

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



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## PRESIDENT'S MALARIA INITIATIVE



**PRESIDENT'S MALARIA INITIATIVE**

**Rwanda**

**Malaria Operational Plan FY 2015**

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## 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 has been selected as a GHI Plus country.

The President's Malaria Initiative (PMI) is a core component of the Global Health Initiative (GHI), along with HIV/AIDS, and tuberculosis. 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 and, as part of the GHI, the goal of PMI has been adjusted to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. This will be achieved by continuing to scale up coverage of the most vulnerable groups — children under five years of age and pregnant women — with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS). Rwanda officially became a PMI country in FY 2007, although the USG had been supporting malaria control activities for several years before that.

Over the past ten years, Rwanda has scaled up malaria control interventions successfully and has set the ambitious goals in their 2013 – 2018 Malaria Strategic Plan (MSP) of achieving pre-elimination status (test positivity rate of less than five percent) and near zero malaria deaths by 2018. 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. From 2005 to 2012, the Rwandan HMIS has shown remarkable improvements in malaria indicators: an 86% reduction in malaria incidence, 87% reduction in malaria morbidity, 74% reduction in malaria mortality, and a 71% reduction in malaria test positivity rate. However, the Rwandan HMIS also shows how fragile gains in malaria control can be as significant upsurges have been identified and responded to in 2009, 2012, and 2013.

The FY 2015 Malaria Operational Plan (MOP) for Rwanda was developed in consultation with the National Malaria Control Program (NMCP) and with the participation of all national and international partners involved in malaria prevention and control in the country. FY 2015 MOP development occurred concurrently with the Joint Assessment of National Health Strategies (JANS) review of the MSP. PMI subject matter experts in vector control, monitoring and evaluation (M&E), and case management participated as part of the JANS team, making the MOP process particularly inclusive with active participation of WHO (both in-country and regional), Roll Back Malaria, UNICEF, and the Global Fund to fight AIDS, Tuberculosis and Malaria (Global Fund) during the MOP discussions. The activities that PMI proposes supporting with FY 2015 funding align with the vision of the draft 2013-2018 MSP to achieve pre-elimination by 2018 and will build on investments made by PMI and other partners to improve

and expand malaria-related services with an emphasis toward enhanced surveillance, monitoring and evaluation. The proposed FY 2015 PMI budget for Rwanda is \$18 million. Based on Government of Rwanda (GOR) malaria control gap analyses in the MSP and discussions and meetings with the NMCP and partners, the following major activities will be supported:

**Indoor residual spraying:** PMI supports the NMCP's strategy to reduce malaria transmission through indoor residual spraying (IRS) in high-burden districts by targeting high incidence sectors using the HMIS. Rwanda has conducted eleven IRS rounds to date and has withdrawn IRS operations in certain districts due to reduction in malaria incidence, transmission, and funding. The 2013 spray round consisted of two spray rounds (February/March and September/October) and protected approximately 1 million residents in three districts bordering malaria-endemic neighbors. The coverage rate was more than 98% of the 242,589 targeted structures. Due to detection of pyrethroid resistance, the NMCP with PMI support developed and implemented an insecticide resistance management plan (IRM) which included a phased transition to carbamates starting in one district in September/October 2013 and expanding to three districts in February/March 2014. The next spray round will take place in September 2014 using a carbamate insecticide and a second round will occur in February 2015. In 2014, PMI, the NMCP, and stakeholders are implementing the results of an IRS capacity assessment, where Rwanda showed strengths in leadership, coordination, planning, entomological monitoring, and implementation. Recommendations were provided for improving logistics, environmental compliance, and monitoring and evaluation at decentralized levels, which will improve IRS capacity. Global Fund resources implemented through the NMCP will also be used to support IRS operations in Rwanda starting in September 2014. With FY 2015 funds, PMI will deploy IRS in high burden districts in collaboration with Global Fund support. PMI will work with the NMCP to find efficiencies and cost savings in IRS operations. According to the IRM plan, the NMCP plans to transition to long lasting organophosphates in September/October 2015. The PMI implementing partner will retain responsibility for procurement of insecticide, technical assistance for supervision, quality control and assurance, and environmental monitoring in IRS districts.

**Insecticide-treated nets:** In 2011, Rwanda was one of the first countries in sub-Saharan Africa to achieve universal long-lasting insecticidal net (LLIN) coverage with the distribution of over 6.1 million LLINs. PMI has been collaborating with the NMCP and Global Fund to maintain universal coverage for all age groups, and a replacement campaign was conducted in late 2012/early 2013. Unlike previous mass campaigns in Rwanda, the NMCP has monitored confirmed malaria cases with the HMIS following the campaign and noted an increase in malaria cases. The specific manufacturer of LLINs used for the campaign lost WHOPEs approval in 2013 and an additional PMI procurement of 400,000 LLINs had to be cancelled. The NMCP responded by replacing the sub-standard LLINs in seven high burden districts and is monitoring HMIS to ensure consequent reductions in malaria cases. This additional distribution was not planned and has increased the LLIN gap analysis, which PMI and other stakeholders are working to mitigate. PMI procures conical LLINs, which are distributed through antenatal care (ANC) and Expanded Program for Immunization (EPI) clinics in all health centers and community distribution through quarterly visits from community health workers (CHWs). In 2014, PMI procured 1,400,000 LLINs to support routine LLIN distribution. PMI continues collaborating with the NMCP to support net care messaging to increase net longevity due to net durability

study results showing over 50% net failure due to holes within two years in the field. With FY 2015 funding, PMI will procure 1,000,000 nets. These nets will be distributed through routine distribution channels targeting pregnant women at ANC, infants in EPI clinics, and through CHWs at the community level. In addition, PMI will continue to support the LLIN distribution systems to district and health center levels to prevent stockouts and will enhance behavior change communication (BCC) activities at national and community levels, particularly among CHWs, to promote correct and consistent net use.

**Malaria in pregnancy:** Rwanda supports two out of the three prongs of WHO recommended strategy to reduce malaria in pregnancy (MIP). The NMCP discontinued intermittent preventive treatment of malaria in pregnancy (IPTp) in 2008 due to significant parasite resistance to sulfadoxine-pyrimethamine. PMI continues to support other interventions to prevent and encourage early detection and treatment of malaria in pregnant women, including procurement of LLINs and distribution to pregnant women at ANCs, training of health care workers on focused antenatal care (FANC), and support to a cadre of maternal health community health workers (*Agents de Santé Maternelle* - ASMs) who monitor pregnant women in their village and encourage them to attend their ANC appointments. The Maternal Child Health (MCH) Program, in coordination with the NMCP, the Community Health Program, and the EPI, with support from PMI and other partners, has developed an integrated approach to deliver quality health care for pregnant women; FANC is now available nationwide.

With FY2015 funding, the NMCP, PMI, and partners will continue to support early diagnosis and treatment of MIP and LLIN procurement and distribution to pregnant women. PMI, in coordination with USG MCH programs and the MOH, will also continue to facilitate supervision of ASMs by health center supervisors, contribute to their training, evaluate performance of community outreach to pregnant women, and strengthen linkages between ASMs and health facilities to promote LLIN use, ANC attendance, and early detection and treatment of malaria in pregnant women.

**Case management:** The NMCP adopted artemether-lumefantrine (AL) as the first-line treatment for uncomplicated malaria in 2006. In conjunction with a LLIN mass campaign targeting children under five, this intervention showed decreases in the malaria burden according to the HMIS. In response to an upsurge in malaria cases and a recommendation from the WHO, the NMCP revised their treatment policy in November 2009 to require diagnostic confirmation of all fever cases. The Global Fund procured the majority of ACT needs for Rwanda. However, the Global Fund's single stream financing ends in June 2014. PMI is working with the NMCP and the MoH to apply for the new funding model with the Global Fund which is planned to be disbursed in January 2015.

PMI has prioritized capacity building and system strengthening for integrated community case management of fever, as well as strengthening laboratory diagnostic training and supportive supervision. Integrated community case management (iCCM) by CHWs accounted for 60% of all treatment of malaria cases in Rwanda in 2013. With FY 2015 funding, PMI will continue to strengthen efforts to ensure prompt and effective integrated case management (iCCM) of malaria at the household/community level by CHWs through diagnosis and treatment of malaria, diarrhea, and pneumonia. PMI will procure ACTs and RDTs to help fill gaps in iCCM

commodities. PMI will continue to support the full iCCM package in seven districts. The NMCP, MCH, PMI, Community Health Desk and other stakeholders will collaborate to better integrate trainings and supervision to help find cost savings. PMI will also continue to fund BCC activities to promote timely treatment seeking and proper use of ACTs. At the health facility level, PMI will concentrate on strengthening capacity in laboratory diagnostics and supply chain management. PMI will strengthen quality assurance/quality control (QA/QC) systems at national and district levels for accurate malaria diagnosis, and will support the NMCP's supervisory role to monitor and reinforce the correct use of ACTs at health facilities and in communities.

**Monitoring and evaluation:** Both PMI and the President's Emergency Plan for AIDS Relief (PEPFAR) have contributed to strengthening Rwanda's M&E systems with noticeable improvements. HMIS data are complete, accurate, and timely enough to be used for routine program monitoring. NMCP staff analyze these data, produce maps and charts showing the geographic distribution and trends in malaria cases, and make data-based programmatic decisions. PMI, Global Fund, and the NMCP in collaboration with the HMIS Unit in the Rwanda Biomedical Center (RBC) also conduct annual data quality audits (DQAs) nationwide to validate HMIS data. Malaria data from health centers, referral hospitals, and the private sector are integrated in the HMIS whereas data from CHWs implementing iCCM are entered in the Community Information System (SIS-com) which then is aggregated and integrated within the HMIS. Rwanda has fully transitioned its HMIS to the web-based DHIS2 platform, allowing data entry and analysis with only an internet connection. The NMCP, PMI, and the HMIS unit have worked on custom dashboards that show real time data and are used for evidence-based programmatic decision making. As described above, Rwanda experienced an upsurge in malaria cases in 2013 where malaria cases increased by 95% compared to 2012. The NMCP, PMI, and other malaria stakeholders are investigating the drivers of this increase and responding appropriately. Data from early 2014 reveal that the NMCP responses are having an effect as malaria cases have decreased by 50% compared to the same time period in 2013.

With FY 2015 funding, PMI will continue to support the NMCP to strengthen evidence-based decision making throughout the health system and strengthen surveillance, especially at the decentralized district levels. The GOR has prioritized decentralization and with the ambitious goal of achieving malaria pre-elimination by 2018 it is pivotal to build the ability of districts to analyze and respond to upsurges in malaria. Therefore, PMI will support the NMCP in strengthening decentralized M&E capacity. PMI will also continue to work with the NMCP to implement, evaluate, and possibly expand "reactive case detection" where index cases at health centers in epidemic-prone districts are investigated at the household level by a team from the district. The NMCP, through PMI and Global Fund support, will build a mobile reporting system and train CHWs, health center, and district response staff. A database and data manager will be supported to analyze and evaluate the efficacy of the "reactive case detection" methodology in Rwanda.

**Operational Research:** In previous fiscal years, PMI supported a study to determine the prevalence of malaria among pregnant women. The cross section study included six rural health centers with varying malaria transmission and included testing via microscopy, RDT, and polymerase chain reaction. The results show a low national burden in malaria in pregnancy among this population (microscopy 1.6%, RDT 2.5%, and PCR 5.7%).

PMI also supported a prospective three year net durability monitoring activity to examine the physical durability and insecticide residual efficacy of LLINs although this was not formally considered OR. The results showed that over 50% of both polyester and polyethylene LLINs failed due to holes or lack in durability between 18 and 24 months in the field. The results from these studies have directly impacted Rwanda's programming (see MIP and LLIN sections). PMI has no OR studies planned in FY 2015.

**Behavior change communication:** With FY 2015 funding, PMI will continue to support implementation of Rwanda's national malaria communications strategy. PMI will support the NMCP to develop, update, and implement a new malaria BCC communication plan for 2013 – 2018 that will include strategies to support Rwanda's path towards pre-elimination by 2018. The BCC implementing partner will continue to scale up activities focusing on community mobilization and engagement using interpersonal communication, mass media through community radio, and mobile cinema and dramas. As Rwanda transitions to pre-elimination, BCC will focus on countering reduced malaria risk perception due to declines in the malaria burden with reminders that malaria gains are fragile, so people should continue to sleep under nets and visit the health facility or community health worker if anyone has fever. In districts that share borders with other countries, BCC will need to be intensified for residents, in particular those who cross borders into neighboring countries. Efforts aimed at those who enter Rwanda from countries with high malaria transmission should be considered as well.

**Health systems strengthening, capacity building, and transition:** As shown by the 2010 DHS results and trends in the HMIS, 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 capacity building at the NMCP through support of seconded staff; continued strengthening of the HMIS, the National Reference Laboratory, and Logistics Management Information System; and the integration of service delivery within other programs, such as MCH and EPI. PMI also works with the Peace Corps to help strengthen capacity of Peace Corps Volunteers and local communities to understand and prevent malaria via educational programs and activities.

As a part of GHI, PMI and the GOR are supporting integrated service delivery, including integration of malaria control with MCH and community-based health service delivery. PMI supports the iCCM approach, partnering 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. The NMCP also works with MCH to deliver folate/iron to improve outcomes of pregnancy.

PMI prioritizes the reforms of USAID Forward and will implement these reforms in collaboration with the Mission and the GOR when possible. FY 2013 and FY 2014 MOPs include government to government (G2G) financing of discrete activities (IRS and iCCM implementation) and scale up of such activities where the NMCP and MOH have proven their capacity. In April 2014, PMI and the Mission were informed that G2G financing will not move forward at this time, though in the future this reform might be revisited with appropriate authorization. Therefore, PMI reprogrammed G2G funding for these activities to appropriate implementing partners.

In FY 2015, PMI will work with the NMCP and other malaria stakeholders to consolidate gains made in malaria control and help the NMCP change their paradigm from scaled-up malaria control to enhanced surveillance, monitoring, and evaluation. With the NMCP's ambitious goal of achieving pre-elimination, the NMCP needs to improve their understanding of malaria epidemiology at the household level and identify drivers of transmission in terms of case importation, local transmission, and hot spot foci. The NMCP has proven that it has the capacity to implement malaria control interventions such as iCCM, IRS, nationwide surveillance, and monitoring and evaluation. In FY 2015, PMI will coordinate with the NMCP to implement and expand enhanced surveillance (reactive case detection), through which malaria index cases are investigated and epidemic response teams investigate household contacts to stop transmission and ensure Rwanda's path toward pre-elimination.

## Abbreviations and Acronyms

ACT	Artemisinin-based combination therapy
ANC	Antenatal clinic
AL	Artemether-lumefantrine
ASM	<i>Agents de Santé Maternelle</i> (specialized maternal community health workers)
BCC	Behavior change communications
CDC	U.S. Centers for Disease Control and Prevention
CHD	Community Health Desk
CHW	Community health worker
DfID	Department for International Development
DHS	Demographic and Health Survey
ESR	Epidemic surveillance and response
FANC	Focused antenatal care
FHP	Family Health Project
FY	Fiscal year
FBO	Faith-based organization
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, TB, and Malaria
GOR	Government of Rwanda
GPIRM	Global Plan for Insecticide Resistance Management
HBMF	Home-based management of fever
HCC	Health Communication Center
HMIS	Health management information system
iCCM	Integrated community case management
ICIPE	International Centre of Insect Physiology and Ecology
IDSR	Integrated Disease Surveillance and Response
IMCI	Integrated management of childhood illnesses
IPTp	Intermittent preventive treatment of malaria in pregnancy
IRS	Indoor residual spraying
ITN	Insecticide-treated bed net
IVM	Integrated vector management
KEMRI	Kenya Medical Research Institute
LLIN	Long-lasting insecticide-treated net
LMIS	Logistics management information system
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
MPDD	Medical Procurement and Distribution Division
MSP	Malaria Strategic Plan
NMCP	National Malaria Control Program (called the Malaria and Other Parasitic Diseases Division in Rwanda)

NGO	Non-governmental organization
NRL	National Reference Laboratory
OP	Organophosphate
PEPFAR	President's Emergency Plan for AIDS Relief
PMI	President's Malaria Initiative
QA/QC	Quality assurance/quality control
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SIS-COM	Community information system
SP	Sulfadoxine-pyrimethamine
UNICEF	United Nations Children's Fund
USAID	U. S. Agency for International Development
USG	United States Government
WHO	World Health Organization

## STRATEGY

### Introduction

The President's Malaria Initiative (PMI) is the United States Government's (USG) 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 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 2007 and progressed rapidly with support from PMI and other partners. Since 2006 with the support of the Global Fund to fight AIDS, Tuberculosis and Malaria (Global Fund), ACTs have been available and are being used in all public health facilities nationwide. In early 2011, Rwanda achieved universal coverage of its population with ITNs (one ITN for every two people), one of the first sub-Saharan countries to achieve this target.

