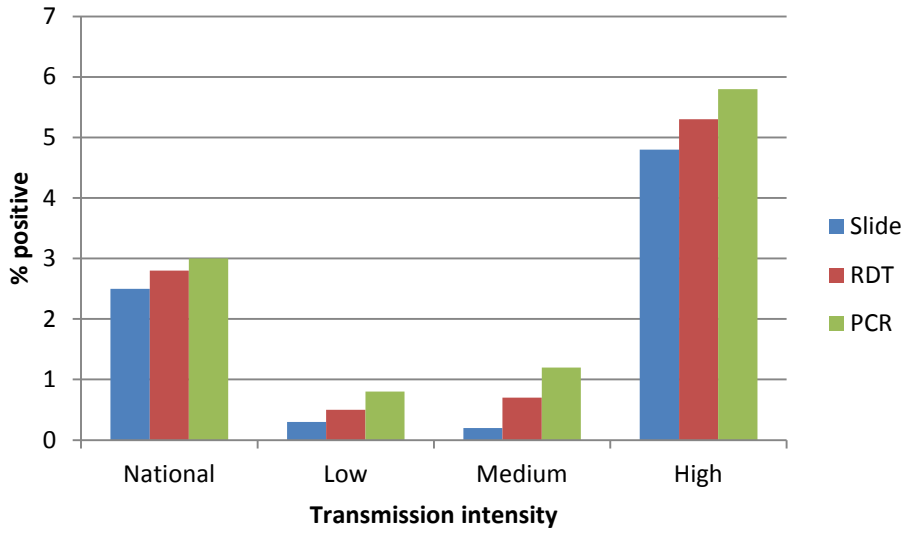
The MoH, with the support of partners including PMI, has worked to improve the quality of FANC services at health facilities through training and capacity-building efforts at national and district levels. PMI-supported integrated FANC training in 12 of 30 districts resulted in training of 17 supervisors, 17 trainers of trainers, and approximately 266 providers in district hospitals and health centers. The malaria in pregnancy burden study trained 67 providers and 6 trainers of trainers in intermittent screen and treat, case management, and the rapid assessment protocol. PMI has also supported trainings and procurements to scale up and strengthen the role of ASMs in malaria in pregnancy by procuring a one-year supply of iron/folate and mebendazole for ASMs and training 29 ASM supervisors in six of 30 districts.

In collaboration with PEPFAR, PMI also assisted the MOH to develop and review training materials for strengthening integrated ANC services including FANC, prevention of mother-to-child transmission (PMTCT) of HIV, nutrition education, promotion of breast-feeding, and family planning.

Rapid assessment of the burden of malaria in pregnancy

The study of the burden of malaria in pregnancy was conducted in six sites with varying malaria endemicity and targeted both primigravidae and multigravidae at their first ANC visit. Peripheral malaria burden was measured with microscopy, RDTs, and PCR. Pregnant women were also asked about LLIN ownership and use. Preliminary survey results show that malaria prevalence in pregnant women by microscopy was 2.5% at national level; it was 4.8%, 0.2% and 0.3% in high, moderate and low transmission districts respectively. The figure below illustrates the regional variability of prevalence by test and gravidity. Based on the low burden and regional variation, MOPDD has developed a new MIP strategy which includes intermittent screening with RDTs and treatment at the health center to occur during ANC visits. The IST approach will be implemented in three high-burden malaria districts.

Figure 6. Preliminary results of 2011-12 assessment of the peripheral malaria burden in pregnancy



Plans and justification

Results of the rapid malaria in pregnancy assessment showed a low nationwide malaria prevalence of 2.5% in pregnant women, which supports the significant decline in malaria cases observed over the last years. However, the study highlighted a higher burden of malaria (4.8% by microscopy) in pregnant women in malaria districts with higher levels of transmission, which exacerbates birth and maternal outcomes. In order to reduce this burden, the MOPDD, PMI, and partners would like to implement and scale-up IST with RDTs during ANC visits. The MOPDD will implement IST in three high malaria burden districts and monitor and evaluate impact of this novel approach in reducing the burden of MIP in Rwanda. Nationwide, Rwanda will continue to distribute LLINs to women pregnant for the first time at their first ANC visit, implement FANC to ensure quality care, and engage and mobilize ASMs to encourage early and frequent ANC attendance to promote a healthy delivery.

Proposed activities with FY 2013 funding ($200,000)

Based on the data obtained from the malaria in pregnancy assessment and data showing decreased malaria prevalence, PMI will support the implementation of a new national strategy for the prevention and treatment of malaria in pregnancy. PMI will continue to support collaboration with the MCH desk and the MOPDD in the training, supervision and implementation of the community outreach approach and focus on links between ASMs and health facilities to ensure that pregnant women receive and use LLINs correctly and consistently, attend ANC early and regularly, and receive prompt treatment for malaria.

- *Implementation of malaria in pregnancy interventions at community, district and national levels*: PMI will implement IST in three high burden districts. PMI will continue to support MCH and malaria in pregnancy interventions by providing technical assistance for MIP strategy development and coordination for implementation of the strategy at the national level and resources for trainings as needed at the district level. PMI, in coordination with USG MCH programs and the MOH, will also continue to facilitate supervision of ASMs by health center supervisors, contribute to the training of the ASMs including the printing of training materials and routine data collection tools, evaluate performance of community outreach to pregnant women, and strengthen linkage between ASMs and health facilities to promote LLIN use and ANC attendance by pregnant women. *($200,000)*

3. Case Management

Malaria Diagnosis

MOPDD/PMI objectives

Rwanda's national malaria treatment policy states that all cases of presumed malaria should be laboratory confirmed with either microscopy or rapid diagnostic tests (RDTs) prior to treatment with an artemisinin-based combination therapy (ACT). The policy applies to all age groups and health facilities, communities, and the private sector. The diagnostic policy limits the role of RDTs in health facilities to use in emergency situations and at times laboratory technicians are not available. At the community level, RDTs are used exclusively by CHWs for laboratory confirmation of malaria cases.