This FY 2015 PMI Malaria Operational Plan (MOP) presents a detailed plan for the ninth year of PMI in Rwanda and is based on a joint gap analysis of malaria control in Rwanda developed between the Malaria and Other Parasitic Diseases Division (MOPDD, referred to as the National Malaria Control Program [NMCP] in this document) and relevant malaria control stakeholders. It is also informed by a new (draft) 5-year 2013–2018 National Malaria Strategic Plan (MSP), which is being finalized. The new strategy aims to achieve pre-elimination by 2018. The 2013–2018 MSP was strengthened through a Joint Assessment of National Health Strategies (JANS) review, which included subject matter experts from UNICEF, WHO, PMI, and Roll Back Malaria. PMI Rwanda supported the JANS through participation in the steering committee and logistic support. This operational plan briefly reviews the current status of malaria control policies and interventions in Rwanda, describes progress to date, challenges and unmet needs if the national targets of NMCP and PMI are to be achieved, and provides a description of planned FY 2015 activities. The activities that PMI proposes to support with FY 2015 funds are aligned with the 2013–2018 MSP and build on investments made by PMI and other partners (including the Global Fund “results-based financing” model which is envisioned to start in January 2015) to expand malaria-related services. The total amount of PMI funding requested in FY 2015 for Rwanda is \$18 million.

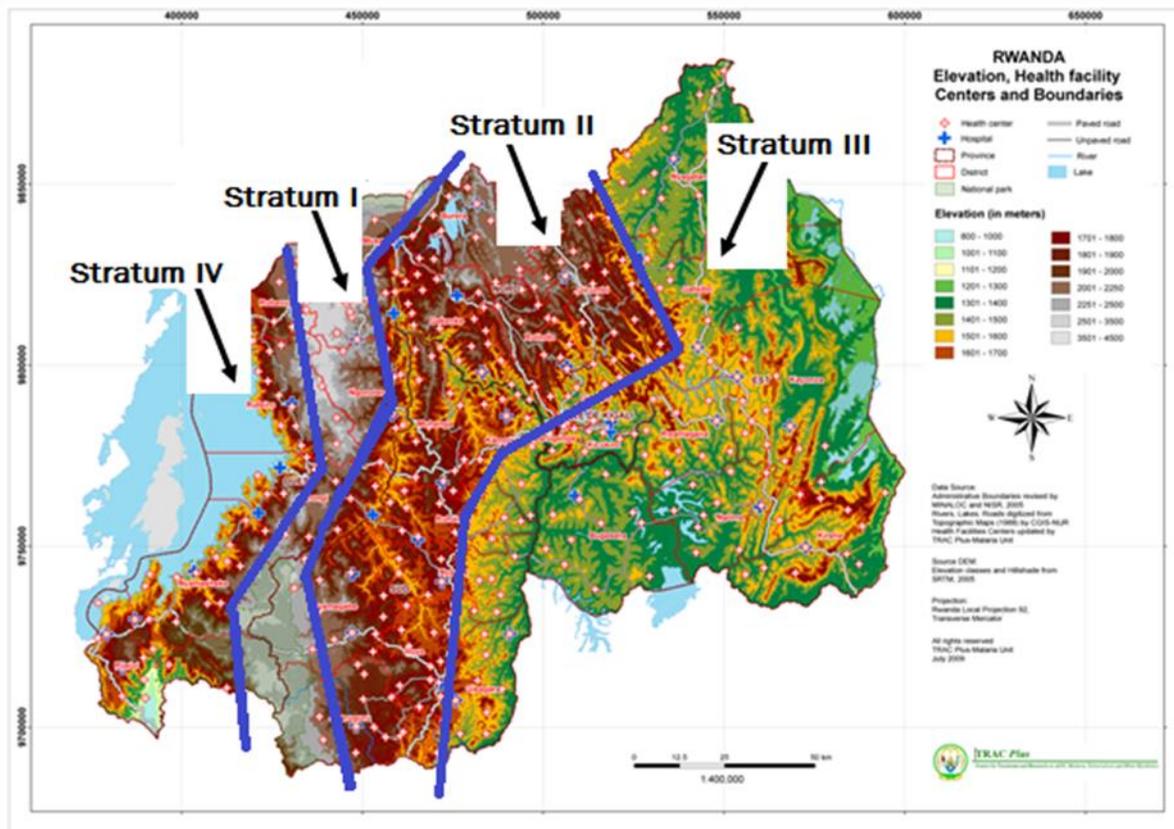
### Country Malaria Situation

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 12 million (projections based on the 2012 census results), 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 2.2 million children under five and 443,000 pregnant women/year (projections based on the 2012 census results).

The country is divided into four malaria ecologic zones based on altitude, climate, level of transmission, and disease vector prevalence (Figure 1). Malaria is mesoendemic in the plains and prone to epidemics in the high plateaus and hills. The NMCP in Rwanda has classified 19 (63%) of the country's 30 districts as epidemic-prone and the remaining 11 as endemic. 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 from areas of low to high transmission); 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).

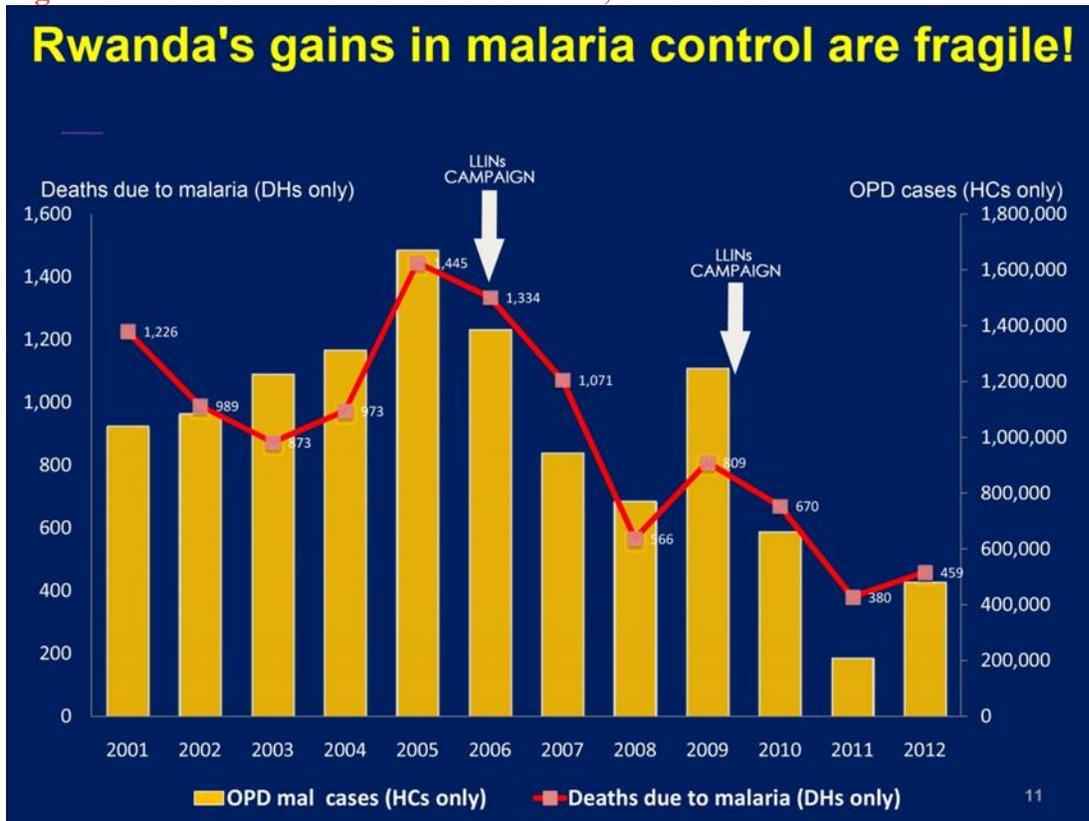
**Figure 1- Rwanda elevation, health centers, boundaries, and malaria risk stratification**



Through the successful implementation and scale up of malaria control interventions, Rwanda has achieved significant reductions in the burden of malaria over the last ten years. All major malaria indicators have decreased significantly from 2005 to 2012 with contributions from the

Global Fund and PMI; incidence declined by 86%, morbidity declined by 87%, mortality declined by 74%, and test positivity rate declined by 71%. Rwanda, in line with WHO recommendations, has mandated laboratory confirmation of malaria cases and has an over 95% confirmation rate of malaria cases. However, Rwanda has shown how fragile gains in malaria control are with significant upsurges in 2009, 2012, and 2013 where cases have doubled from the previous year (Figure 2).

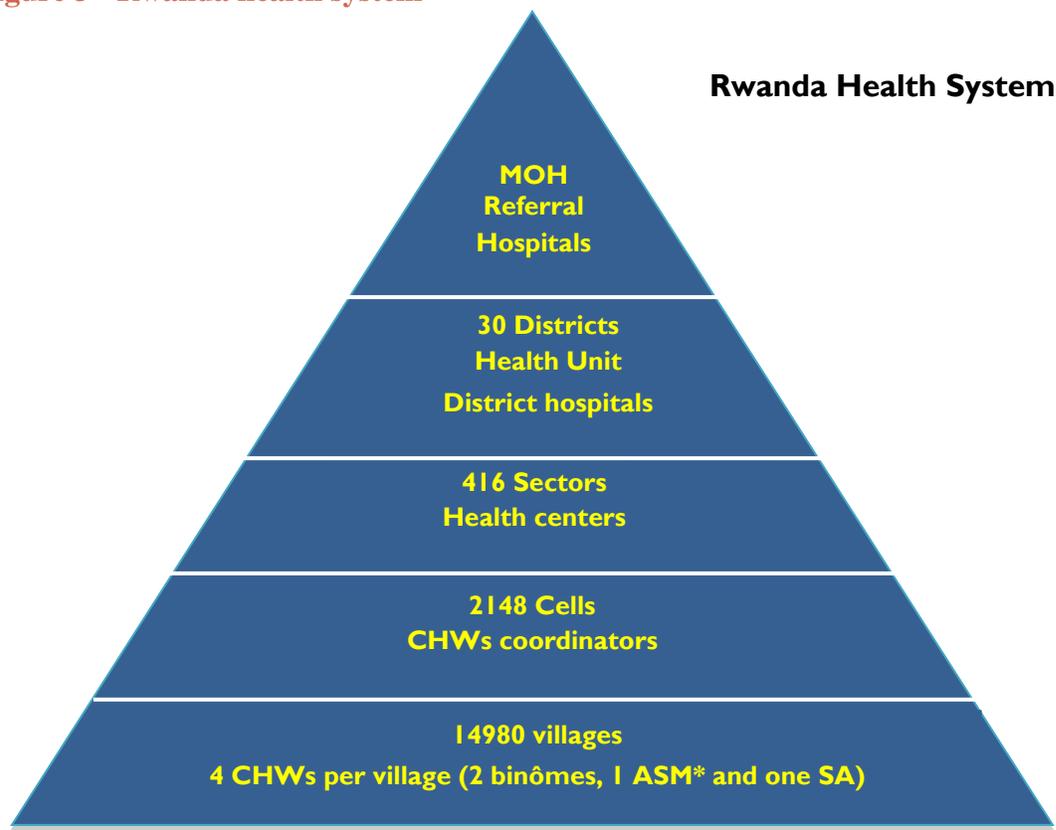
**Figure 2 - Malaria deaths and malaria cases, 2001 - 2012**



### Country Health Delivery System and MoH Organization

The Rwanda Health System has five tiers and is led by the Ministry of Health (MOH) (Figure 3). The MoH supports, coordinates, and regulates all interventions whose primary objective is to improve the health of the population. The mission statement of the MoH is “to provide leadership of the health sector to ensure universal access to affordable preventive, curative, and rehabilitative health services of the highest attainable quality.”

**Figure 3 - Rwanda health system**



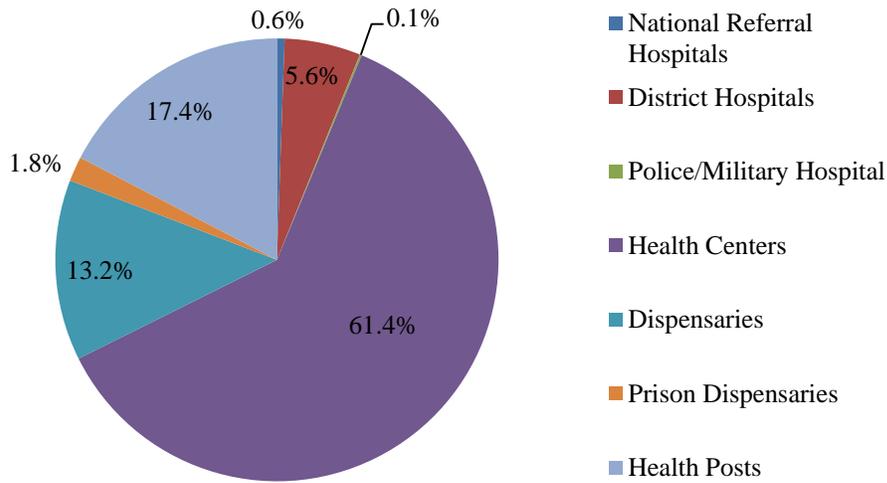
CHW = community health worker; binome = two community health workers (male and female) in a village who implement iCCM; ASM = Agent de santé maternelle; SA = social affairs community worker

Services are provided at different levels of the health care system (community health, health posts, health centers, district hospitals and referral hospitals) and by a variety of providers, including public, faith-based, private-for-profit, and nongovernmental organizations.

### **Health Facilities**

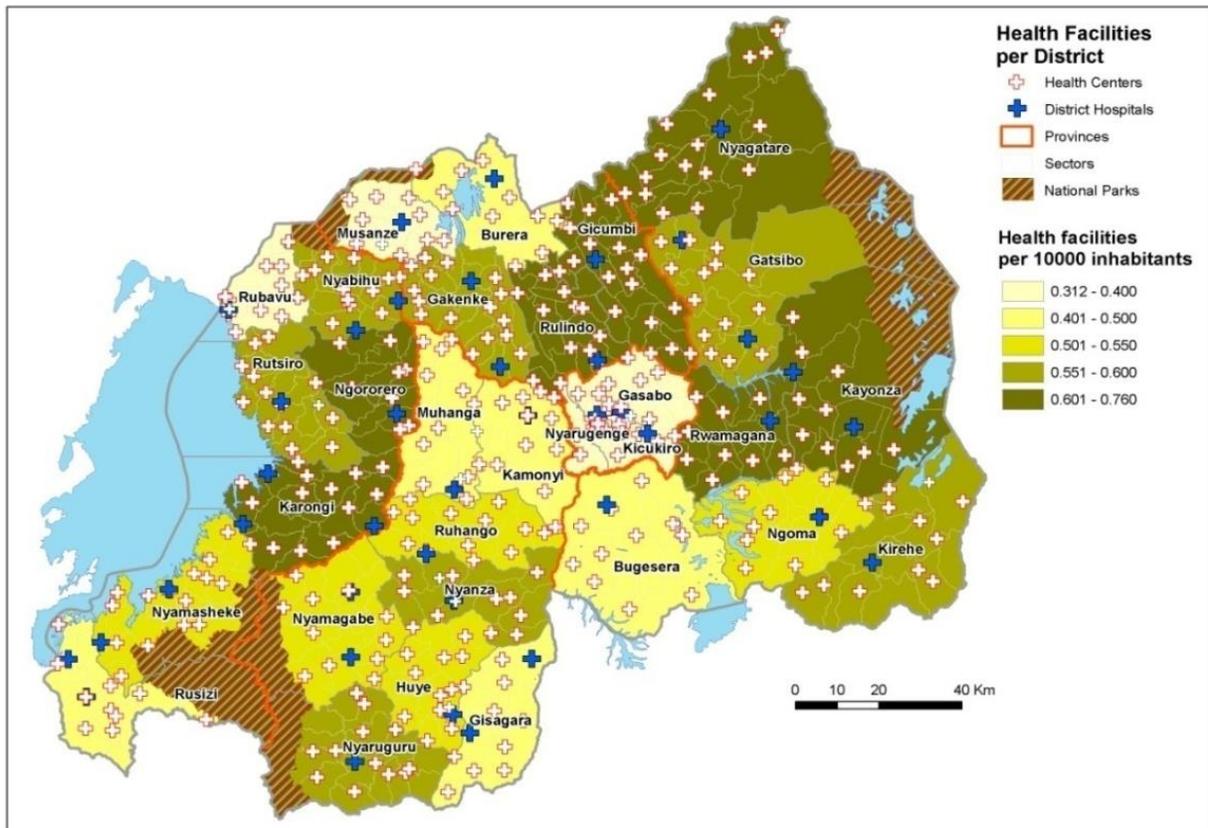
Public health facilities represent 55% of the total number of health facilities in Rwanda; an additional 22% are run by faith-based organizations, 20% by private organizations, 2% by communities, and 1% by parastatal organizations. The number of public health facilities in Rwanda at the end of 2012 was 720. In Figure 4, these facilities are classified as referral hospitals, district hospitals, health centers, dispensaries, and health posts and their geographic distribution is shown in Figure 5.

**Figure 4 - Distribution of health facilities by type, 2012**



Source: Health Facilities Database, HMIS Unit, 2009-2011

**Figure 5 - Geographical distribution of health facilities per district, 2011**



## Referral System

An extensive network of public sector health centers exists to meet the health needs of Rwanda's population. This network is structured as a pyramid with three referral hospitals at the apex supported by 42 district hospitals and 524 health centers (Figure 3). The health centers, in turn, use a network of 60,000 community health workers (CHWs) and other community-based associations for community outreach activities. Referral hospitals also serve as teaching institutions for doctors and pharmacists.

**Table A - Minimum package of services in different types of health facilities**

Health Facilities	Minimum Package of Services Provided
National Referral Hospital	Advanced inpatient/outpatient services, surgery, laboratory, gynecology, obstetrics, and radiology; specialized services including ophthalmology, dermatology, ear nose and throat, stomatology, and physiotherapy
District Hospitals	Inpatient/outpatient services, surgery, laboratory, gynecology obstetrics, and Radiology
Health Centers	Prevention activities, primary health care, inpatient, referral, and maternity
Dispensaries	Primary health care, outpatient, and referral
Health Posts	Outreach activities (i.e., immunization, family planning, growth monitoring, ANC)

All health centers and facilities above that level have at least one functional microscope and reagents needed for the diagnosis of malaria. The referral system is anchored by the provision of an average of four ambulances per district as well as the CHWs' access to cell phones. Table A summarizes the services provided at each type of health facility.

Administratively, Rwanda consists of four provinces and Kigali City, 30 districts, 416 sectors, 2,148 cells, and 14,980 villages. The 2010 DHS showed that 78% of the households have at least one family member with health insurance and that among those insured 98% have community health insurance (*mutuelles*). Each district has at least one district hospital and an average of one health center per 20,000 people.

## Updates in MOP strategy for FY2015

Currently the Government of Rwanda (GOR) and partners are in the process of finalizing the Malaria Strategic Plan 2013-2018. The plan articulates the key interventions and funding required for the country to achieve pre-elimination by 2018. In addition, since the last MOP:

- The NMCP has finalized and published the results of the Malaria Indicator Survey 2013
- The GOR is preparing to undertake the Demographic Health Survey 2014-2015 which will include key malaria indicators, parasite prevalence, and anemia

- There has been a JANS review of the Rwanda Malaria Control Strategic Plan 2013-2018
- The GOR is developing a concept note for the Global Fund under the New Funding Model (NFM) piloting the “Results Based Financing” (RBF) approach to support malaria interventions over the next three years; if Rwanda’s application is successful, the first disbursement is planned in January 2015
- In April 2014, PMI and the Mission were informed that government to government (G2G) financing, a major reform proposed by USAID Forward and embraced by PMI and the Mission, would not move forward at this time. In FY 2013 and FY2014 MOPs, funding for certain activities was designated for G2G in anticipation of G2G approval. Therefore, PMI reprogrammed G2G activities from FY 2013 and FY2014 to appropriate implementing partners.

### **National Malaria Control Plan and Strategy**

The NMCP, in collaboration with Roll Back Malaria (RBM), WHO, the Global Fund, PMI, and other partners, is currently finalizing a new 2013–2018 MSP. It addresses challenges and gaps identified in a Malaria Program Review, which was completed in March 2011, incorporates recommendations from a malaria pre-elimination forum that took place in September 2012, includes four gap analysis workshops carried out by the NMCP in collaboration with all stakeholders, and has been reviewed and validated both through a Roll Back Malaria MSP process as well as a Joint Assessment of National Health Strategies (JANS) review. The MSP is costed using both the conventional costing method and the One Health tool. In the context of malaria, the One Health tool has challenges in equating costs to impact as it uses the LiST model which only incorporates LLINs (long-lasting insecticide-treated nets) and intermittent preventive treatment of malaria in pregnancy (IPTp) and excludes IRS (indoor residual spraying), case management in terms of diagnosis and treatment, and other important drivers in the impact model. Rwanda achieved universal LLIN coverage in early 2011 and discontinued IPTp in 2008, therefore the conventional costing method was preferred. The strategy’s goals and objectives are aligned with three of the GOR’s primary strategic documents: Vision 2020, the overarching strategy used to guide long-term development in Rwanda; Economic Development and Poverty Reduction Strategy for 2013–2018; and Rwanda’s mid-term development plan, which in turn serves as the framework for the national Health Sector Strategic Plan III for 2012–2018 (Figure 6).

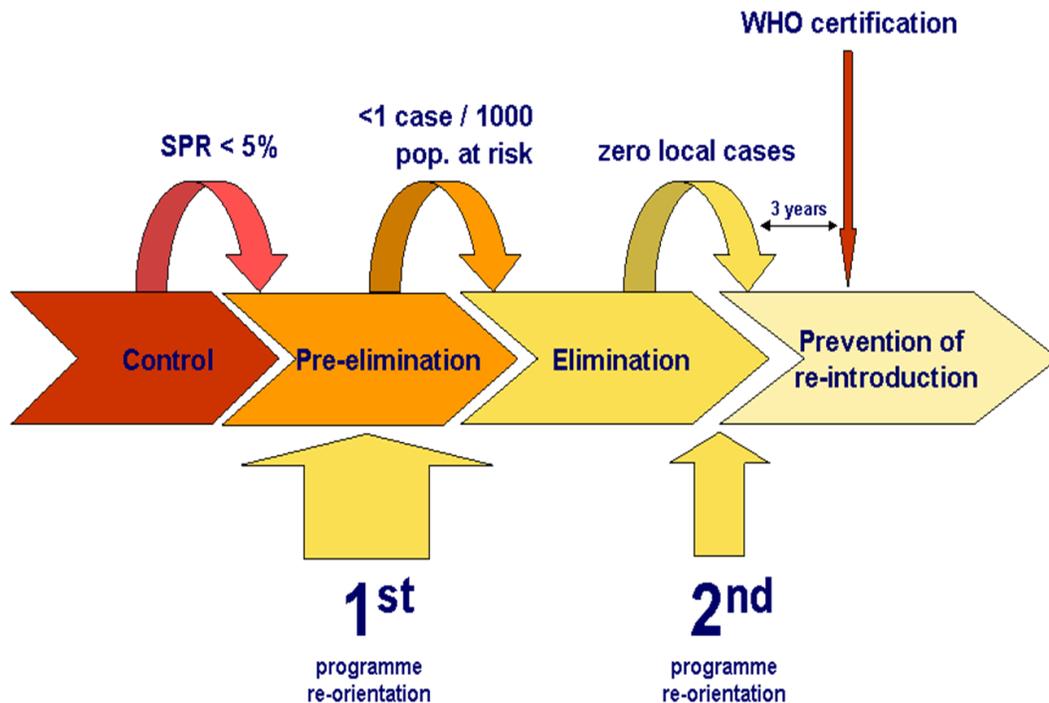
**Figure 6 - Rwanda's development and health strategic framework**



NSP, National Strategic Plan  
HSS, Health System Strengthening

With the significant reduction in malaria cases over the past ten years, the NMCP articulated an ambitious vision of a Rwanda free from malaria as a way to contribute to socio-economic development. It has targeted new goals to achieve malaria pre-elimination nationwide and near zero malaria deaths by 2018, by reducing malaria morbidity to pre-elimination levels of less than 5% test positivity rate among febrile patients and by lowering mortality by 50% from the 2011 baseline level. These goals are elucidated in the draft 5-year 2013–2018 MSP, which provides six distinct objectives with subsequent strategies and activities, focuses on shifting the paradigm from malaria control to enhanced surveillance, investigation, and response (Figure 7), addresses gaps observed in the implementation of Rwanda's previous strategies, and provides detailed approaches for achieving malaria-related results and targets. This plan aims to sustain progress, consolidate gains, and transition from scale up of malaria control and prevention activities to a targeted identification and response paradigm where enhanced malaria surveillance identifies, investigates, and responds to cases to stop transmission and shrink the malaria map in Rwanda.

**Figure 7 - WHO stages in malaria control**



Under the 2013–2018 MSP, the NMCP assumes the lead coordination role and takes responsibility for the decentralization of malaria control and prevention activities throughout the country. The NMCP coordinates the contributions of all health partners, donors, and private sector stakeholders.

The NMCP sets the following objectives to reach by 2018:

- 90% of population at risk will be effectively protected with locally appropriate vector control interventions selected based on evidence
- All malaria cases will be tested and promptly treated in line with the national policy
- By 2016, six districts will have initiated malaria pre-elimination
- All health units will report on key indicators promptly for enhanced decision making and action
- Expand and maintain strong multi-sectoral partnerships and capacity for effective program management and coordination at all levels
- 95% of the population will have correct knowledge, behaviors and practices towards malaria prevention and control.

## **Strategic Interventions of the 2013-2018 Malaria Strategic Plan**

### *LLINs*

Rwanda's goal for LLIN coverage is the maintenance of universal coverage of LLINs, defined as one net per two people. The NMCP intends to maintain universal coverage levels by developing a long-term LLIN procurement and distribution plan to:

- Ensure a continuous supply of replacement nets
- Identify additional targeted populations and new delivery channels
- Sustain financing to ensure the predictability and availability of resources
- Establish country-specific net replacement and disposal guidelines
- Monitor the lifespan of insecticide efficacy and net durability
- Strengthen procurement mechanisms to avoid delays
- Monitor and report on net use quarterly through community health volunteers.

### *Evidence-based focused IRS*

The national IRS strategy, incorporated in the insecticide resistance mitigation (IRM) plan, targets specific sectors in high burden districts, based on test positivity rates (HMIS data) and entomological indicators, including insecticide resistance, vector density/behavior, and entomological inoculation rates. IRS is seen as being complementary to sustained universal LLIN coverage, the keystone MSP intervention.

### *Malaria in pregnancy*

Rwanda's MIP activities include two of the three WHO-recommended interventions to prevent and promptly detect and treat malaria in pregnant women. This includes providing a LLIN to every primigravidae (first pregnancy) on her first visit to an antenatal care (ANC) clinic, low-dose iron/folate tablets for all pregnant women, and effective case management of pregnant women with fever after parasitological diagnosis by microscopy or RDTs. Rwanda stopped supporting intermittent preventive treatment of malaria in pregnancy (IPTp) in 2008 due to increasing parasite resistance to sulfadoxine-pyrimethamine and decreasing malaria prevalence nationwide. The NMCP is now considering a switch to an intermittent screen and treat (IST) approach to preventing and controlling malaria in pregnancy.

### *Case management*

#### *Malaria diagnosis*

Rwanda's national malaria treatment policy states that all suspect cases of malaria should be laboratory confirmed by either microscopy or RDT prior to treatment with an ACT. The policy applies to all age groups and health facilities, communities, and the private sector. The diagnostic policy advocates the use of microscopy in health facilities and limits the role of RDTs to communities and in health facilities during emergency situations and at times when laboratory technicians are not available. RDTs have been introduced nationwide for use by community health workers (CHWs) for parasitological confirmation of malaria cases.

### *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. 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.

### *Malaria treatment in the community*

The draft 2013-2018 MSP regards the integrated community case management of malaria (iCCM) 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 model, the MOH CHD has introduced and consolidated iCCM to include malaria, pneumonia, diarrhea, and other components (nutrition, family planning, hygiene, and palliative care).

### *Drug supply and pharmaceutical management*

The MOH procures antimalarials and supplies for health facilities through the Medical Procurement and Production Division (MPPD), which is part of the Rwanda Biomedical Center. The MPPD 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.

### *Monitoring and evaluation*

Rwanda is in the process of developing a 2013 – 2018 M&E costed plan with PMI support to complement the 2013 – 2018 MSP. Rwanda's Health Management Information System (HMIS) and Community Information System (SIS-COM) provide complete, timely, and accurate monthly malaria data through the DHIS2 web-based platform so the NMCP and district M&E officers can use data to make programmatic decisions. The NMCP M&E strategy 2008 – 2012 involved system strengthening, transitioning to a new HMIS platform (DHIS2), training for decentralized data analysis and response, and ensuring data quality and completeness through automated data checks and quarterly data quality audits (DQAs). The M&E strategy focused on documenting the efficacy and impact of scale-up of malaria interventions. The new 2013 – 2018 M&E strategy will highlight and explain the steps in the shift necessary for pre-elimination to phased individual case reporting and investigations (starting in six low burden districts and expanding thereafter). Rwanda will continue to prioritize mapping, stratification, and using malaria interventions based on the evidence from the field.

### *Behavior Change Communication*

In 2011, Rwanda developed and adopted a national integrated BCC strategy to harmonize the communication activities and messages for health sector interventions, including malaria and other infectious diseases, maternal health, and family planning. The strategy stresses advocacy for leadership and direction as well as social mobilization with a focus on positive changes in social norms and individual behaviors. These integrated BCC activities include a combination of

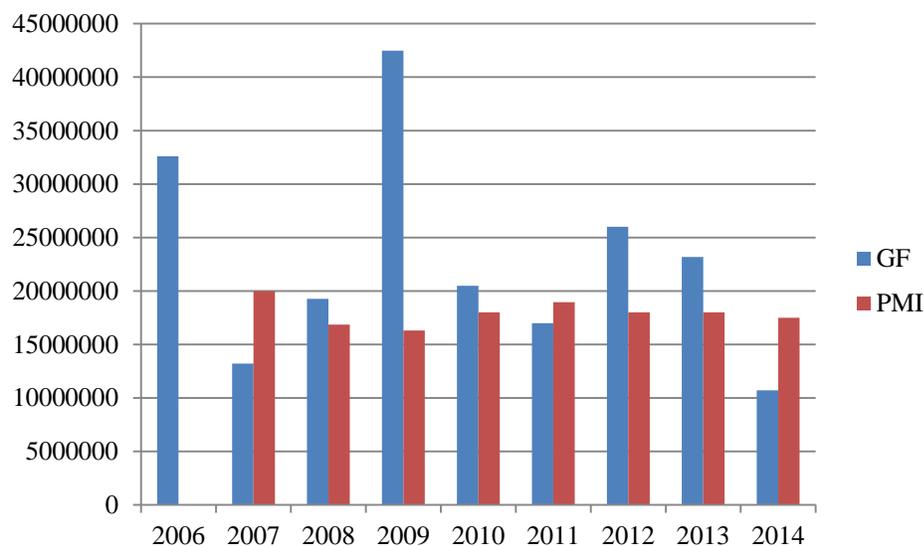
interpersonal communication, community education and mobilization, information, trainings, and media campaigns to influence and/or modify behaviors and environmental factors. These activities will be carried out at the national and community levels.

## Integration, Collaboration, and Coordination

### *Funding and integration with key development partners*

PMI and the Global Fund provide the majority of malaria funding to Rwanda (Figure 8). Other development assistance for malaria comes from RBM and WHO. Rwanda has one active Global Fund malaria grant that has been implemented since July 2011 and will continue until June 2014. The Global Fund grant supports the expansion of community case management with RDTs, antimalarials for treatment at health facilities and in the community, procurement of LLINs, the strengthening of monitoring and evaluation systems, and resources for health communications, HSS, HMIS, and program management operating costs. In 2013, the NMCP applied for a \$6-million Global Fund interim funding grant (July 2014-Dec. 2014) to ensure continuity of operations until the full roll-out of the New Funding Model in January 2015. The NMCP is submitting a concept note to the Global Fund for funding to cover 2015-2017. Under the Global Fund NFM, the proposed malaria funding level for Rwanda is \$40 million for the 2015-2017 allocation period.

**Figure 8 - Global Fund and PMI support to Rwanda, 2006–2014**



Source: [www.theglobalfund.org](http://www.theglobalfund.org); [www.pmi.gov](http://www.pmi.gov)

### *Collaboration within the Global Health Initiative and other USG Programs*

PMI functions within the GHI strategy and contributes to strengthening health systems for delivery of GHI programs of maternal, neonatal and child health, and reproductive health. At community level, malaria community-based interventions such as net distribution, hang-up campaigns, and house spraying use health workers that deliver a package of other GHI

initiatives, such as community-based drug distribution for malaria, pneumonia and diarrhea, and behavior change communication for positive health behaviors.

### *Collaboration with other USG programs*

PMI works in collaboration with the President's Emergency Plan for AIDS Relief (PEPFAR) on cross-cutting programmatic issues related to HIV/AIDS and malaria interventions. This has included support to the Medical Procurement and Production Division (MPPD) of the Ministry of Health and co-funding, since 2012, the Field Epidemiology & Laboratory Training Program (FELTP). In addition, PMI supports Peace Corps Volunteers through the PMI/PC Stomping Out Malaria in Africa initiative to support malaria prevention and control activities. These include the promotion of behavior change communication activities aimed at improving use of ITNs and promotion of early health seeking behavior.