Progress during the last 12 months

Rwanda has made remarkable progress in ensuring appropriate malaria diagnosis before treatment with ACTs. Indeed, with PMI and Global Fund support, Rwanda has achieved 99% laboratory confirmation of malaria cases in 2011, according to HMIS data. In 2012, PMI procured 500,000 RDTs and safety boxes for needle disposal for use in communities as well as 200 microscopes and supplies for use in health facilities; all of these commodities had arrived in country by April 2012. In addition, PMI has supported the

training of 693 CHWs in malaria case management and diagnostics (RDTs) thus far in 2012. For internal QA/QC, malaria blood slides from 40 district hospitals and 17 health center laboratories are randomly selected each quarter (8 positive slides and 7 negative slides) for verification by the National Reference Laboratory (NRL). In 2010-2011, the total discordance was 4.25%. Supervision was organized by the National Reference Laboratory (NRL) to district hospital laboratory staff in affected health facilities including Kibilizi, Nyanza, Kirehe, Nyagatare, Munini, Mibilizi and Rwamagana Hospitals. For external QA/QC, ten proficiency testing panels (malaria slides for microscopy) were supplied in July and October 2010 and March 2011 by WHO/NICD; all three panels yielded acceptable scores of 80%, 80%, and 97.5%; an acceptable score is 75% and above.

Challenges, opportunities, and threats

Despite Rwanda's remarkable progress in ensuring appropriate malaria diagnosis before treatment with ACTs, the management of severe malaria cases at district hospitals is not always in accordance with national guidelines, According to a recent health facility survey, the reasons for non-compliance with the national guidelines included ignorance of the national treatment policy, lack of training, and absence of treatment algorithms. Also, communication between the NRL and the MOPDD needs to be streamlined in order to improve planning, implementation and reporting/feedback of laboratory QA/QC activities. The strong government commitment and support represents an opportunity for overcoming these weaknesses.

Gap analysis for malaria rapid diagnostic tests 2010/2011 – 2014/2015

The RDTs gap analysis below shows that Rwanda will have a gap of 1.2 million RDTs in 2013/2014 after accounting for Global Fund contributions. PMI will work with other partners to cover the RDT gap.

	2010/2011 (baseline)	2011/2012	2012/2013	2013/2014	2014/2015
Population	10,745,236	11,033,141	11,355,940	11,686,013	12,022,635
Needs in RDTs		1,650,559	2,056,930	2,097,980	1,807,344
Funding partners					
PMI			500,000		
GF			1,006,316	869,827	
Final gap			550,614	1,228,153	

Plans and justification

PMI considers accurate diagnostic capacity a critical component of malaria case management particularly in the context of Rwanda's rapidly decreasing malaria transmission and changing epidemiology. Given that PMI has procured more microscopes than anticipated in 2012 and has budgeted another $150,000 for microscopes in the FY 2012 MOP, it was agreed not to procure any more microscopes with FY 2013 funds. Instead, PMI will procure lab consumables, including immersion oil and slides. Also, PMI will increase its contribution towards RDTs in 2013/2014 to offset the gap left by the ending of the current Global Fund grants in June 2014. PMI support for the quality control of microscopy and RDTs will be provided directly to the district hospitals and health centers.

Proposed activities with FY 2013 funding ($999,515)

- *Procure approximately 1,162,000 RDTs and 50,000 safety boxes:* PMI has been supporting procurement of RDTs for use by CHWs in communities. With the ending of the current Global Fund grants in June 2014, PMI will increase its contribution for RDTs and safety boxes to cover the gap. *($799,515)*

- *Procure laboratory diagnostic commodities:* PMI will procure laboratory supplies such as immersion oil, slides, and stain, as determined by a coordinated quantification by the MOPDD and the target districts and other partners. With the end of the current Global Fund grants in June 2014, PMI's contribution toward lab supplies for malaria microscopy will be crucial. *($100,000)*

- *Strengthen malaria laboratory diagnostics in health facilities*: PMI will continue to strengthen malaria diagnostics by supporting an integrated and decentralized national quality control system for microscopy at health facilities and providing continued training for malaria diagnostics including RDTs. PMI contributions (in conjunction with support from PEPFAR) will reinforce training at health facility level. Training needs will be ascertained through the quality control system. *($100,000)*

Malaria Treatment at Health Facilities

MOPDD/PMI objectives

As of October 2006, all health facilities officially transitioned from amodiaquine-SP to artemether-lumefantrine (AL) as the first-line treatment for uncomplicated malaria. Treatments are provided at a highly subsidized price at health facilities ($0.44). Oral quinine is the second-line treatment for cases of uncomplicated malaria and when AL is contraindicated, such as in children weighing less than 5 kilograms and pregnant women in their first trimester. In 2011, Rwanda changed its treatment policy for severe malaria from parenteral quinine to parenteral artesunate as the first-line treatment for severe malaria. However, quinine and parenteral artemether remain as alternative treatments for

severe malaria. The rollout of this new policy is expected to begin in October 2012 when the PMI-funded shipment of parenteral artesunate reaches the country.

Progress during the last 12 months

Antimalarials for health facilities continue to be covered under Global Fund grants. In 2011, PMI supported the implementation of facility-level Integrated Management of Childhood Illness (IMCI) through training of 187 health providers in eight districts. In collaboration with the Global Fund, an assessment of severe malaria and malaria deaths in patients admitted to 40 district hospitals was carried out. It is expected that the results of the assessment will provide recommendations on what needs to be improved in the management of severe malaria cases. In 2012, PMI continued support to IMCI through training of 90 health care providers and refresher training of 316 others in the same eight districts. Additional support included revision of training guides, IMCI chart booklets, and development of new registers. Also, through participation in an ongoing data audit being conducted by the GOR, PMI is supporting a countrywide health facility survey that includes data collection on aspects of malaria case management at the facility level. Finally, PMI is procuring the first consignment of 40,000 vials of parenteral artesunate for the treatment of severe malaria. This shipment is expected to reach the country in October 2012.