PMI prioritizes the reforms of USAID Forward and will implement these reforms in collaboration with the Mission and the GOR when possible. FY 2013 and FY 2014 MOPs include government to government (G2G) financing of discrete activities (IRS and iCCM implementation) and scale up of such activities where the NMCP and MOH have proven their capacity. In April 2014, PMI and the mission were informed that G2G financing will not move forward at this time, though in the future this reform might be revisited with appropriate authorization. Therefore, PMI reprogrammed G2G funding to appropriate implementing partners. This reprogramming delayed the availability of FY 2013 funds by approximately six months. PMI worked in collaboration with the NMCP and implementing partners to mitigate most of the effects of this delay.

### **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 and to reduce malaria-associated mortality by 50% in new countries added to PMI in FY 2010 and later. By the end of 2015, PMI will assist 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;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria.

### **Progress on Indicators to Date**

#### ***Health Management Information System***

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 HMIS collects monthly data on the number of reported cases (presumed and confirmed) of malaria and deaths attributed to malaria by age group from over 524 health centers and district hospitals. SIS-COM (community information system) collects data from the community health workers and integrates the data with HMIS. Performance-based financing and monthly data quality audits, showing concordance between clinic registers and HMIS reports, encourage completeness of reporting. Based on HMIS data, Rwanda has seen an 84% decline in confirmed 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.

Dramatic fluctuations in numbers of confirmed malaria cases are seen in the HMIS data (Table B). From 2009 to 2011, there was a steep decline in total malaria cases reported, a 45% decline in the number of malaria deaths, and a 75% decrease in the test positivity rates. However, Rwanda has experienced an increase in malaria incidence since 2012, with a near doubling of cases in 2013, which is being analyzed by the NMCP and has been documented in all Eastern African countries. Despite the increased number of reported cases, malaria case-fatality rates (malaria deaths/malaria admissions) have continued to decline. The NMCP conducted a mass campaign in late 2012/early 2013 to replace the LLINs from the universal net distribution campaign in 2010/2011. However, unlike malaria trends after past distributions of LLINs, the HMIS showed an overall increase in malaria in the following months. The NMCP, with PMI support, conducted an investigation of the LLINs and they were found to have low insecticide bioefficacy and low original insecticide concentration after six months in storage. In order to mitigate the effect of the lower than expected bioefficacy and concentration of the insecticide in LLINs, the NMCP redirected LLINs from another manufacturer to replace the 2012/2013 LLINs in high malaria burden districts. The HMIS has subsequently shown reductions in malaria cases following this distribution.

**Table B - Summary of malaria data reported through the HMIS, 2009–2013<sup>1</sup>**

	2009	2010	2011	2012	2013
Total cases reported	1,322,622	663,785	225,176	487,150	949,966
% confirmed <sup>1</sup>	51%	94%	99%	99%	99%
% morbidity <sup>2</sup>	15.2%	7.8%	3%	5.9%	8.5%
Test positivity rate <sup>3</sup>	54.3%	24%	13.1%	15.6%	29.2%
Case fatality rate	2.3%	2.5%	3.5%	2.5%	1.8%

<sup>1</sup>Proportion of suspect cases that received laboratory confirmation by microscopy or RDT.

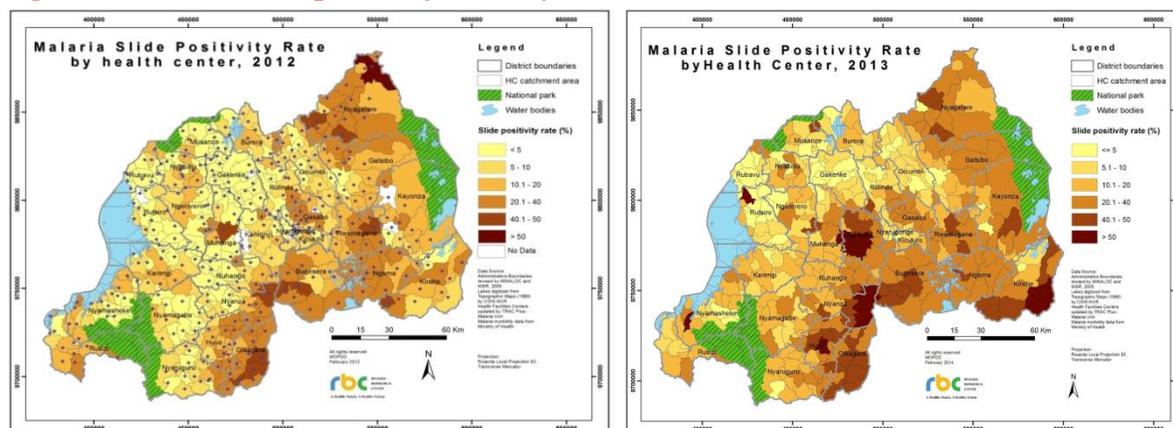
<sup>2</sup>Until 2010, % morbidity relates to % of fever cases with malaria. In 2011, the denominator changed from fever cases to all outpatient cases. It represents confirmed malaria new cases as a percentage of all outpatient new cases.

<sup>3</sup>Test positivity rate: malaria positive tests divided by total tests of suspect cases.

Figure 9 depicts the increased malaria burden in 2013 compared to 2012, as measured by test positivity rates from health centers throughout the country. Given such high diagnostic confirmation rates, the NMCP uses these facility-based test positivity rates instead of household-

level parasite prevalence to stratify malaria burden by district and to monitor the impact of interventions.

**Figure 9 - Malaria test positivity rates by health center, Rwanda 2012, 2013**



### *National Household Surveys*

Rwanda conducted a full DHS survey in 2005, an interim survey in late 2007/early 2008, and a full DHS survey in 2010. The NMCP also conducted a National Malaria Indicator Survey (MIS) in 2007/2008 and in 2013. These surveys show marked improvements in key prevention indicators, as summarized in Table C. It is important to note that 2.5 million LLINs were distributed after the 2010 DHS data collection, and therefore the 2013 MIS was conducted 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. Due to the anticipated low parasitemia prevalence and large sample size required to obtain valid prevalence estimates, parasitemia measurements were not obtained in the 2013 MIS.

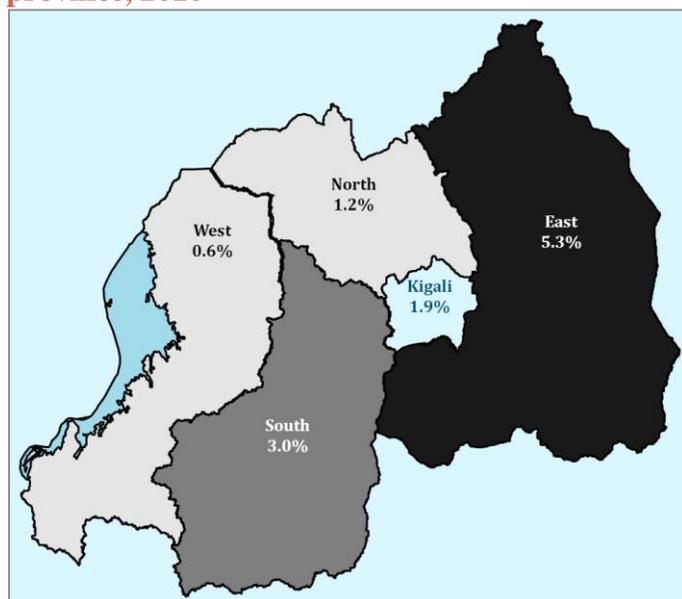
**Table C - DHS and MIS survey data, 2005-2013**

<b>Indicator</b>	<b>DHS 2005</b>	<b>Interim DHS 2007/2008</b>	<b>DHS 2010</b>	<b>MIS 2013</b>
Proportion of households with at least one ITN	15%	57%	82%	83%
Proportion of children under five years old who slept under an ITN the previous night	13%	58%	70%	77%
Proportion of pregnant women who slept under an ITN the previous night	17%	62%	72%	76%
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 2007/2008, DHS 2010, 2013 MIS

Figure 10 shows malaria prevalence data per province. The geographical distribution of the malaria burden reflects the same pattern observed in the HMIS data (Figure 9).

**Figure 10 - Household-level parasite prevalence in children under five years of age, by province, 2010**



Source: DHS 2010

### **Challenges, Opportunities, and Threats**

Rwanda has made tremendous achievements in reducing morbidity and mortality from malaria over the last ten years. Globally, Rwanda has been recognized for the gains made in the health care sector in ensuring increased access to health care<sup>1</sup>. The country has put in place systems to ensure increased access to health care, especially by vulnerable populations. Key among these is the Community-Based Health Insurance (CBHI) and the Performance-based-Financing (PBF) which have increased access to health care and offer a foundation on which various health programs are implemented. However, one of the challenges facing the country is that the majority of the funding to the PBF and CBHI are dependent on external funding. According to the HSSP III 2012-2018, one of the vulnerabilities is ensuring financial and institutional sustainability of these initiatives. The GOR remains committed to ensuring the achievement of Vision 2020 through reducing population growth, improving maternal health, and reducing the burden of malaria. Undoubtedly, a strong health care system will be essential for pre-elimination of malaria.

The HSSP III articulates the priorities in the health sector over the next five years, which include sustaining the achievements already made against infectious diseases, improving access to health services, and institutional strengthening. Rwanda has already achieved high levels of coverage

<sup>1</sup> Lu Chunling, *et al.* Towards universal health coverage: An evaluation of Rwandan Mutuelles in its first eight years, PLOS June 18, 2012

with the various interventions. The Rwanda MIS 2013 showed high coverage of ITNs with at least 83% of the population owning one mosquito net. In addition, a large proportion of the population has correct knowledge on causes and prevention of malaria and over 95% of all fever cases are tested and treated appropriately. These achievements are an important opportunity that needs to be harnessed and sustained to ensure that Rwanda achieves its goals and targets by 2018.

Rwanda has a strong community-based health care system with a large cadre CHWs and a well-articulated and implemented strategy on iCCM of childhood diseases. CHWs play a pivotal role in the diagnosis and treatment of malaria at the village level. This is an invaluable opportunity that ensures utilization, accessibility, and appropriate and prompt treatment of malaria. In addition, the community health workers through the *Système Informatique de Santé Communautaire* (SIS-COM) are able to report data in a timely manner which informs and allows the program at the national level to respond to various needs at the community level. Rwanda also has a strong HMIS with high reporting rates from most health facilities. These are opportunities on which to build and strengthen surveillance in line with the Malaria Strategic Plan (MSP) as the country seeks to achieve pre-elimination. The importance of accurate and timely data, subsequent analysis, and rational response as the burden of malaria declines are paramount.

Rwanda's 2013-2018 MSP articulates the key interventions that will be necessary for the pre-elimination of malaria and the attendant resources by 2018. However, the prospects of achieving pre-elimination are under threat given declining global resources. Without the necessary resources to sustain the gains already made, it will be difficult for the country to reach the goal of pre-elimination. The HMIS documents significant increases in malaria cases when planned malaria interventions such as LLIN mass campaigns are delayed. It is critical that resources both domestic and global are mobilized and available to support the country and ensure that the targets and goals set in the strategic plan are achieved.

The reduction of the burden of malaria in Rwanda is threatened by the continued high prevalence of the disease in neighboring countries. Currently, the actual number of malaria cases that result from cross-border transmission are not well known, although local versus imported case categories are now being collected. The districts that border Tanzania, Uganda, and Burundi account for over 60% of the disease burden in the country. The MSP recognizes the importance of cross-border transmission and articulates the strategies for strengthening collaboration and linkages that will be critical for achieving pre-elimination in these specific districts. It is laudable that the MSP has recognized and articulated specific actions required to mitigate the threat posed by cross-border malaria transmission.

Increasing insecticide resistance poses a threat to many African countries. While Rwanda still has an effective insecticide to use for IRS, the country and partners are cognizant of the imminent threat insecticide resistance poses and especially in the context of declining resources and the prospect of transitioning to much more expensive insecticides. The NMCP has developed an Insecticide Resistance and Mitigation Plan (IRM) which is important for monitoring and taking ameliorative actions where necessary.

## **PMI Support Strategy**

The overall PMI strategy for Rwanda is aligned, complementary, and supportive of Rwanda's draft 2013–2018 National MSP, whose new goals are to achieve pre-elimination nationwide and near zero malaria deaths by 2018. To achieve this, PMI will make strategic investments that leverage resources from the GOR, development partners, and technical agencies. PMI's national-level support includes health system strengthening, support to the HMIS and SIS-COM, improvement of pharmaceutical and commodity supply chain management, and enhancement of BCC activities. Integrated interventions, including diagnostics, integrated community case management, reducing the burden of MIP, surveillance/monitoring/evaluation, and provision of antimalarial commodities and diagnostics in health facilities and communities, are specific priorities that PMI will continue to support.

Rwanda has prioritized decentralization and PMI will support this effort with building and transitioning capacity and supporting programs in the 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.

## OPERATIONAL PLAN

### Vector Control: Insecticide-Treated Nets and Indoor Residual Spraying

#### Insecticide-treated Nets

##### *NMCP/PMI objectives*

Rwanda achieved universal LLIN coverage in 2010/2011 after a rolling universal campaign and has prioritized maintaining universal coverage of LLINs. The HMIS data show the impact that LLINs have on the burden of malaria both in terms of decreases following mass distributions and increases when these replacement campaigns are delayed or sub-standard LLINs are distributed, supporting this prioritization. The primary objective is to maintain universal coverage and achieve over 90% use in children under five years of age and pregnant women through:

- Continuous distribution channels: ANC, EPI, and community through CHWs
- Universal coverage mass campaign in 2016.

As per RBM guidance, the NMCP defines universal coverage as one net for every two people. Surveys are conducted by CHWs quarterly to quantify LLIN needs by household and distribute LLINs if needed. Rwanda's national LLIN target elucidated in their 2013 – 2018 MSP is to achieve and maintain over 90% ownership and use.

##### *LLINs, HMIS, and upsurges*

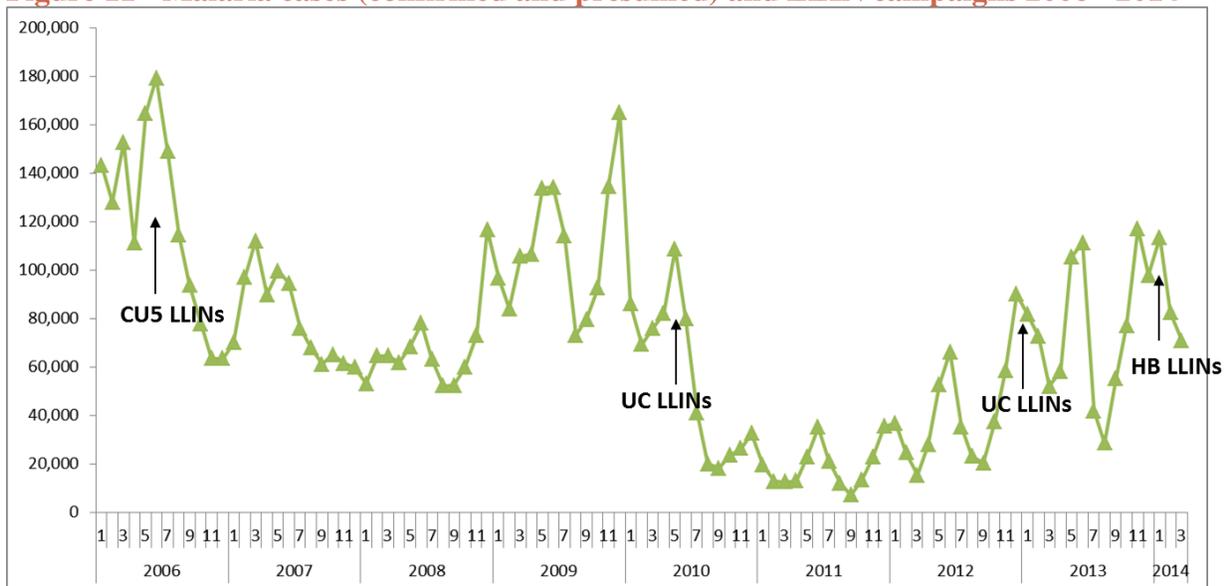
Rwanda has achieved significant reductions in the burden of malaria and documented unprecedented reductions following the first universal coverage LLIN campaign. Interestingly, Rwanda also shows upsurges in malaria (2009, 2012, and 2013). The NMCP has investigated the drivers of these upsurges and although they are multifactorial, LLINs appear to be a major factor (Figure 11) as malaria peaks correlate with delays in arrival of LLINs for a replacement campaign, waning LLIN efficacy after two years consistent with the LLIN net durability study results, and a recent problem with distribution of sub-standard LLINs.

In 2009, a universal coverage campaign was planned to expand the children under five campaign implemented in 2006, however the LLINs were delayed and not distributed until 2010/2011. Following this campaign, Rwanda documented unprecedented reductions in malaria cases in 2010 and 2011. Malaria cases started increasing in 2012, which corroborated net durability and efficacy data showing over 50% of LLINs losing efficacy within two years. The NMCP responded in 2013 with a universal campaign, but the HMIS showed increasing malaria cases and a 95% increase from 487,150 in 2012 to 949,966 confirmed cases in 2013. PMI has helped the NMCP investigate the increase and again LLINs appear to be a major factor. In this case, most of the LLINs distributed in 2013 were from one manufacturer who lost WHOPES certification in 2013. Pending tenders to the manufacturer were cancelled due to the loss of certification but over three million LLINs were distributed in high burden districts and the HMIS showed an increase in malaria cases in the following months rather than a decrease. Further

investigations of the manufacturer’s LLINs revealed a premature reduction in bioactive insecticide and therefore a significant reduction in mosquito mortality in WHO bioassays.

Other factors contributing to the upsurges were explored but there were no reported stockouts of ACTs or RDTs. Rwanda instituted a health insurance scheme in 2009 and there has been no major increase in access to health centers or integrated community case management since then. The NMCP and PMI are exploring climate data as evidence is growing that global warming is affecting previous malaria-free zones. Yet, no major increases of rainfall or temperature were noted and the malaria burden doubled in the usual high malaria burden districts whereas most epidemic prone districts remained low.

**Figure 11 - Malaria cases (confirmed and presumed) and LLIN campaigns 2006 - 2014**



CU5 LLINs (campaign targeting children under five)  
 UC LLINs (universal coverage campaign)  
 HB LLINs (campaign targeting high burden districts replacing sub-standard LLINs)

*Progress during the last 12 months*

In 2013, PMI planned to procure 400,000 LLINs in order to fill a gap in routine coverage. The tender was placed but it was cancelled as the manufacturer lost WHOPES approval. PMI consequently consolidated the order with the 1,000,000 LLINs planned for 2014, procuring 1.4 million nets to maintain universal coverage through continuous distribution channels including ANC, EPI, and the community.

PMI has also provided external technical assistance to the NMCP to identify, quantify, and forecast viable continuous distribution channels in Rwanda with the NETCALC™ software, which assists in LLIN quantification and forecasting. For sustainability, the consultants suggested working to strengthen the private sector sales of LLINs, however, Rwanda has a virtually non-existent private sector for LLINs. Therefore, the NMCP, PMI, and other stakeholders agreed to continue to implement a mass campaign specifically in 2016 and continuous distribution to target new cohorts through ANC and EPI and pilot a community-based

distribution. Rwanda will evaluate the effect of the different LLIN continuous distribution channels to maximize efficiency and impact and document coverage for the MDGs in the 2014/2015 DHS.

In 2013, PMI also supported technical assistance and data management for a MIS to obtain current LLIN ownership and coverage data. The MIS included multiple LLIN preference and perception questions. These results will inform LLINs specifications (i.e., conical vs. rectangular and preferred colors) and distribution to increase acceptance and adherence. As evidenced in 2009, 2012, and 2013, malaria cases can increase and maintaining high LLIN ownership and use is critical for Rwanda's goal of pre-elimination. Therefore, PMI will continue to support the NMCP to work with local civil society organizations to target the CHWs nationwide to carry out interpersonal communication sessions, community mobilization, and sensitization of the population to ensure net use and net care to prolong net longevity.

#### *LLIN gap analysis*

The NMCP 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). NETCALC™ software was used for quantification.

To maintain universal coverage, the NMCP's policy calls for replacement of old, expired LLINs every three years through phased rolling mass campaigns, which use malaria incidence trends to target high-risk districts. The NMCP also prioritizes distribution to high-risk vulnerable (pregnant women) and new populations (infants/children) with new delivery channels, notably community distribution through CHWs. In January 2013, LLINs were distributed to children under five years of age in Nygatare soon after arrival in country.

**Table D - Estimated projection of LLIN needs and gaps, 2014-2016**

<b>RWANDA ITN Gap Analysis</b>			
<b>Calendar Year</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
Total Targeted Population	12,022,635	12,365,180	12,713,052
<b>Continuous Distribution Needs</b>			
Channel #1 ( <i>primigravidae ANC</i> )	240,453	247,304	254,261
Channel #2 ( <i>EPI</i> )	492,928	506,972	521,235
Channel #3 ( <i>community through CHWs</i> )	1,007,986	643,393	-
<i>Estimated Total Need for Continuous</i>	1,741,367	1,397,669	775,496
<b>Mass Distribution Needs</b>			
2014/15/16 mass distribution campaigns	1,762,450*	-	7,062,807
<i>Estimated Total Need for Campaigns</i>	1,762,450	-	7,062,807
<b>Total Calculated Need: Routine and Campaign (Total Continuous Need + Total Mass Need)</b>	<b>3,503,817</b>	<b>1,397,669</b>	<b>7,838,303</b>
<b>Partner Contributions</b>			
PMI (estimated contributions by year)	1,400,000	375,000	1,000,000
Global Fund SSF(June 2014)**	1,293,688	0**	0**
<i>Estimated Total Partner Contributions</i>	2,693,688	375,000	1,000,000
Surplus/Carried over ITNs from previous year	-	-	-
<b>Total ITNs available in calendar year (Total Contributions + Total Surplus)</b>	<b>2,693,688</b>	<b>375,000</b>	<b>1,000,000</b>
<b>Total ITN Surplus* (Gap) (Total Need-Total ITNs Available)</b>	<b>(810,129)</b>	<b>(1,022,669)</b>	<b>(6,838,303)</b>

\*2014 replacement campaign in high burden districts of sub-standard nets distributed in 2013

\*\*Global Fund SSF ends in June 2014 and Rwanda is applying for the NFM for \$40 million over three years (\$13.3 million/year). If successful, the funds are planned to be disbursed by January 2015. At this time, the amount of funding available from the Global Fund for commodities is unknown. Once Global Fund resources are available, adjustments to these quantities may be made.

#### *Plans and justification*

The primary challenge in Rwanda is to maintain universal coverage through continuous distribution to new cohorts of children under five years of age, pregnant women, communities,

and through periodic mass campaigns, which will require adequate financing, forecasting, surveillance, and distribution. The NMCP also has to ensure proper and consistent use of LLINs in the context of possible reductions in malaria burden and reduced perceptions of risk.

Major threats facing malaria control and LLINs in Rwanda are established pyrethroid resistance in the Eastern Province and lack of durability of LLINs in the field. At the moment, the only insecticides recommended for LLINs are pyrethroids, primarily permethrin, alpha-cypermethrin, and deltamethrin. Resistance testing has confirmed pyrethroid resistance in one high malaria burden district with 18% and 20% mortality to permethrin and deltamethrin respectively. This district has achieved universal LLIN coverage and the NMCP and PMI are implementing IRS with carbamates in three high burden districts to mitigate the problem of pyrethroid resistance and conserve the efficacy of the LLINs.

PMI will support the maintenance of universal coverage with the procurement and distribution of LLINs, net durability assessment, and BCC campaigns to promote usage and prolong the longevity of the LLINs. PMI will procure 1,000,000 LLINs with FY 2015 funds (described above) to contribute to maintaining universal coverage and to address LLIN gaps in 2016, which are significant. Historically, PMI Rwanda has procured conical LLINs for routine coverage targeting vulnerable populations. Global Fund single source funding (SSF) will cover procurement of 1,293,688 LLINs in 2014. Global Fund SSF ends in June 2014 and the NMCP has \$6 million interim funding to cover the gap from June 2014 - January 2015. Rwanda will apply for the Global Fund NFM in June 2014. The malaria allocation is \$40 million for three years, therefore, the NMCP will have \$13.3 million/year from Global Fund if successful, which is planned to be disbursed in January 2015. This is a significant reduction (>50%) from historical Global Fund funding for Rwanda. PMI will work with the NMCP and the Global Fund to prioritize LLINs (possibly through FY 2014 reprogramming) and help mitigate the impact of this reduction in funding. However, the NMCP would like to conduct a mass campaign in 2016 to replace nets from the universal coverage campaign in 2013. Given the current level of resources from both PMI and the Global Fund, it is unlikely the projected LLIN gap will be filled without additional resources from the GOR and other donor support.

Given the usefulness of the results from the net durability study, which showed that the anticipated useful life of LLINs in Rwanda is approximately two years<sup>2</sup>, and the capacity built within the NMCP, PMI would like to continue to support net durability testing to test innovations in LLINs such as new materials or new insecticide combinations in field settings.

#### *Proposed activities with FY 2015 funding (\$5,875,000)*

PMI will support the NMCP's efforts to maintain universal LLIN coverage by procuring and distributing LLINs for distribution through continuous distribution, new delivery channels using CHWs to distribute at the community, and contribute towards universal coverage replacement mass campaigns. PMI will also support continued net durability monitoring using the entomological capacity built within the NMCP during the three-year prospective study. PMI will continue to focus BCC efforts at national and community levels to promote correct and

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<sup>2</sup> Hakizimana, E. *et al.* Monitoring Long-Lasting Insecticidal (mosquito) Net Durability to Validate Net Serviceable Life Assumptions, Rwanda., *Malaria Journal* (submitted April, 2014)

consistent usage (described under BCC) and explore net care and repair strategies to promote durability given the reduction in resources. Specific activities for FY 2015 funding include:

- *Procure and distribute 1,000,000 LLINs*: Support the procurement and distribution of free LLINs through continuous distribution channels targeting first-time pregnant women and newborns based on the gap analysis. Another novel channel involves CHWs monitoring and distributing LLINs in their communities. PMI will try to mitigate the impact of the reduced malaria funding by working with the NMCP, Global Fund, and other donors to advocate for additional funding to cover the large projected LLIN gap in 2016. (\$5,000,000)
- *MPPD management fee for 1,000,000 LLINs*: MPPD charges a 4.3% management fee for LLINs procured with donor funds; the fee covers import and storage. (\$215,000)
- *Distribution of 1,000,000 LLINs*: MPPD does not have the capacity to distribute LLINs due to their bulky nature. PMI has worked with an implementing partner to successfully distribute LLINs from the medical stores to health centers for routine distribution. Therefore, an additional \$0.50 per LLIN is included to provide transportation to the health center. (\$500,000)
- *Net durability and insecticide resistance monitoring*: Prospective LLIN durability, longevity, and efficacy monitoring of routine versus new net products. (\$160,000)
- *Community mobilization and health communications for LLIN use*: PMI will support the NMCP's efforts to work with CHWs and established local NGOs to carry out interpersonal communication sessions, community mobilization, and sensitization across all malaria interventions. (Budget included under BCC)

## **Indoor Residual Spraying**

### *PMI and NMCP objectives*

The national IRS strategy, based on the 2013-2018 MSP, targets specific sectors in high burden districts based on test positivity rates (HMIS data) and entomological indicators, including insecticide resistance, vector density/behavior, and entomological inoculation rates. IRS is seen as being complementary to sustained universal LLIN coverage, the keystone MSP intervention. In addition to supporting IRS operations, PMI resources support routine use of personal and environmental safety measures, entomological evaluation of IRS impact, and vector-insecticide susceptibility monitoring to inform IRS insecticide class selection.

### *PMI IRS program accomplishments*

Table E lists PMI-supported IRS rounds by date, target district, number of structures, and class of insecticide.

**Table E- PMI supported IRS, 2007-2014**

Round	Date	Districts	No. of structures sprayed (% targeted structures sprayed)	Insecticide
1	Aug-Sep 2007	Kigali (all three districts)	152,072 (96%)	Pyrethroid
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%)	
8	Aug-Oct 2012	Bugesera, Nyagatare, and Gisagara	236,610 (97.5%)	
9	Feb-Mar 2013	Bugesera, Nyagatare, and Gisagara	121,154 (99.6%)	
10	Sep- Oct 2013	Bugesera, Nyagatare*, and Gisagara	224,708 (98.1%)	Pyrethroid,*Carbamate
11	Feb-Mar 2014	Bugesera, Nyagatare, and Gisagara	123,919 (98.6%)	Carbamate

IRS targeting, based on the HMIS, has resulted in the withdrawal of IRS from some locations. For example, spraying was withdrawn from Kigali, Kirehe, and Nyanza Districts in 2012 due to significant declines in malaria cases. The intervention remains in Nyagatare, Bugesera, and Gisagara districts, where issues such as imported cases of malaria and eco-epidemiological conditions create a more intractable transmission situation.

Figure 12 shows districts (green) where PMI IRS activities are ongoing. Prevalence in all three districts is thought to reflect significant numbers of imported cases of malaria as well as autochthonous transmission.



insecticides appears to be widespread, probable evidence of carbamate resistance, observed in both 2011 and 2013, argues for a proactive shift to organo-phosphate (OP) class insecticides for IRS in September/October 2015 based on the IRS strategy in the IRM plan. While this decision is technically sound, it creates programmatic issues related to significantly greater insecticide costs and resource allocation. Although the Global Fund award is not yet approved, additional IRS support to cover the gap created by rotating to a more expensive IRS compound was factored into PMI planning.

**Table F - *Anopheles gambiae s.l* -insecticide susceptibility data, 2011 and 2013. Highlighted cells indicate either probable or confirmed instances of vector resistance (WHO thresholds\*)**

Insecticide resistance tests in 2011							
district	site	pyrethroid			oc <sup>1</sup>	carbamate	op <sup>2</sup>
		delta	λ-cyhal	permeth	ddt	bendiocarb	fenitrothion
Kirehe	Bukora	88	99	84	80	91	100
Nyanza	Busoro	100	100	100	100	100	100
Ruhango	Karambi	99	100	91	97	99	100
Kicukiro	Kicukiro	90	100	99	52	100	100
Rutsiro	Kivumu	100	100	100	95	96	100
Bugesera	Mareba	99	100	99	99	100	100
Rusizi	Mashesha	100	95	90	91	100	99
Nyamagabe	Mbuga	98	100	95	100	99	99
Nyagatare	Mimuli	98	100	86	76	94	100
Karongi	Mubuga	99	100	97	96	98	100
Musanze	Rwaza	99	100	100	96	91	100
Nyamasheke	Nyamasheke	93	99	89	75	96	99
Bulera	Rubaya	100	100	100	100	100	100
Kayonza	Rukara	94	100	84	--	99	100

Insecticide Resistance tests in 2013								
district	site	pyrethroid				oc <sup>1</sup>	carbamate	op <sup>2</sup>
		delta	λ-cyhal	permeth	Etofenpro x	ddt	bendiocarb	fenitrothion
Nyagatare	Nyagatare	82	74	76	76	99	100	100
Nyagatare	Mimuli	81	57	66	82	95	100	100
Bugesera	Mwogo	88	85	90	80	99	93	100
Bugesera	Rilima	99	95	98	97	100	97	100
Bugesera	Mareba	90	86	-	95	97	100	100
Gisagara	Kirarambogo	58	35	50	64	51	100	100
Gisagara	Gakoma	94	90	89	94	100	99	100
Nyanza	Busoro	87	77	95	90	89	100	100
Rusizi	Mashesha	97	88	89	90	88	100	100
Rusizi	Nkanka	99	96	97	100	99	100	100



### *Plans and justification*

PMI will continue to deploy IRS based on evidence from epidemiological and entomological surveillance. There will be continued emphasis on capacity building in anticipation of greater NMCP engagement in IRS, associated with Global Fund support. While the IRS targets for FY 2015 funding are still subject to change, it is envisaged that the PMI contribution will cover IRS for approximately 250,000 structures with a possible phased transition to an OP-class insecticide.

Given Global Fund support, the NMCP will assume even greater responsibilities for implementation of IRS activities, including payment of IRS spray staff, transport, staff services, warehouse and site management, and BCC mobilization activities. As much as possible, PMI will harmonize implementation with the NMCP to find efficiencies and cost savings in IRS operations. For example, a common insecticide procurement for both PMI and Global Fund funded IRS campaigns in Rwanda could occur through the established initiative-wide PMI procurement mechanism to take advantage of the guaranteed manufacturing time (thus assuring availability of insecticide) and to help lower prices for bulk orders of equipment such as protective gear. Other activities such as logistics, warehousing, and payment of spray operators and community mobilizers could be moved to the local government systems for additional cost savings.

### *Proposed activities with FY 2015 funding (\$6,255,360)*

- *Implementation of IRS in high burden districts.* Support spraying of approximately 250,000 structures in selected health sectors, located in three high-burden districts, as determined by HMIS data. The choice of insecticide, most likely an OP-class compound, will be informed by insecticide susceptibility testing results for 2014. Operational costs are based on previous expenditure analyses provided by the IRS implementing partner. Funds going to the PMI IRS implementing partner will be used to provide operational, logistical, and technical assistance as in the past.(\$5,893,360)
- *Entomologic monitoring activities.* Entomologic monitoring, described under the General Vector Control Section of this plan, will continue to guide decision-making on IRS moving forward.(\$350,000)
- *Technical assistance for IRS.* CDC staff will conduct one TA visit to assist with IRS planning and implementation and entomological monitoring. (\$12,000)

## **Malaria in Pregnancy**

### *NMCP/PMI objectives*

Rwanda's MIP activities include several WHO recommended interventions to prevent and promptly detect and treat malaria in pregnant women. This includes providing an LLIN to every

primigravidae (first pregnancy) on her first visit to an ANC clinic, low-dose iron/folate tablets for all pregnant women, and effective case management of pregnant women with fever after parasitological diagnosis by microscopy or RDTs. Rwanda stopped supporting IPTp in 2008 due to increasing parasite resistance to sulfadoxine-pyrimethamine and decreasing malaria prevalence nationwide and is now considering a switch to an intermittent screen and treat (IST) approach to preventing and controlling malaria in pregnancy.