Challenges, opportunities, and threats

There are well-defined roles for each level of the health system. Malaria activities are integrated with the broader health system. Other strengths include availability of policies and guidelines for case management; availability of drugs and other commodities; and a well-functioning referral system for malaria cases. In spite of this, case management of severe malaria at district hospitals is not always in accordance with the national guidelines (some cases are treated before being confirmed). Also, the relatively high staff turnover and high population movement between Rwanda and neighboring countries represent challenges to the success of Rwanda's MOPDD.

Gap analysis for ACTs 2010/2011 – 2014/2015

The ACTs gap analysis below shows that Rwanda will have a gap of approximately 30,000 ACT treatments in 2013/2014 after accounting for Global Fund contributions.

	2010/2011 (baseline)	2011/2012	2012/2013	2013/2014	2014/2015
# of malaria cases		933,513	800,573	671,144	482,647
ACTs needs (buffer stock included)		1,042,422	909,483	780,054	534,747
Funding partners					
GF			913,713	750,104	
PMI			0		
Final gap			-4,230	29,950	

Plans and justification

PMI will continue to support prompt and effective case management of malaria through provision of ACTs for use by CHWs and parenteral artesunate for the treatment of severe malaria in health facilities. This contribution will help fill the gap left by the Global Fund in these commodities in 2014/2015.

Proposed Activities with FY 2013 funding ($344,509)

- *Procure malaria drugs:* PMI will procure 30,000 ACT treatments, and 62,406 treatments of parenteral artesunate for severe malaria, to address the gap left by Global Fund in 2013/2014. *($194,509)*

- Support therapeutic drug testing: Support drug efficacy testing for ACT resistance. *($150,000)*

Malaria Treatment in the Community

MOPDD/PMI objectives

Building on the home-based management of fever (HBMF) model, initiated in 2004, the MOH Community Health Desk (CHD) has introduced and consolidated the iCCM package to include pneumonia, diarrhea, and other components (nutrition, family planning, hygiene, palliative care). The iCCM package is being implemented by 30,000 CHWs throughout the country's 30 districts. RDTs were introduced into the iCCM package nationwide, and all districts are now implementing the full iCCM package. PMI

Rwanda has been supporting iCCM in seven districts and has also supported the MOPDD by repackaging ACTs for the community sector with pictorial dosing information.

Progress during the last 12 months

The MOH has made significant progress in scaling up iCCM countrywide. All seven districts in which PMI has supported home-based management of malaria have completed the conversion to iCCM. In 2011, PMI supported training of 3,700 CHWs, refresher training of 2,183 CHWs, orientation of 212 supervisors, and training of 203 trainers in seven districts, CHW supervisors in 10 districts, as well as development of iCCM supervision tools. So far in 2012, 693 CHWs have been trained and 5,935 children have been treated by CHWs in seven districts. Of these children, 3,821 were tested for malaria using RDTs and 390 children were treated for uncomplicated malaria using ACTs. PMI has also supported acquisition of a large quantity of CHW kits, including wooden boxes, jerry cans, thermometers, timers; job aids etc. which are expected to last for more than three years in PMI-supported districts. PMI also continued to support repackaging of ACTs for use by CHWs.

Challenges, opportunities, and threats

Rwanda has a well-established community-based health system for the management of malaria, diarrhea, and pneumonia. Financing of the community-based health care is provided through the community insurance scheme, small fees collected for medications, and community performance-based financing. Rwanda has successfully scaled up the use of RDTs by CHWs; however, the pharmaceutical management system at community level is not yet well established. Also, there is no pre-referral treatment policy for severe malaria in the community, allegedly because the use of rectal suppositories would not be well accepted by communities. A new USAID bilateral partner with PMI funding is improving the drug management system at community level as well as assessing the acceptability of pre-referral treatment of severe malaria in the community with rectal suppositories in children under five years old.

Plans and justification

PMI will continue to support prompt and effective case management of malaria with a specific focus on the community. The MOPDD has indicated that it has secured funds for the repackaging of ACTs to be used by CHWs, so this will not be funded through FY 2013 MOP.

Proposed activities with FY 2013 funding ($2,419,912)

- *Support for integrated community case management implementation*: PMI will continue to support implementation of the iCCM package and will expand from the current 7-supported districts to 12 districts. The support will include original and refresher trainings at district levels, supportive supervision, training in appropriate RDT use, evaluating CHW performance with RDTs, monitoring

activities, and provision of CHW materials and supplies. PMI will support CHWs to provide appropriate health communications messages to encourage understanding and adherence to the current treatment algorithms. PMI will continue to support the CHD to coordinate all community health implementing partners and to ensure that community health materials (e.g., training modules, job aids, motivation/incentive packages, per diem supervision protocols, and key messages) are reviewed and standardized across partners. PMI, with leveraged funds from other USG MCH programs, will support the complete package of iCCM interventions, which includes malaria, pneumonia, diarrhea, malnutrition, and family planning, in currently supported districts or other districts depending on priorities of the MOH. Costs for iCCM implementation were calculated by reviewing partner expenditure data (showing cost per CHW of $205.78/year) and multiplying by the average number of CHWs per district (844 CHWs). *($2,000,000)*

- *Technical assistance for iCCM implementation*: Although PMI will support iCCM implementation in 12 districts, general technical assistance for iCCM implementation will be provided nationwide including strengthening supervision, quality control of diagnostics, and M&E. *($310,450)*

- Storage and distribution of iCCM commodities: This amount represents MPDD's charge for storage and distribution of iCCM commodities (*1,162,000* RDTs and 50,000 safety boxes for iCCM). *($71,956)*

- Storage, management, and delivery by MPDD of 30,000 AL treatments and 62,406 treatments of injectable artesunate. *($17,506)*

- *Procure approximately 1,162,000 RDTs and other supplies:* PMI will procure approximately *1,162,000* RDTs as a contribution towards narrowing the gap left at the end of the Global Fund grant. In addition, PMI will procure safety boxes for RDT disposal for CHWs in PMI-supported districts. (Funds for this are included under the Case Management/Diagnosis section.)