Maternal mortality in Rwanda fell from 750 deaths (2005 DHS) to 476 deaths (2010 DHS) per 100,000 live births, a 36% decline. Most (98%) pregnant women visit an ANC clinic 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 Maternal Child Health (MCH) Program, in coordination with the NMCP, the Community Health Program, 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 (FANC), which is now available nationwide. Under this integrated approach, the NMCP helps to support the training of health care workers on focused antenatal care, and a cadre of maternal health community health workers (*Agents de Santé Maternelle* - ASMs). The ASMs identify pregnant women in their villages, distribute a first dose of low-dose iron, folic acid, and mebendazole for anemia prevention, promote LLIN use and encourage women to go early and regularly for their (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 in community health insurance schemes (*mutuelles*).

#### *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. Last year, PMI continued FANC and ASM support in 7 of the 30 districts; other districts were supported by the Global Fund. PMI supported FANC trainings in four districts – Ngoma, Nyarugenge, Ruhango, and Kigeme. Twenty health providers from each of the districts completed the theoretical and practical sessions, enabling them to provide FANC instead of routine ANC to pregnant women. All trained health providers left with an action plan for how to maintain their knowledge and skills base as well as a plan for training their co-workers on FANC. Another 21 trainees from 4 health centers were trained in FANC in March 2013. All trainees were enthusiastic about the training and each developed an action plan for implementing the approach in their respective health facilities. Rwanda has adopted the updated WHO guidance in treating MIP and quinine is available for the 1<sup>st</sup> trimester treatment. Health workers have been trained on the updated recommendations in the case management of MIP.

PMI has continued to strengthen the role of ASMs in malaria in pregnancy given the importance of early and frequent ANC visits. Fifty-seven supervisors in three districts were trained as trainers; through a cascade training program, 478 ASMs in those three districts were also trained.

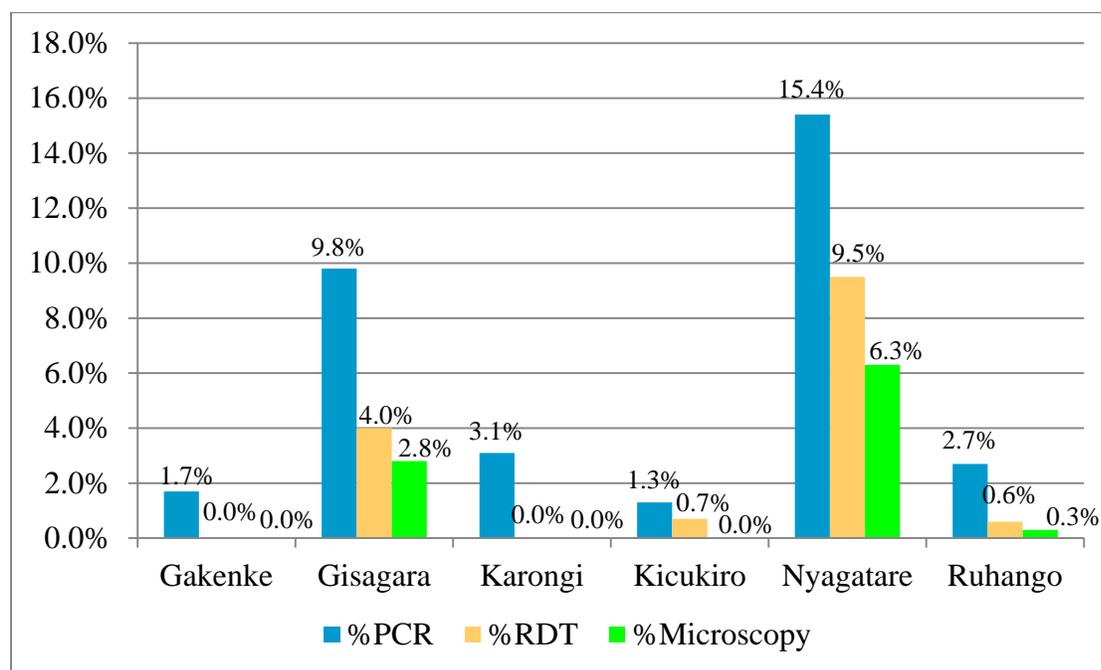
The trainings were integrated with the MCH program. After the trainings, ASMs reported an increase in confidence in providing education to pregnant women in terms of sleeping under an LLIN, birth preparedness, recognizing danger signs during pregnancy including malaria (i.e. fever while pregnant), the importance of going to a health center for delivery, and the importance of prenatal visits.

A CHW sensitization meeting was held in the Ngoma District to uncover the causes that lead to infant and maternal mortality and to integrate these results into facility and district level interventions. The meeting served as a platform for CHWs to discuss the challenges they faced encouraging pregnant women in communities to adhere to four standard ANC visits and to have their first visit before 14 weeks of gestation (these are the main quality improvement indicators selected by health facilities to improve quality); link those challenges with child and maternal deaths and home deliveries in the community; and identify the strategies to overcome identified problems.

#### *Rapid assessment of the burden of malaria in pregnancy*

The study of the burden of malaria in pregnancy was completed in 2012 and a final report has been submitted. The study was conducted in six sites with varying malaria endemicity and targeted both primigravidae and multigravidae at their first ANC visit. Peripheral malaria parasitemia 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 approximately 2%, 3%, and 6% at the national level for microscopy, RDT, and PCR respectively (Figure 14). High transmission settings (Nygatare and Gisagara) had the highest prevalence: 5%, 7%, 13% by microscopy, RDT, and PCR respectively. Figure 14 illustrates the district variability of prevalence by type of test and transmission setting.

**Figure 14 - Results of 2011-12 assessment of the peripheral malaria burden in pregnancy, by district and type of test**



### *Plans and justification*

After discontinuing IPTp in 2008, the NMCP is reevaluating their MIP approach to determine if another preventative strategy might be suitable in the context of pre-elimination. Results of the rapid assessment showed a relatively low nationwide malaria prevalence of approximately 2% in pregnant women by microscopy, 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 poor birth and maternal outcomes. In order to reduce this burden, the NMCP is considering the implementation of IST with RDTs during ANC visits. Their vision is to pilot the implementation of IST in a few districts and monitor and evaluate impact of this approach in reducing the burden of MIP in Rwanda. For FY 2015, the NMCP will continue to distribute LLINs to all primigravid women in 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 2015 funding (\$200,000)*

- *Implementation of malaria in pregnancy interventions at community, district, and national levels:* PMI will continue to support MCH and malaria interventions for pregnant women by providing technical assistance for MIP strategy development, coordination for strategy implementation 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 support FANC services, including the supervision of ASMs by health center supervisors; the training of ASMs; printing of training materials and routine data collection tools; evaluation of community outreach to pregnant women; and strengthening the linkage between ASMs and health facilities to promote early detection and treatment of malaria in pregnancy, LLIN use, and ANC attendance by pregnant women. PMI will work with the NMCP to pilot an implementation of IST in a few districts and evaluate its feasibility and efficacy. (\$200,000)

## Case Management

### Diagnosis

#### *NMCP/PMI objectives*

Rwanda's national malaria treatment policy states that all suspect cases of malaria should be laboratory confirmed by either microscopy or RDT prior to treatment with an ACT. The policy applies to all age groups and health facilities, communities, and the private sector. The diagnostic policy advocates the use of microscopy in health facilities and limits the role of RDTs to communities and in health facilities during emergency situations and at times when laboratory technicians are not available. RDTs have been introduced nationwide for use by community health workers (CHWs) for parasitological confirmation of malaria cases.

Rwanda has a well-established community-based health system for the management of malaria, diarrhea, and pneumonia. The NMCP supports iCCM in collaboration with the MOH Child Health Desk. The iCCM package includes treatment of malaria, pneumonia, diarrhea, and other components such as nutrition, family planning, hygiene, and palliative care. The trained CHWs responsible for implementing the package use RDTs to diagnose malaria and specially packaged ACTs for treatment at the community level. Currently, approximately 30,000 CHWs implement the iCCM package throughout the country's 30 districts. PMI Rwanda supports iCCM in seven districts and the Global Fund supports the other districts. Financing of community-based health care is provided through the community insurance scheme, small fees collected for medications, and community performance-based financing.

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

Diagnostic capacity is a critical component of malaria case management, particularly in the context of Rwanda's rapidly decreasing malaria transmission and changing epidemiology. Rwanda has made remarkable progress to ensure appropriate malaria diagnosis before treatment with ACTs. With PMI and Global Fund support, Rwanda has achieved greater than 95% laboratory confirmation of malaria cases with microscopy at health facilities and RDTs at the community level (source: HMIS).

The change to universal diagnostic testing has resulted in increased attention to provider behavior. Monthly supervisory visits from district health staff to health centers have been conducted in seven PMI-supported districts. With FY 2013 funds, PMI procured over 1 million

RDTs, 581,000 gloves as well as 200 microscopes and supplies for use in health facilities (i.e., reagents for slides).

Activities for diagnosis at the community level included updating and distributing iCCM tools to incorporate changes from the new protocols on RDT use and quality control. This facilitated the revision of a number of indicators and the harmonization of information between the Sick Child Recording Form and other related tools such as the Referral Sheet, Reporting Form, Drugs Supply Tool and Supervision Checklist. From October to December 2013, 355 health care providers and 6053 CHWs from all seven PMI-supported malaria districts (Gasabo, Kicukiro, Nyarugenge, Ruhango, Kirehe, Kayonza, and Ngoma) received iCCM refresher training in the use and management of RDTs as well as CHW kits (bags, flashlights). Additional refresher training is planned for June 2014 for CHWs that require further support based on evaluations. iCCM quarterly supervision from central level to district hospital, health center, and community levels is currently ongoing.

**Table G - RDT gap analysis, 2013– 2016**

GAP ANALYSIS FOR RDTs	2013	2014	2015	2016
Total fever cases countrywide*	4,417,492	4,699,496	4,999,600	5,321,185
Total fever cases diagnosed as clinical malaria in outpatient ( <i>Health clinics</i> )	2,816,492	2,985,481	3,164,610	3,354,486
Total fever cases diagnosed as clinical malaria at ( <i>Community level-routine</i> )	170,560	177,382	184,478	191,857
Total fever cases after reduction in fever cases with increase of use of vector control measures	3,975,743	3,759,597	1,499,880	5,321,186
Need in RDT	1,854,485	1,982,708	2,119,805	2,268,603
Buffer stock	216,357	216,357	216,357	-
<b>Total RDTs needed</b>	<b>2,070,842</b>	<b>2,199,065</b>	<b>2,336,162</b>	<b>2,268,603</b>
Available RDTs ( <i>already financed from GF</i> )	1,786,727	-	-	-
Available RDTs ( <i>already financed from PMI</i> )	250,000	831,000	581,000	-
<b>Total RDTs available</b>	<b>2,036,727</b>	<b>831,000</b>	<b>581,000</b>	<b>-</b>
Final Gap of RDTs needed	34,115	1,368,065	1,755,161	2,268,603

\*Data from the DHS, adjust for reporting rates and coverage

\*\*Based on the targets in the National Strategic Plan

#### *Plans and justification*

In line with Rwanda’s 2013-2018 Malaria Strategic Plan to “ensure all malaria cases are tested with a quality diagnosis<sup>4</sup>”, PMI will continue to procure RDTs for use in the communities and microscopes for the health facility level. In addition, PMI will continue to support iCCM trainings and procurement and distribution of necessary equipment and reporting tools. PMI support for the quality control of microscopy and RDTs will be provided to the district hospitals and health centers for QA/QC for RDTs at the community. Given the importance of universal malaria diagnosis, the NMCP works with the NRL with PMI support to ensure quality functional

<sup>4</sup> Draft Rwanda Malaria Strategic Plan, April 2014 Version

microscopes at health centers and RDTs at the community. QA/QC of RDTs at the community is conducted via outreach from the health centers. The NMCP has a procurement plan for laboratory commodities and PMI procured 85 microscopes in late 2013. As Rwanda moves towards pre-elimination it will begin to engage in reactive case detection as described in the 2013-2018 MSP and will need some technical assistance to design the best course for implementation.

*Proposed activities with FY 2015 funding (\$522,400)*

- *Procure approximately 1 million RDTs:* PMI has been supporting procurement of RDTs for use by CHWs in communities. PMI will also support customs clearance, storage, and transport. (\$380,000 for RDTs, \$30,400 for clearance, storage)
- *Procure microscopes and laboratory consumables:* PMI has been supporting the MoH policy for mandatory laboratory confirmation before ACT treatment. PMI will continue this support by procuring 170 microscopes and laboratory consumables. (\$100,000)
- *Technical assistance for diagnosis related to pre-elimination:* CDC staff will conduct one TA visit to assist with strengthening malaria diagnosis in the context of pre-elimination. This includes helping the NMCP think through their reactive case management strategy. (\$12,000)

Treatment

*NMCP/PMI objectives*

All health facilities use artemether-lumefantrine (AL) as the first-line treatment for uncomplicated malaria. Oral quinine is recommended when AL is contraindicated, such as in children weighing less than 5 kilograms and pregnant women in their first trimester, and as the second-line treatment for cases of uncomplicated malaria when AL is not well tolerated or available. In 2011, Rwanda changed its treatment policy for the first-line treatment of severe malaria from parenteral quinine to parenteral artesunate; parenteral quinine and parenteral artemether remain as second-line alternatives. Intramuscular artesunate is recommended as pre-referral treatment for the management of severe malaria in health facilities only.

At the community level, trained CHWs provide treatment (after positive diagnosis with RDT) to children under five years of age in the community with prepackaged ACTs that have been specifically packaged with pictorial dosing information and BCC information in the local language (Kinyarwanda) to ensure proper dosing. There is no policy to date for pre-referral treatment for the management of severe malaria at the community level although discussions are ongoing.

*Progress during the last 12 months*

PMI has supported refresher trainings and supervisory visits from the NMCP and district staff have been trained to promote the implementation of quality Integrated Management of Childhood Illness (IMCI) in health facilities. In addition, PMI supported the review and update of facility-based IMCI guidelines and training materials and supervision visits conducted post-

training to ensure utilization. The use of IV artesunate was adopted in 2012 and scaled up in 2013 for severe malaria treatment. With FY 2013 funds, PMI procured 62,000 ampules of injectable artesunate. PMI also supported a severe malaria audit and the field work was completed; analyses and dissemination of results are pending.

Antimalarials for health facilities continue to be covered mostly under Global Fund grants. However, because deliveries of Global-Fund procured ACTs were delayed, PMI supported the NMCP request for emergency procurement using FY 2013 funds, for a total of 300,000 ACTs of which 30,000 were included in the FY 2013 MOP. The stockouts created an opportunity for the MPPD, the NMCP, and PMI to further improve data sharing and transparent forecasting and planning.

#### *ACT gap analysis*

Funding for ACTs in the public sector has been supported primarily by Global Fund. Because of Rwanda's successful applications for Global Fund grants, PMI currently provides only gap funding support for malaria commodities.

**Table H - Gap analysis for ACTs 2014-2017**

GAP ANALYSIS FOR ACTs	2014	2015	2016	2017
<b>Malaria endemic: All population is at risk</b>	11,686,013	12,022,635	12,365,180	12,713,052
Number of simple malaria cases expected at HF and community level*	1,031,464	825,171	742,654	668,389
Number of simple malaria cases to be treated through reactive detection	550,140	440,112	396,101	396,101
Number of PW to be treated through ANC services **	3,354	3,450	3,549	3,649
<b>Total number of malaria cases targeted***</b>	<b>1,584,958</b>	<b>1,268,733</b>	<b>1,142,304</b>	<b>1,068,139</b>
Buffer stock (includes ACT needs for outbreak response)	716,431	515,740	447,835	397,491
<b>Total ACTs needed</b>	<b>2,301,389</b>	<b>1,784,473</b>	<b>1,590,139</b>	<b>1,465,630</b>
No. of treatments financed (GF)	574,720	934,191	-	-
No. of treatments financed (PMI)	280,000	420,000	-	-
<b>Gap in ACTs needed</b>	<b>1,446,669</b>	<b>430,282</b>	<b>1,590,139</b>	<b>1,465,630</b>

\*Assumption: The baseline is 2012-2013, morbidity rate of 0.06% calculated based on the general population / growth population rate 2.6%

\*\*4.1% of population are PW, 0.7% are malaria cases data from DHS2010

\*\*\* Based on 82% coverage at health facility, and 16% at community level

#### *Plans and Justification*

In line with Rwanda's 2013-2018 MSP to "ensure all malaria cases are promptly treated in line with national guidelines<sup>5</sup>", 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. PMI will continue support to the national iCCM program in seven districts.

*Proposed activities with FY 2015 funding (\$2,367,240)*

- *Procure malaria drugs:* PMI will procure 350,000 ACT treatments and 100,000 vials of parenteral artesunate for severe malaria. (\$803,000)
- *Management and distribution of malaria treatments:* Costing estimates approximately 8% to deliver supplies and will also support customs clearance, storage, and transport for all commodities. (\$64,240)
- *Support for integrated community case management implementation:* PMI will continue to support implementation of the iCCM package in seven 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, 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. (\$1,500,000)

## **Pharmaceutical Management**

The MOH procures antimalarials and supplies for health facilities through the Medical Procurement and Production Division (MPPD), which is part of the Rwanda Biomedical Center. The MPPD 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. PMI uses implementing partners to procure malaria commodities and to work to strengthen the supply chain in Rwanda. Malaria commodities will be integrated into the coordinated procurement and distribution system (CPDS) with family planning, HIV, and other health commodities, which will improve donor coordination and flexibility with responding to delivery delays or other impediments. Rwanda is also considering joining the PPMRm (Procurement Planning & Monitoring Report for Malaria) which will improve health commodity procurements.

A paper-based Logistics Management Information System (LMIS) for all program-related commodities was launched in 2011, and an electronic LMIS system (e-LMIS) was rolled out and will be fully scaled up by December 2014, funded by PEPFAR, PMI, and the Global Fund. The e-LMIS harmonized the process for collecting logistics data across all programs. A joint PMI

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<sup>5</sup> Draft Rwanda Malaria Strategic Plan, April 2014 Version

and PEPFAR assessment of the supply chain was conducted in August of 2011 to evaluate the implementation of the LMIS and measure system performance including product availability at the facility and district pharmacy levels for a variety of products.

With PMI and PEPFAR funds, USAID has assisted with the establishment and training of the Logistics Management Office (LMO). The LMO is 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 also provides supportive supervision of supply chain management to health facilities and district pharmacies. New directors have been named and capacity building has been prioritized by the MoH.

Parliament approved the creation of the Rwanda Food and Medicines Regulatory Authority in 2013. The authority will assist the Pharmacy Task Force in implementing its mandate to guarantee quality control of incoming and circulating drugs. The Pharmacy Task Force was created 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 NMCP conducts antimalarial drug quality control annually with the support of the pharmacy department of National University of Rwanda, where drugs collected at all levels of health care are sampled and sent for drug analysis.

#### *Progress in the last 12 months*

In 2013, PMI helped support the roll-out of the e-LMIS system. This support included holding an e-LMIS user acceptance testing workshop, supporting an e-LMIS TOT and roll-out workshop. In addition, PMI supported the operationalization of the Rwanda National Pharmaceutical Supply Chain Strategic Plan.

#### *Plans and justification*

To improve the procurement of needed commodities, PMI will continue to support forecasting, quantification, and procurement planning for ACTs and mRDTs and will support the LMO to institutionalize supply chain management functions and expand the identified supply chain best practices in the community. Support for malaria commodity logistics will continue to focus on monitoring the LMIS and newly rolled out e-LMIS to ensure continued availability of ACTs and other malarial commodities at health facility level. PMI will also support the harmonization and integration of supply chain indicators with the national malaria logistics indicators and logistics supervision tool.

Pharmaceutical and supply chain strengthening activities will also include: ensuring capacity building of malaria staff in standardized quantification principles to align them with CPDS procedures; ensuring supply chain system strengthening by formative supervision through district pharmacies; support the implementation, mentorship and evaluation of key performance indicators for supply chain management focusing on malaria health commodities; strengthening of MPPD in supply chain management system in order to improve procurement process of malaria commodities; strengthening the utilization of e-LMIS for porting, ordering and quantification for malaria commodities.

#### *Proposed activities with FY 2015 funding*

- *Central Level Supply Chain Management*: 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 (Coordinated Procurement and Distribution System), as well as support implementation of the electronic logistics management system (e-LMIS). (\$300,000)

## **Monitoring and Evaluation**

### *NMCP/PMI objectives*

Rwanda is a data-rich environment and the NMCP, districts, and health centers are using evidence to refine and target malaria control interventions. Certain districts in Rwanda (mainly north and western) continue on the path toward malaria pre-elimination, defined by WHO as a malaria test positivity rate (microscopy or RDT) among febrile patients of <5%. Many other districts (mainly eastern and southern) remain well above the 5% threshold, resulting in a national-level malaria test positivity rate (29% in 2013) considerably higher than the pre-elimination target. The test positivity rate also varies significantly per year as described in Table A. Despite these trends, Rwanda's National MSP 2013-2018 lays out an ambitious plan to achieve pre-elimination by 2018 and the NMCP is in the process of developing a 2013–2018 M&E plan with PMI and other stakeholder support.

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

- *HMIS*: The HMIS indicators and forms were revised and a new web-based platform (DHIS2), 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 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. Since 2012, the community information system SIS-COM has been linked to the HMIS through DHIS2. Private sector treatments are currently not reported.
- *Community information system*: This system originally included two systems: a paper-based system with performance-based financing, through which 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 CHD. The system was transitioned into the community-based SIS-COM (*mUbmizima*), which includes community diagnosis, treatment, and essential drug logistic information. SIS-COM is separate from the HMIS, although since 2012, it has been linked to the HMIS through the DHIS2 web-based platform. SIS-COM incorporates a real-time, web-based data platform, with a minimum set of indicators. The registers and reporting formats were designed specifically to collect community data generated by CHWs using cell phones. As of November 2012, all 30 districts were trained on the cell phone-based reporting system.

- *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. There is a functional weekly epidemiological reporting system in place.
- *Entomological surveillance:* See Vector Control/Entomology Section.
- *Logistics management information system (LMIS):* A paper-based system harmonized across all programs launched in early 2011 provides basic data on drug consumption, laboratory commodities, and stockouts at health facilities, independent of the HMIS. Reports flow from health facilities to district offices to MPDD and will be used for quantification. Currently, data are provided by the HMIS and district pharmacy reports to the NMCP through biannual quantification workshops with all district pharmacy directors. An automated LMIS will be rolled out in 2013, which will improve data quality and access.
- *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 an MIS was conducted in 2013. The current MIS includes malaria-related behavioral questions but does not include biomarkers as the estimates would be constrained by sample size. The upcoming 2014/2015 DHS will collect malaria and anemia biomarkers and dried blood spots for possible future testing.
- *Research and routine monitoring activities:* Activities include participating in household surveys to track use of LLINs, monitoring drug and insecticide efficacy, evaluating community case management, participating in health facility surveys, and malaria in pregnancy.

In the context of pre-elimination, experts at the 2012 malaria forum recommended that Rwanda enhance surveillance and epidemic response capacity as it has successfully scaled up interventions and is transitioning from malaria control to pre-elimination. Malaria trends attest to a shifting malaria epidemiology and the NMCP and partners need to adapt to these changes to better target effective interventions, monitor progress, and evaluate impact. The transition to pre-elimination will require a shift from scale up of malaria control to focused enhanced surveillance, case investigation and response, which will need more vigilance and resources. PMI will assist Rwanda in evaluating their progress towards the Millennium Development Goals (MDGs) and the Abuja targets in preparation for the 2015 deadline.

**Table I - Rwanda Monitoring and Evaluation Table, 2009-2017**

Data Source	Survey Activities	Year								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
Household surveys	Demographic Health Survey (DHS)*		X				X			
	Malaria Indicator Survey (MIS)					X			X	
	TRAC**	X			X					
Health facility surveys			X		X		X		X	
Malaria Surveillance and Routine System Support	Support to “enhanced” malaria surveillance system						X	X	X	X
	Support to HMIS	X	X	X	X	X	X	X	X	X
Therapeutic	<i>In vivo</i> efficacy testing						X	X	X	
Entomology	Entomological surveillance and resistance monitoring	X	X	X	X	X	X	X	X	X
Other Data Sources	Malaria Impact Evaluation					X	X			
	Net durability monitoring			X	X	X	X	X	X	X

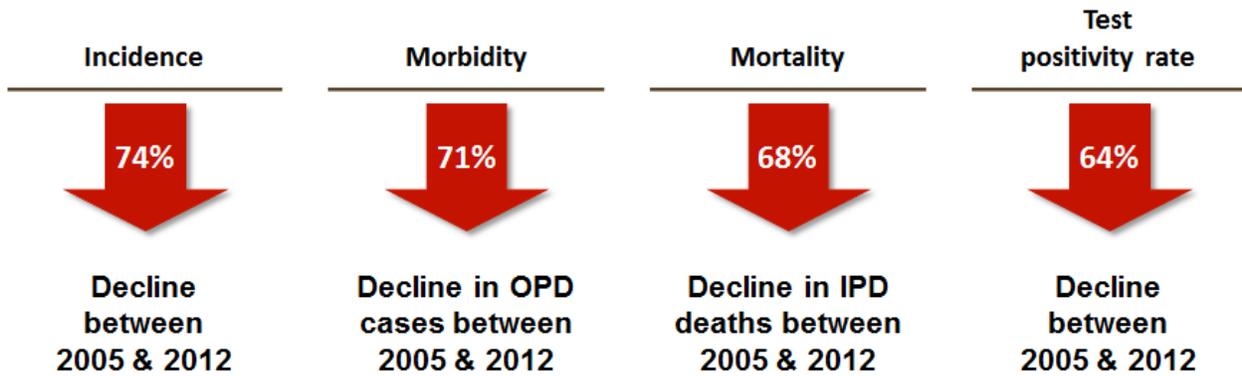
\*Not PMI-funded

\*\*TRAC, Malaria Control Behavioral Tracking Survey

### *Progress in M&E since PMI launch*

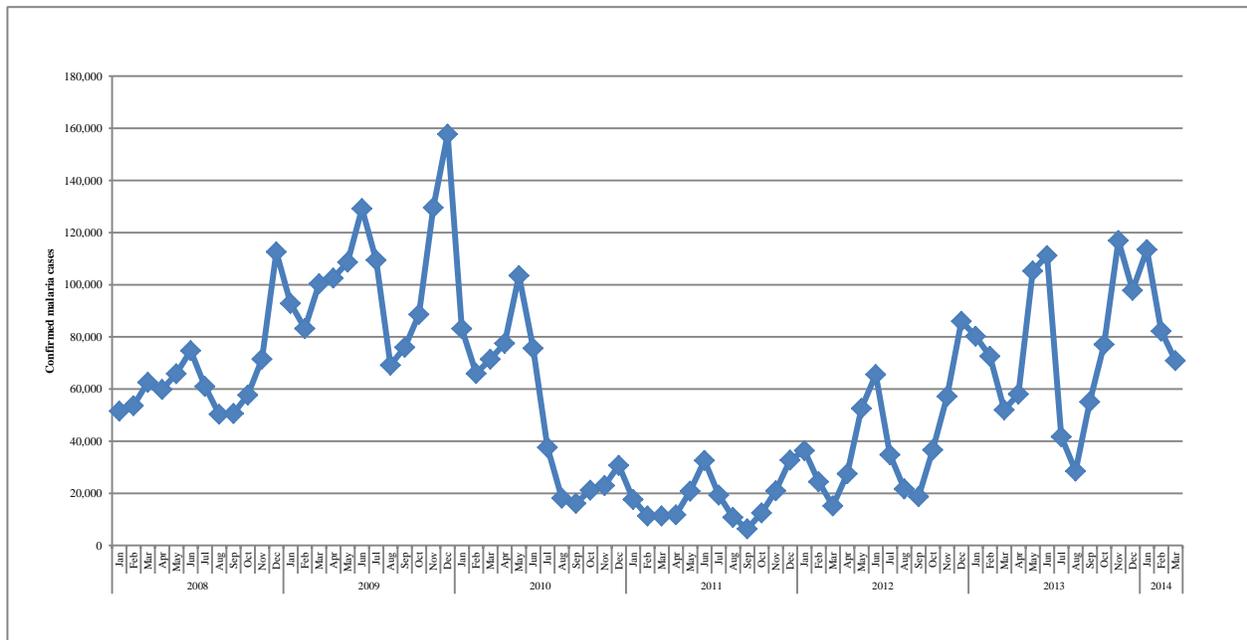
Rwanda has achieved remarkable reductions in the burden of malaria since the inception of PMI (Figure 15). From 2005 to 2012, Rwanda saw a 74% decrease in malaria incidence, a 71% decrease in malaria morbidity, and a 68% decrease in malaria mortality as reported by HMIS. Despite these unprecedented reductions, Rwanda experiences fluctuations in numbers of confirmed malaria cases. Since 2012, Rwanda has reported increasing numbers of confirmed malaria cases, with nearly 500,000 confirmed cases in 2013 (Figure 16). However, these increases were partially due to increased diagnostic confirmation of microscopy and RDTs at health centers, availability of RDTs for community health workers, and a consistently improving HMIS.

**Figure 15 - Malaria trends in Rwanda, 2005-2012**



As described in Figure 16, the fragile nature of malaria control is evidenced by increases in malaria cases occurring in late 2009/early 2010 and in late 2012/early 2013. These experiences highlight the importance of updating the epidemic thresholds and developing an epidemic detection and response strategy with rational evidence-based approaches. However, one caveat in preparing for an epidemic is to acknowledge the challenge of setting up epidemic thresholds (usually based on 3-5 year trends) in the context of ongoing reductions in the malaria burden over time. As malaria prevalence abates, epidemic thresholds will need to be continuously revised downward and will require ever higher reporting frequency.

**Figure 16 - Rwanda Out-Patient Department Confirmed Malaria Cases, 2006–2014**



Health facilities report routine data on confirmed malaria cases through the HMIS and CHWs report through SIS-COM (*mUbmizima*). Both systems, supported through PMI and PEPFAR, are vital for tracking malaria trends and were integrated in 2012 under the DHIS2 web-based platform. DHIS2 allows password-restricted web access to PMI resident advisors (RAs), the NMCP, and other stakeholders, plus real-time reporting, analysis, and mapping. The NMCP, PMI, and HMIS section have developed data dashboards with relevant malaria indicators to facilitate data analysis, presentation, and timely decision making at the district and central levels by malaria officers and the NMCP. PMI is also supporting the NMCP and partners to pilot mobile phone-based reporting in one district with low malaria burden (TPR<1%) as well the development and implementation of a database to track individual malaria cases in the context of pre-elimination. Districts with low test positivity rates will be transitioned over time with the aim of community-based surveillance by CHWs.

Data reports are complete, submitted in a timely fashion, and generally of high quality. Reporting is enhanced through PBF 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.

Malaria trends were influenced 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, these decreasing malaria trends have been corroborated and triangulated over time through HMIS, SIS-COM, and MIS and DHS results.

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

Rwanda continues to make progress in monitoring and evaluation, as seen by evidence-based decision-making with data from the HMIS and SIS-COM, a completed 2013 MIS, piloting of mobile reporting and investigation in a low prevalence district, and entomological monitoring. PMI continued to strengthen the NMCP M&E capacity by training HMIS unit staff. DHIS2 has been functional for a year with web-based access and data are being analyzed and reported in a more timely fashion, with increased quality, and increased access through the web-based platform. The NMCP continues to monitor data quality, with PMI support, by conducting semiannual data quality assessments of reported malaria cases. PMI collaborated with the MOH in participating in the annual Global Fund on-site data verification process. Both assessments have found high concurrence between HMIS records and health facility registers.

With the goal of pre-elimination by 2018, the NMCP has prioritized epidemic surveillance and response. This includes enhanced surveillance from health facilities, real-time cell phone reporting by CHWs, and subsequent case investigation and follow-up. With the significant reductions in malaria, PMI has also supported the NMCP in mapping and stratifying malaria cases, calculating new epidemic thresholds, and standardizing protocols for epidemic surveillance and response. PMI has also supported the development and finalization of the 2013-2018 MSP. With PMI support, the NMCP and partners are also in the process of documenting best practices in malaria control with health system strengthening, impact evaluation, and a Roll Back Malaria (RBM) Progress & Impact series report.

### *Plans and justification*

PMI will continue to support the NMCP to strengthen evidenced-based decision making throughout the health system with the focus on decentralization. PMI will continue to strengthen M&E staff capacity to maintain high quality data, perform data analysis, and make data-based programmatic decisions. On the path towards pre-elimination, Rwanda will need to shift toward enhanced surveillance and epidemic detection and response and move from limited aggregate data to individual reporting and line listings with additional data such as travel history. PMI will support the NMCP with the development of a pre-elimination database and will hire a data manager to oversee and analyze the reactive case detection data from the enhanced surveillance districts (included in capacity building section). Following a year of implementation, the efficacy, feasibility, and cost effectiveness of the pre-elimination surveillance will be evaluated through an external assessment of the pre-elimination data. With decreasing malaria burden and the transition from stable endemicity to unstable epidemicity, the GOR has prioritized decentralization of data collection and use to increase the ability of districts to analyze and respond to upsurges in malaria. PMI will support the NMCP to sustain decentralized M&E capacity, build a database, and improve the HMIS to ensure that pre-elimination data needs are met. With FY 2015 funds, PMI will also technically support the planning and implementation of a MIS in 2016/17 and a health facility survey to assess intervention coverage and clinical capacity and quality, respectively.