- *Support for Third-year Peace Corps Volunteer (PCV):* As part of the ongoing collaboration with Peace Corps, PMI will continue support to two third-year PCVs for placement with the iCCM implementing partner. The PCVs will live in Kigali and work out of the implementing partner's office with regular (at least once a week) site visits to multiple communities within one district. Their responsibilities will include mentoring and supporting CHWs and their supervisors in each of three to five communities in one district. This will allow cross-fertilization across communities of ideas, best practices, and lessons learned. Other duties may include piloting new interventions or systems; compiling and disseminating lessons learned and best practices to the central level; and working closely with health center supervisors in ongoing trainings, routine supervision visits, quality assurance of diagnostics, case management, reporting, stock management, behavior change communication and monthly

meetings. Technical supervision will be provided by a PMI Resident Advisor and the implementing partner's technical advisor for iCCM. In addition, the PCVs will be responsible for providing technical support to health PCVs in Rwanda. Costs are included in the overall budget for iCCM implementation and include housing, a computer, workspace in the central office, local travel and a phone. *($20,000)*

Drug Supply and Pharmaceutical Management

Objective

The objective of the MOPDD is to ensure that malaria commodities are procured through the Coordinated Procurement and Distribution System (CPDS) and are fully supported by the LMIS so that commodities are available at all levels of the supply chain.

Progress during the last 12 months

In the past 12 months, PMI supported several specific technical areas within the drug supply chain. PMI has assisted in the development of new standard operating procedures for the supply chain of all products, including malaria commodities, through support of a harmonized LMIS and the support of a logistics advisor for two years who sits at the MOPDD and supports other partners. The LMIS system will assist MOPDD to quantify and procure the appropriate amounts of commodities, leading to a leaner supply chain and overall cost savings. Together with PEPFAR, PMI supported an assessment of the supply chain in August 2011 to ensure successful implementation of the new LMIS and measure product availability at the facility and district pharmacy level for a variety of products, including those for malaria. This assessment showed challenges in distributing commodities from the district to the health center. PMI supported the strengthening of antimalarial drug availability and management at the community level. Refresher trainings that included drug management were conducted for CHWs. The CHD, with support from PMI and other partners, provided stock cards for CHW stock management and supplied job aids on rational medicine use and medicine management.

PMI coordinated with PEPFAR to provide technical assistance to the Pharmacy Task Force to build MOH capacity to establish pharmaceutical policies and rational drug use. Finally, PMI supported the establishment of regulation and drug quality control, a pharmacovigilance system, and a national adverse drug effect reporting system that employs a passive reporting system. Because these activities have been jointly supported, PMI plays only a minor role, but starting fiscal year 2012, they will be solely funded by the Global Fund.

Challenges, opportunities, and threats

Rwanda's experience in managing, storing, and distributing commodities is enhanced by national policies and guidelines regarding commodities and availability of training in this area. With its new Logistics Management Office, the country should be well-positioned

to begin the transition to assuming management of increasingly greater proportions of antimalarial drugs (and LLINs, if they belong in this category as well) and to address challenges of drug stock-outs at the health center level.

Plans and justification

PMI plans to support MPDD through an implementing partner for the procurement and distribution of commodities.

PMI will no longer provide technical assistance to the Pharmacy Task Force.

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

- Strengthen pharmaceutical management and supply chain at the national and district levels with the support of a seconded logistician and technical assistance for coordinated procurement and distribution of malaria commodities. *($300,000)*

- Management and distribution of LLINs: *funds included in the LLIN section*.

- Storage and distribution of iCCM commodities*: funds included in the Case Management section*

- Storage, management, and delivery by MPDD of 30,000 AL treatments and 62,406 treatments of injectable artesunate *(funds included in the Case Management section)*

4. MONITORING AND EVALUATION

MOPDD/PMI objectives

In 2011, Rwanda experienced unprecedented reductions in malaria morbidity and mortality in association with achieving universal LLIN coverage, IRS in five high malaria burden districts, and iCCM with RDTs and ACTs. Based on these decreasing trends, Rwanda has focused on the goal of achieving pre-elimination (nationwide SPR<5%) by 2017, elucidated in the 2013-2017 Malaria Strategic Plan.

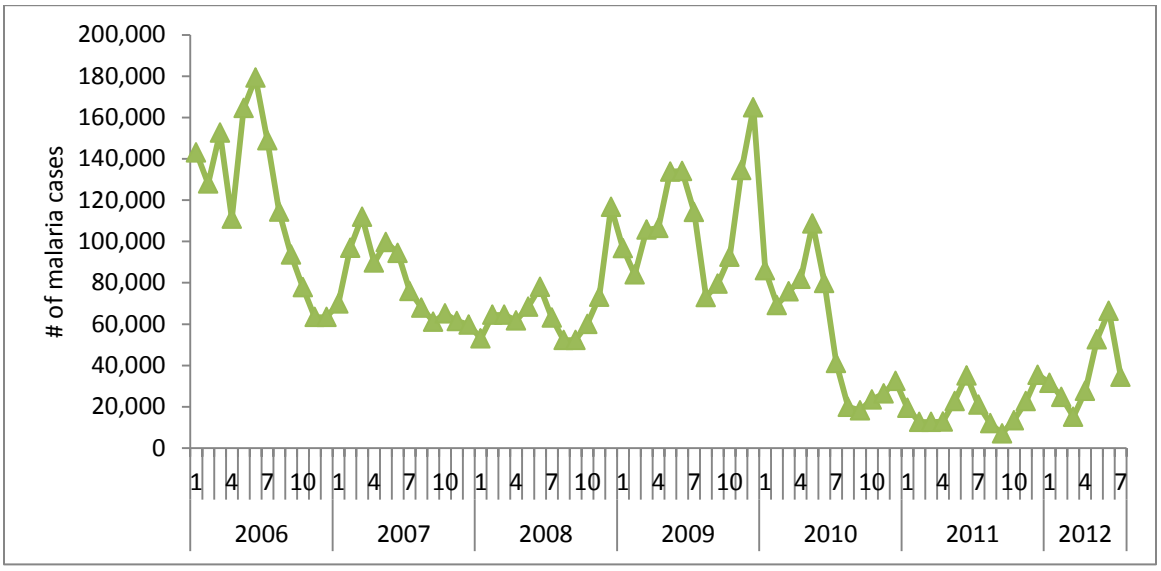
Rwanda is a data-rich environment and the MOPDD, districts, and health centers are increasingly basing decisions on real-time data to refine malaria control interventions. Recommendations from the Malaria Program Review highlighted the need to use quality surveillance data to better understand the changing malaria epidemiology in Rwanda and strategically target malaria control interventions to respond effectively. Malaria trends are showing a shifting epidemiology in Rwanda and the MOPDD and partners need to adapt to these changes to ensure effective interventions and impact.

Health facilities report routine data on malaria cases through the HMIS, and CHWs report through SIS-COM (*mUbmizima*), both of which are vital for tracking malaria trends. Currently, there are no linkages between the two systems. Reporting is enhanced through

performance-based financing and over 90% of health centers and CHWs report complete and timely data. Integrated data quality audits are conducted quarterly through the MoH, and reporting systems include automated logic and cross-checks to ensure data quality. Following malaria trends in Rwanda is confounded by numerous changes, including implementation of new reporting systems, increased health care utilization with the adoption of health insurance schemes (*mutuelles*), case definition changes, and the rapidly increasing proportion of cases treated in the community with the scale up of iCCM. However, decreasing malaria trends have been corroborated through HMIS, SIS-COM, and MIS and DHS results.

The fragile nature of malaria control has been evidenced by upsurges in malaria cases occurring in late 2009/early 2010 and in late 2011/2012 (data for the first five months of 2012 are not yet official and are not included in the figure below). These experiences reinforce the need to generate quality data and evidence-based programmatic decision making. With the transition to DHIS2, the MoH has moved to web-based dashboards to allow timely analysis of the data both at the central and district levels. Guidelines for system access and data use are being finalized.

Figure 7. Rwanda Out-Patient Department Malaria Cases (presumed and confirmed) 2006–2012



Progress during last 12 months

Substantial progress has been made in monitoring and evaluation, as seen by improvements in the HMIS, SIS-com, a completed 2010 DHS, and entomological monitoring. PMI continued to strengthen the HMIS Unit through its support for the MOH M&E unit and staff at the MOPDD. A server has been installed which links to the HMIS database to allow for direct access for the MOPDD to routinely track HMIS data. Approved MOPDD users, which includes PMI, can access the web-based HMIS platform and analyze the data. The MOPDD, with PMI support, conducted quarterly data quality

assessments of reported malaria cases and found high concurrence between HMIS records and health facility registers. Based on results from the Malaria Program Review and the changing epidemiology of malaria, the MOPDD prioritized epidemic surveillance and response and enhanced surveillance from sentinel sites and CHW real-time cell phone reporting and subsequent case investigation and follow-up. PMI has also supported the MOPDD in mapping and stratifying the malaria burden and in developing new epidemic thresholds and standardized protocols for epidemic surveillance and response. PMI has also supported the development and finalization of the 2012-2017 Malaria Strategic Plan. The MOPDD and partners with PMI support are also in the process of documenting best practices in malaria control with a health system strengthening paradigm, impact evaluation, and Roll Back Malaria (RBM) Progress & Impact series.

Plans and justification

PMI will continue to support the MOPDD to strengthen evidenced-based decision making throughout the health system. Information systems have been developed and are working. The next step is to strengthen capacity in terms of personnel in M&E including maintaining quality, analysis, and data-based programmatic decision making. The GoR has prioritized decentralization and with decreasing malaria burden and transition from stable endemicity to unstable endemicity, the ability for the district to analyze and respond to upsurges in malaria is pivotal. PMI will support the MOPDD to strengthen decentralized M&E capacity and support Rwanda's goal of achieving pre-elimination by 2017.

Challenges, opportunities, and threats

Reorientation to pre-elimination needs to be included in an updated M&E plan, which focuses on M&E capacity strengthening at the district level. Districts will need to identify and respond rationally to upsurges in malaria to achieve and maintain pre-elimination status. This decentralization process has been prioritized by the MoH and offers the MOPDD and PMI an opportunity to build capacity and improve malaria control. As witnessed by recent trends, upsurges in malaria trends are unpredictable and the M&E system needs to maintain the quality and efficiency that has been achieved over time. Major threats, such as insecticide resistance and net failure, also need to be monitored to ensure that malaria prevention and case management remain effective to mitigate cyclic upsurges.

Proposed Activities with FY 2013 Funding ($550,000)

PMI will reinforce the capacity of the MOPDD to collect, analyze and use the data generated by the program for evidence-based decision making at all levels of the health information system including community, health centers and district hospitals, and the monitoring and evaluation unit at the MOPDD. PMI will continue to support routine information systems, disease and entomologic surveillance, and program evaluations.

- *Support WHO National Program Officer for Malaria:* PMI will support a WHO national program officer who will work with cross-border collaboration and

finalizing memorandums of understanding which coordinate border malaria control efforts between Rwanda and its malaria endemic neighbors. *($60,000)*

- *Community surveillance and case investigation in two epidemic-prone districts:* PMI will train CHWs on real-time mobile reporting of confirmed malaria cases in two epidemic-prone districts. PMI will also train district malaria staff in implementing case investigations with RDT testing of contacts and rationale epidemic response. Standardized protocols will be developed, implemented, and disseminated. *($100,000)*

- *Support for Field Epidemiology and Laboratory Training Program (FELTP) in malaria*: PMI will support capacity building within the Rwandan MOH by contributing to the FELTP, which is designed to train staff in applied epidemiology and public health laboratory management, while providing epidemiologic services to national and sub-national health care workers and supervisors. *($150,000)*

- *Support for epidemiologic investigation in the highest malaria burden district:* PMI will support an epidemiologic survey to investigate the origin of the malaria cases seen in health facilities in Nyagatare District and establish the role of local transmission versus imported malaria cases in the district. *($65,000)*

- *Support M&E capacity of the MOPDD with supervision, data quality audits, and dissemination*: PMI will support capacity building within the MOPDD by supporting supervision visits, quarterly data quality audits, and dissemination of best practices, M&E results, and impact at international conferences. *($75,000)*

- *M&E reporting systems in USAID/Rwanda*: PMI will contribute to a mission contract for harmonizing partner reporting systems and ensure USAID reporting requirements. The contractor will train implementing partners and collate quarterly data for mission and PMI annual reports. *($100,000)*

5. Behavior Change Communication (BCC)

MOPDD/PMI objectives

The National Behavior Change Communication Policy for the health sector aims at strengthening the implementation of overall development objectives in Rwanda, with specific focus on the health sector. The National Policy emphasizes enabling the population to make informed health behavior choices through providing appropriate information, with quality messages and methods, including use of media.

Progress during the last 12 months

Over the past 12 months, PMI supported BCC activities for malaria prevention and treatment in 14 administrative districts in Rwanda. In support of MOH's malaria targets

and priorities, PMI, through international and local partners, prioritized and targeted the 'poorest of the poor' and pregnant women. The interventions included a combination of BCC campaigns, trainings to effectively implement BCC campaigns, distance learning radio programs for CHWs, community radio spots, community sensitization (e.g., community dialogues, interpersonal communication and town hall meetings), and mobile video shows. Examples of some key BCC activities include PMI's support to the MOH's malaria campaign aimed at addressing barriers to malaria control, prevention and treatment and the use of radio for broad outreach with 16 talk shows and 500 radio spots, which aired on five local radio stations and focused on the benefits of IRS, precautions, and improving the acceptability of preventive methods like IRS. In order to strengthen iCCM, a distance learning radio program aimed at building the capacity of CHWs was broadcast twice a week on two popular radio stations, covering topics such as malaria causes, consequences, and prevention. All malaria BCC activities were intended to improve community ownership and facilitate empowerment for improved uptake and sustained behavior change.

The following results were achieved: 67,483 people were reached with malaria prevention messages; 611 community events were conducted on malaria prevention; 60,685 individuals were reached with prevention messages through community events; 1,253 interpersonal communication sessions were held; 25,562 individuals were reached with messages through IPC; and 3,706 people were trained in malaria prevention.

Challenges, opportunities, and threats

Rwanda's success in decreasing its malaria burden poses challenges as well as opportunities. If people are aware that malaria transmission has fallen to low levels, they may mistakenly believe that malaria is no longer a health problem in Rwanda. It, may become more difficult to capture their attention through mass media and interpersonal communication efforts and to convey convincingly their continued malaria risk. BCC which conveys the message that people must continue to adhere to malaria interventions (LLIN use, IRS, prompt diagnosis, and treatment) ensures that malaria transmission is kept at low levels.

Plans and justification

With FY 2013 funding, PMI will continue to support implementation of Rwanda's national health communication strategy. Behavior change communication activities will be focused on raising awareness of health workers, religious leaders, community health workers, community groups, and other malaria stakeholders on the importance of hanging and sleeping under bed nets and using other malaria commodities for prevention and treatment of malaria. A new bilateral project to plan and conduct BCC activities is expected to be awarded in early FY 2013.

Proposed activities with FY 2013 funding ($150,000)

- *Community integrated BCC*: PMI, in close collaboration with the MOPDD and Rwanda's Health Communications Center, will support national-level BCC activities as outlined in the integrated BCC strategy. Integrated health messaging will be used to promote continued use of LLINs despite declining malaria transmission; awareness and acceptance of IRS, especially in new districts; and prompt malaria diagnosis and treatment. *($150,000)*

- *Community mobilization and health communications for LLIN use and case management:* budgeted in the LLIN section.

6. Health Systems Strengthening, Capacity Building, and Transition

Health Systems Strengthening

Rwanda has devoted significant resources to strengthening its health system, leveraging resources from its national budget, the Global Fund, the USG, and other donors. With these resources, Rwanda has achieved worldwide recognition for its innovative health financing programs, such as performance-based financing and community-based health insurance. These programs, as well as current efforts to determine the costs of essential health services and to pilot a web-based system to track all resources in the health sector, are supported by USG and other development partners.

MOPDD/PMI objectives

Health systems that allow accessibility to quality affordable health services are critical, as is a strong disease surveillance system to monitor, detect, and respond to disease outbreaks (e.g., malaria and neglected tropical diseases).

Progress during the last 12 months

PMI, as part of broader USG efforts, supported capacity building of the national medical store to forecast, procure, store, and distribute health commodities and provided technical assistance to the coordinated procurement and distribution system for all health commodities. The support included the rollout of the harmonized LMIS nationwide. A team of 23 trainers and 6 supervisors conducted the rollout reaching 1,253 participants. PMI continued to support human resource needs at the Malaria Division and quality of laboratory services through the NRL. PMI supported a total of 17 supervisors to provide periodic supportive supervision and training in QC/QA for malaria diagnostics to selected laboratories around the country. PMI supported overall strengthening of M&E systems, including HMIS and community information systems. PMI supported trainings on M&E and data use for approximately 110 participants including district managers, supervisors, and an M&E officer. PMI also trained 40 M&E officers on the HMIS.

Capacity Building

The organizational relationships within the Ministry of Health have been restructured with consolidation of many public and private health entities into an overarching center, the Rwandan Biomedical Center. The Malaria and Other Parasitic Diseases Division, MOPDD, sits withinthe newly approved Rwandan Biomedical Center (RBC). The RBC encompasses malaria, HIV, TB, NRL, and the School of Public Health. , whose mandate covers not only all parasitic diseases but also neglected tropical diseases.

Progress during the last 12 months

PMI continued to support three seconded positions (housed at the MOPDD):

1) A logistics officer who started in 2010.
2) An IVM advisor who started in early 2011.
3) An epidemiologist in charge of updating ESR thresholds and responses who started in mid-2011.

Proposed activities with FY 2013 funding

One of these activities will be supported with FY2 013 funding; the other two have been supported for three years and will be transitioning to MoH support:

- *Strengthening commodity supply chain management for drugs and other commodities at the central level:* Reinforcing supply chain systems by supporting a logistics officer at the LMO to implement and monitor the new LMIS system for routine quantification, forecasting, and procurement. (Funding included in case management section)

Transition

The GOR has demonstrated not only a strong commitment at the highest levels of government to improving the health of its citizens but also an ability to manage successfully other direct donor funding from the World Bank, other bilateral donors, and the Global Fund. Given these efforts, over the next five years, a key focus on USG engagement with the GOR is to accelerate support for the sustainable transition of activities to national ownership. Consistent with the intent of OECD/DAC 2005 Paris Declaration on Aid Effectiveness, the 2008 Accra Agenda for Action, and the Busan 4th High Level Forum on Aid Effectiveness, PMI will promote host-country ownership, and invest in local capacity development. This transition is closely aligned with Rwanda's GHI Strategy, which integrates key administration priorities, such as PEPFAR, PMI, and Best Practices at Scale in the Home, Community and Facilities.

MOPDD/PMI objective

The MOPDD's objective in transitioning to direct government financing for activities is to improve efficiency and save costs in health service delivery.

Progress during the last 12 months

USAID/Rwanda conducted fiduciary risk assessments for different institutions including the Ministry of Health, MPDD, administrative districts, district hospitals and health centers. Risk mitigation strategies have been developed and are under negotiation with the relevant institutions. PMI activities for the initial transition to the GOR have been identified and discussed within the Mission and with the MOPDD.

Challenges, opportunities and threats

Rwanda's strong national commitment and capacity, along with goodwill and support from donors, make government-to-government transitioning of funds a desirable next step in collaborating to prevent and control malaria. Challenges in the areas of capacity and technical assistance will be met with continuing support in those areas.

Plans and justification

PMI, like other USG programs, is planning to provide direct support to the GOR to implement some malaria control and prevention activities starting with FY 2012 funds. The GOR has demonstrated strong commitment at the highest levels of government to improving the health of its citizens and the ability to manage successfully other direct donor funding from the World Bank and Global Fund. Rwanda is among the first countries in Africa that are progressing towards receiving direct funding from the USG. Direct financing will help to further build Rwanda's capacity to conduct its own activities and create a more sustainable program.

Proposed activities for FY 2013 for transition through G2G ($4,200,000) (funds already included in specific intervention sections)

- Indoor residual spraying ($1,300,000): Support to the GOR to directly implement IRS, targeting 150,000 houses, and to build capacity to enable decentralization of IRS activities
- Entomologic monitoring ($200,000): Support to conduct entomological monitoring in 12 sentinel sites.
- IVM ($60,000): Support an assessment of malaria vectors and their behavior in high burden districts.
- Implementation of IST ($200,000): Support the implementation of intermittent screening and treatment (IST) based on the MIP burden study supported by FY 2012 funds.
- Strengthen decentralized diagnostic capacity ($100,000): Support QA/QC for microscopy at HCs and DHs.
- Implementation of community case management ($2,000,000): Support implementation of iCCM in 12 districts.
- Support therapeutic drug testing ($150,000): Support drug efficacy testing for ACT resistance.
- Community surveillance in two epidemic-prone districts ($100,000): Support mobile reporting and case investigation for ESR in two districts.

- Support capacity building of the MOPDD for supervision, data quality assurance, and dissemination ($75,000): Support to MOPDD staff to attend trainings, conferences for capacity building.

7. Staffing and Administration

Three full-time malaria specialists have been hired to oversee PMI in Rwanda, within the context of an integrated strategic objective team. The core team includes two international specialists and one Rwandan physician. All are part of a single interagency team led by the USAID HPN officer who has been delegated that authority by the USAID Mission Director. The CDC Resident Advisor is supervised technically and administratively by CDC. Working alongside other Health Office activity managers, the team develops and implements PMI strategies and work plans, coordinates with national authorities, manages collaborating agencies, and supervises day-to-day activities. They also monitor and evaluate outcomes and impact and manage the reporting of results. PMI specialists coordinate closely with the MOH/MOPDD and other national and international partners, including the WHO, UNICEF, the Global Fund, World Bank and the private sector.

All staff supporting PMI activities either in Ministries or in USAID will be approved by the USAID Mission Director. Because of the need to adhere to specific country policies and USG foreign assistance regulations, any transfer of PMI funds directly to Ministries or host governments will need to be approved by the USAID Mission Director and Controller. ($726,064)

ANNEX

Table 1. President's Malaria Initiative - *Rwanda* (FY 2013) Budget Breakdown by Partner				
Partner	**Geographical Area**	**Activity**	**Budget ($)**	**%**
IRS IQC 2 Task Order 4	Targeted districts (3)	IRS implementation	$3,585,800	20%
TBD	Nationwide	LLIN distribution and TA for LLIN management	$375,000	2%
CDC	Nationwide	2 TDYs for IRS implementation and support for FELTP trainees in malaria	$174,200	1%
DELIVER	Nationwide	Procure LLINs, laboratory and CCM commodities	$8,023,486	45%
Civil society organizations	Nationwide	BCC malaria messages, case management	$350,000	2%
Global Environmental Management and Support Contract	IRS-targeted districts	Environmental compliance	$25,000	0%
FHP	Nationwide	Support integrated community mobilization and iCCM	$330,450	2%
WHO	National	WHO Program Officer	$60,000	0%
Pending G2G mechanism	National	IRS implementation, active surveillance, drug efficacy testing, iCCM implementation, IVM, IST, and QA/QC	$4,185,000	24%

		microscopy		
TBD	Nyagatare	Epidemiologic investigation	$65,000	0%
Monitoring and Evaluation Management Service	National	M&E for Mission	$100,000	0%
Administration	National	PMI staff	$726,064	4%
Total			**$18,000,000**	**100%**

Table 2. President's Malaria Initiative - *Rwanda* (FY 2013) Planned Obligations for FY 2013 ($18,000,000)

Proposed Activity	Mechanism	Budget	Commodities	Geographic Area	Description of Activity
PREVENTION					
General Vector Control					
IVM	Pending G2G mechanism	60,000		High district burdens	Support an assessment of malaria vectors and their behavior
Entomological monitoring	Pending G2G mechanism	200,000		12 sentinel sites	Conduct entomological monitoring
General Vector Control Total		**260,000**			
IRS					
Indoor residual spraying	IRS IQC 2 task Order 4	3,585,800	1,000,000	3 districts	Procurement of IRS equipment (insecticide, sprayers, etc.), training, implementation, data collection, protocols, guidelines, BCC, logistic assessment.
Indoor residual spraying	Pending G2G mechanism	1,300,000	0	2 districts	Implementation of IRS in two districts
IRS technical assistance	CDC IAA	24,200		3 districts	2 TDYS for CDC entomologist's technical assistance for monitoring IRS implementation

Environmental compliance	GEMS	25,000		IRS-targeted districts	Support environmental compliance monitoring associated with IRS
IRS Total		**4,935,000**	**1,000,000**		
Long-lasting insecticide treated bednets (LLINs)					
LLIN Procurement	DELIVER	6,000,000	6,000,000	National	Procurement of 1 million LLINs to contribute to routine coverage in children under five and pregnant women
Management and distribution of LLINs	MPD through DELIVER	540,000		National	Management and distribution of LLINs for routine services to children under five and pregnant women.
Distribution of LLINs from district to health centers	TBD	350,000			Distribution from district to health center or distribution site is $0.35 per net
TA for LLIN management	TBD	25,000		National	Technical assistance for issues such as maintenance of universal coverage and LLIN disposal
BCC	Civil Society Organizations	200,000		National	Community-level support to implement promotion of malaria messages
LLIN Total		**7,115,000**	**6,000,000**		
PREVENTION OF MALARIA IN PREGNANCY (MIP)					

Implementation of IST	Pending G2G mechanism	200,000		National	Implement intermittent screening and treatment (IST) based on MIP burden study
MIP Total		**200,000**			
Prevention Total		**12,510,000**	**7,000,000**		
Case Management Activities					
Procure CCM commodities	DELIVER	799,515	799,515	National	Procure approximately1,162,000 RDTs and 50,000 safety boxes for iCCM
Procure laboratory consumables	DELIVER	100,000	100,000	National	Consumables for microscopy testing for district hospitals and health centers
Strengthen decentralized diagnostic capacity	Pending G2G mechanism	100,000		National	Support QA/QC for microscopy at district hospitals and health centers
Procure malaria drugs	DELIVER	194,509	194,509	National	Procure approximately 30,000 AL treatments (estimated unit cost $1.72) and 62,406 vials of parenteral artesunate (estimated unit cost $2.29)
Support therapeutic drug testing	Pending G2G mechanism	150,000		3 sites	Support drug efficacy testing for ACT resistance
Implementation of community case management	Pending G2G mechanism	2,000,000		12 districts	Support implementation of integrated community case management (iCCM) in 12 districts,

Technical assistance for implementation of community case management	FHP	310,450		Nationwide	Provide TA for implementation of iCCM nationwide
Management and distribution of CCM commodities	MPD through DELIVER	71,956		National	MPD management/distribution fee of 9%
Management and distribution of malaria drugs	MPD through DELIVER	17,506		National	MPD management/distribution fee of 9%
Peace Corps support of iCCM	FHP	20,000		National	Support iCCM and PC/PMI initiative
Logistics strengthening	DELIVER	300,000		National	Strengthen pharmaceutical management and supply chain strengthening at the national and district levels.
Case management Total		**4,063,936**	**1,094,024**		
MONITORING AND EVALUATION					
Support WHO National Program Officer for malaria	WHO	60,000		National	Support WHO National Program Officer
Community surveillance in two epidemic-prone districts	Pending G2G mechanism	100,000		2 districts	Mobile reporting and case investigation for epidemic surveillance and response
Support for FELTP trainees in malaria	CDC IAA	150,000		National	Support for FELTP trainees in malaria and disease surveillance for capacity building

Epidemiologic investigation of high malaria incidence sectors in Nygatare	TBD	65,000		Nyagatare	Support an epidemiologic survey to investigate the origin of the malaria cases seen in health facilities in Nyagatare
Support capacity building of the MOPDD for supervision, data quality assessments, and dissemination	Pending G2G mechanism	75,000		National	Support MOPDD staff to attend trainings and conferences for capacity building, and support for data quality assessments
M&E reporting	MEMS	100,000		National	Contribute to USAID Mission M&E system to collect and analyze data on USAID-supported activities
M&E total		**550,000**	**0**		
Behavior Change Communication					
Support integrated BCC for CM	Civil Society Organizations	150,000		National	Community-level communications for case management
BCC total		**150,000**	**0**		
IN-COUNTRY MANAGEMENT AND ADMINISTRATION					
In-country staff, program administration expenses	USAID/CDC	726,064		National	Staff salaries and administrative expenses for USAID PMI country team
Administration total		**726,064**	**0**		
GRAND TOTAL		**$ 18,000,000**	**$ 8,094,024**		Commodities: 45%