### *Proposed activities with FY 2015 funding (\$850,000)*

- *Supportive supervision visits by the NMCP:* PMI will help support NMCP staff to provide adequate supportive supervision to district health teams, health facilities, and community case management workers to ensure high quality recording and reporting of malaria test results and improved data management and use at the local level. (*\$100,000*)
- *Enhanced community surveillance, case investigation, and epidemic response:* PMI will expand training of CHWs on real-time mobile reporting of confirmed malaria cases in six epidemic-prone districts. Support will also be provided to ensure case investigation and follow-up as part of strengthening epidemic response as Rwanda transitions towards pre-elimination in targeted districts. (*\$500,000*)
- *Therapeutic drug efficacy monitoring:* PMI will support routine monitoring of the treatment efficacy of first- and second-line antimalarials at three sites. (*\$150,000*)
- *Support planning for a 2016/17 MIS:* PMI will contribute to the 2016/2017 MIS by providing support to the MOH and technical assistance to monitor Rwanda's MSP. (*\$100,000*)

### **Operational Research**

As part of optimizing PMI programs, operational research (OR) plays an important role in improving upon implementation of malaria control strategies. In previous fiscal years, PMI supported a study to determine the prevalence of malaria among pregnant women. The cross

section study included six rural health centers with varying malaria transmission and included testing via microscopy, RDT, and polymerase chain reaction. Pregnant women attending their first ANC appointment were recruited. The results show a low national burden of malaria in pregnancy among this population (microscopy 1.6%, RDT 2.5%, and PCR 5.7%), however, malaria in pregnancy appears to still be problem in high malaria burden districts and the NMCP is working with PMI to pilot a novel approach - intermittent screen and treat (IST) to reduce this burden.

PMI also supported a prospective three-year net durability monitoring activity to examine the physical durability and insecticide residual efficacy of LLINs although this was not formally considered OR. The study included six study sites in three different transmission zones (low, moderate, and high) and urban and rural settings. The results showed that over 50% of both polyester and polyethylene LLINs failed due to holes or lack in durability after 18 to 24 months in the field. Manufacturers suggest that LLINs last between 3 to 5 years, thus the NMCP and PMI were surprised by the difference of the longevity in the field. The results from these studies have directly impacted Rwanda’s programming (see MIP and LLIN sections). PMI has no OR studies planned with FY 2015 funding.

**Table J - PMI-funded operational research studies in Rwanda**

<b>Completed OR Studies</b>			
<b>Title</b>	<b>Start date</b>	<b>End date</b>	<b>Budget</b>
A study to determine the current prevalence of malaria detectable among pregnant women registering for ANC in six districts in Rwanda: Evidence for developing and implementing a new malaria in pregnancy strategy in the context of reducing malaria prevalence	March 2011	Dec 2012	\$200,000
<b>Ongoing OR Studies</b>			
<b>Title</b>	<b>Start date</b>	<b>End date</b>	<b>Budget</b>
N/A	-	-	-
<b>Planned OR Studies FY15</b>			
<b>Title</b>	<b>Start date</b>	<b>End date</b>	<b>Budget</b>
N/A	-	-	-

## **Behavior Change Communication**

### *NMCP/PMI objectives*

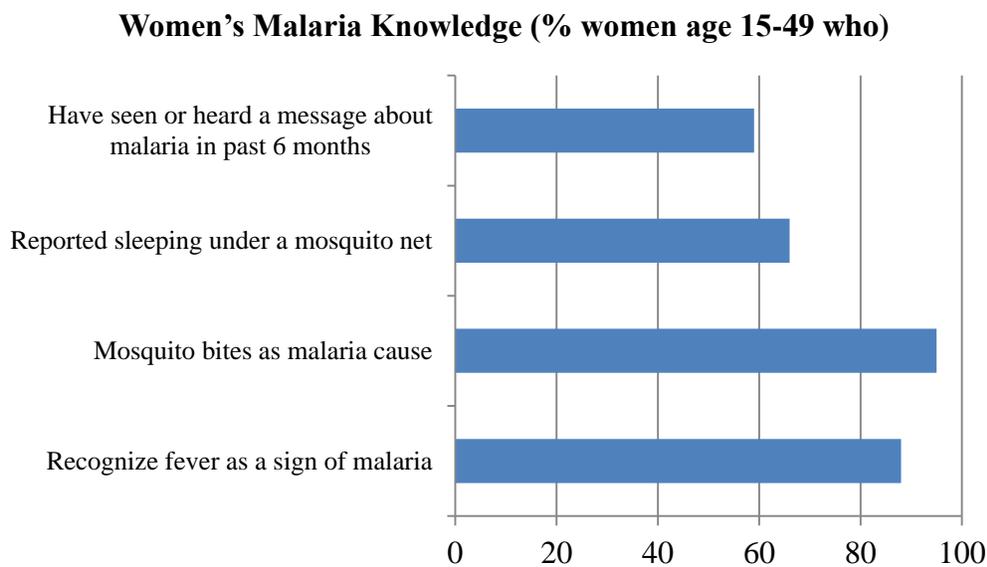
Rwanda’s National BCC Policy for the Health Sector aims to strengthen the implementation of overall development objectives in Rwanda. This national policy emphasizes enabling the population to make informed health behavior choices through providing appropriate information, using quality messages and methods, including use of media and interpersonal communication. The 2013–2018 National MSP and Rwanda’s Malaria Communication Strategy 2008–2012 stress the importance of interpersonal communication within the community as the cornerstone of any malaria intervention in Rwanda. Interpersonal communication should build on an “enabling environment” and strengthened health services. All health behavior change activities are under the auspices of the Rwanda Center for Health Communication within the MOH. This

center coordinates, integrates, and harmonizes health messaging across the MOH, working specifically with the NMCP and other programs.

*Progress during the last 12 months*

In the last year, PMI/Rwanda has supported BCC activities promoting LLIN use, improving malaria case management, MIP, and supporting IRS. To promote LLIN use and improve case management nationwide, PMI supported new billboards stressing diagnostics and treatment, mobile video sessions to promote sleeping under a bed net, drama shows on malaria in towns and villages, sessions on how to use malaria treatment drugs, community events on malaria prevention, and interpersonal communication sessions. A total of 134 radio messages were communicated country wide. An estimated 15,127 people were reached through drama presentations, 2,745 through mobile video units and a total of 585 reached through interpersonal communication. As the country prepares for the pre-elimination of malaria, the use of interpersonal communication channels will be scaled up to reach more community members. Due to PMI and other partners' support for BCC activities, especially through radio, the Rwanda Malaria Indicator Survey (RMIS) 2013 (Figure 17) showed that 59% of women had seen or heard messages about malaria in the past six months. In addition, the RMIS showed that 95% of the women reported mosquito bites as the cause of malaria and 88% recognized fever as a sign of malaria.

**Figure 17 - Women's (age 15 – 49) Malaria Knowledge, 2013 MIS**



The following BCC activities were conducted in three districts to increase acceptance and uptake of IRS: community meetings, door-to-door mobilization, use of CHWs and other volunteers to disseminate information about the project, and mass media. The mobilization also used the monthly community work days (*umuganda*) that are set on the last Saturday of each month to sensitize communities to IRS through local leaders. Of the targeted structures in the February 2014 spray season, 99% were sprayed.

### *Plans and justification*

With FY 2015 funding, PMI will support implementation of the NMCP's new BCC strategy 2013–2018. New plans and strategies for BCC will be based on the revised communication strategy and built on successes of the ongoing BCC interventions with an emphasis on the changing malaria situation, both in Rwanda and in bordering countries. If the situation evolves as expected, with Rwanda ready for pre-elimination by 2018 in areas with very low prevalence, BCC will focus on risk perception with reminders that malaria can still return, therefore people should still sleep under nets and be sure to go to the health facility or CHW with fever symptoms. In districts that share borders with other countries, BCC will need to be intensified for residents, in particular those who cross borders into neighboring countries. Efforts aimed at those who cross borders from countries with strong malaria transmission should be considered as well. These efforts can build on discussion among neighboring countries at the pre-elimination forum regarding possible collaboration activities.

Rwanda has integrated health messaging, which helps extend the reach of malaria-only messages. In addition, the Global Fund has supported and will continue to support a significant amount of malaria BCC efforts. PMI plans to use this funding to target the six high-prevalence districts and evaluate BCC activities' impact. PMI will also continue malaria messaging through support of existing Rwandan BCC channels such as the *umudugudu* (village) and *umuganda* networks (community work and messaging days). PMI will also prioritize evaluation of malaria messages, channels, and impact to ensure that malaria BCC is effective.

### *Proposed activities with FY 2015 funding (\$250,000)*

- *Community integrated BCC*: PMI funding will continue to strengthen capacity through the development of communication materials, updating relevant strategies, monitoring the outcomes of BCC interventions, and working with partners to refocus efforts to interventions that have the greatest influence in impacting behavior. In addition, PMI will support community-level efforts to implement promotion of LLINs, IRS, MIP, and case management. Integrated health messaging in interpersonal communication and mass media will be used to promote continued use of LLINs, IRS, and MIP despite declining malaria transmission and prompt malaria diagnosis and treatment. (*\$100,000*)
- *Central level support for BCC*: PMI funding will continue to strengthen capacity through central level support to the Health Communication Center and NMCP to implement their national BCC strategy and to continue helping them shape BCC messages as they relate to the MSP goal of moving towards pre-elimination. (*\$100,000*)
- *Repackaging ACTs*: Support the repackaging of ACTs for use at the community level, ACTs that have been specifically packaged with pictorial dosing information and BCC information in the local language (Kinyarwanda) to ensure proper dosing. (*\$50,000*)

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

### *NMCP/PMI objectives*

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 PBF and community-based health insurance. These programs, as well as current efforts to determine the costs of essential health services and the recently launched e-LMIS to track all resources in the health sector are supported by the USG and other development partners.

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, continued to support capacity building of the national medical stores to forecast, procure, store, and distribute health commodities and provided technical assistance to the coordinated procurement and distribution system and the LMO for all health commodities. The support included updating and the launch of the e-LMIS nationwide.

PMI continued to support human resource needs at the NMCP. PMI supported the development of standard operating procedures and job aids on malaria diagnosis, including external quality control, slide preparation, and smear staining. In particular, PMI supported the linking of the community-based information system SIS-COM to the HMIS. PMI has also supported capacity building for entomological capabilities in Rwanda. PMI has supported refurbishing and equipping the entomology laboratory and insectary, routine entomological monitoring, specimen analysis and insecticide resistance testing, training of sentinel site technicians in data reporting, entomological techniques and insecticide resistance testing, and supported three NMCP staff to participate in a training on advanced entomological techniques including PCR, ELISA, and general laboratory management at Kenya Medical Research Institute (KEMRI) and International Centre of Insect Physiology and Ecology (ICIPE) in Kenya. PMI will continue to provide technical support for the laboratory technician in charge of raising and maintaining the *Anopheles gambiae* colony.

## **Capacity Building**

The organizational relationships within the MOH have been restructured with consolidation of many public and private health entities into an overarching center, the Rwandan Biomedical Center. The NMCP sits within the Rwandan Biomedical Center, which encompasses malaria, HIV, TB, NRL, and the School of Public Health. Their mandate covers all parasitic diseases as well as neglected tropical diseases.

### *Progress during the last 12 months*

PMI supported three seconded positions (housed at the NMCP):

- 1) A logistics officer who works in the LMO to analyze and respond to eLMIS.
- 2) A laboratory technician for the newly refurbished entomological laboratory.
- 3) A data manager to develop a database and tools, and collect and analyze data from the “enhanced” surveillance pre-elimination districts.

PMI also supported the Rwandan Field Epidemiology and Laboratory Training Program (FELTP). FELTP is a public health training program to enhance competencies in applied epidemiology, implementation, evaluation, and management of disease interventions, surveillance strengthening, epidemic preparedness and response, and leadership skills. The program is managed and supported by the MOH in collaboration with the School of Public Health, CDC Rwanda, and other partners. FELTP residents participate in malaria-specific trainings during the course, and the PMI resident advisors have worked with the CDC FELTP advisor to develop and implement malaria-specific projects among malaria FELTP residents including:

- Develop an insecticide resistance mitigation strategy documenting what additional tests are needed and actions to be taken
- Pilot an enhanced surveillance/case follow-up in a low prevalence district using CHWs and mobile technology
- Develop a QA/QC strategy for ensuring quality of RDTs at the community level
- Implement a therapeutic drug efficacy trial to monitor the effectiveness of ACTs and failure rates
- Assist in the documentation of best practices and RBM’s Progress and Impact Series
- Conduct a literature search on countries who are in the process of achieving pre-elimination

PMI has supported FELTP malaria residents since FY 2012. Five staff members from the NMCP have been part of the FELTP training program to date. During the two-year program, FELTP trainees enroll in a long course in the pursuit of a Masters of Public Health. Following the course portion, the residents take part in a field practicum where they are embedded within the NMCP and work daily with the staff on malaria control issues. Currently, there are three FELTP trainees and they are working on the following papers for publication: Prevalence and Factors Associated with Malaria in Pregnancy in Rural Rwandan Health Facilities - A Cross-sectional Study; Rwanda’s First Malaria Indicator Survey, 2013: Coverage of Malaria Interventions; and A decade of Progress: Impact of Scaling up Malaria Control Interventions in Rwanda, 2005-2012.

Since 2012, PMI Rwanda has supported third-year Peace Corps Volunteers (PCVs) who work with PMI to help increase knowledge and understanding of malaria for other PCVs as well as local communities. Although Peace Corps has been collaborating with PMI since FY 2012 initially focusing on iCCM activities, the Peace Corps’ Stomping Out Malaria in Africa (STOMP) initiative was formally launched in 2013 in Rwanda with a goal to increase the number of volunteers and their counterparts working in malaria prevention by 20%.

One of the primary goals of the STOMP program is the education and training of both PCVs and local communities. In the past year, 1,100 volunteers were engaged in malaria activities and 222,000 individuals were reached via the different activities. In the past year, the Rwanda

STOMP program presented at five volunteer conferences, reaching 90+ volunteers and 40+ Rwandans with 20 hours of malaria prevention and control and health outreach training; they hosted a three-day Training of Trainers for 12 new Regional Malaria Volunteers; three PCVs attended an intensive two-week training in Senegal (Stomping Out Malaria in Africa Boot Camp) and three more will be attending Boot Camp in early June 2014. Peace Corps also supported Grassroot Soccer training for 14 volunteers and 14 Rwandans on sports and health education, focused on HIV/AIDS and malaria prevention (40 hours) and 100 students from the Nyamesheke and Rusizi Districts are writing and performing HIV/AIDS and malaria prevention radio sketches; 4 shows have aired since September 2013.

The Rwanda STOMP program also hosted a Malaria Expo comprised of 45 PC volunteers and 45 Rwandans attending a 4-day conference on malaria prevention and community mobilization. Participants learned about BCC, interactive learning, and disease prevention and went home with materials to do activities in their communities. At the end of the expo, Rwanda counterparts reported a 56% increase in their ability to correctly list three proven malaria prevention interventions. Peace Corps volunteers hosted 7 Girls Leading our World (GLOW) and Boys Excelling (BE) camps in November, reaching 400+ students and 28 adult facilitators. Each camp planned and organized its own unique malaria sessions. A camp at Kayonza Modern School hosted daily youth-led lessons using Malaria No More's NightWatch curriculum and distributed nearly 100 nets. Rwanda also did a "Bike Out Malaria" tour where 15 volunteers travelled some 150 very hilly kilometers in Kirehe and Ngoma Districts and reached over 750 students at 5 different schools with malaria prevention and control education messages.

Malaria PCVs also collaborated with People Living With HIV/AIDS sewing Co-op and taught village-level net care and repair. One hundred and fifty people living with HIV/AIDS were trained in malaria prevention and control and income generation activities in the Kirehe District. After the training three tailor shops were open each shop offering low-cost net care and repair services and displaying repaired, "beautified" nets (sewing local cloth on top of the seams at the bottom of mosquito nets).

PMI also supports a WHO national program officer who technically supports the NMCP and will help to facilitate cross-border efforts.

*Proposed activities with FY 2015 funding (\$480,000)*

- *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 e-LMIS system for routine quantification, forecasting, and procurement. (Funding included in case management section)
- *Support in-country technical assistance for the implementation of pre-elimination activities:* PMI will support a data manager/epidemiologist as a seconded staff member to the NMCP to provide TA on the implementation of pre-elimination activities and surveillance. (\$75,000)

- *Support M&E capacity of the NMCP with supervision, data quality audits, and dissemination:* PMI will support capacity building within the NMCP by supporting supervision visits, quarterly data quality audits, dissemination of best practices, M&E results, and impact at international conferences. (\$250,000)
- *Support to FELTP Program.* PMI will continue to support two malaria residents to the FELTP program and contribute to the advanced training of Rwandan epidemiologists for a 12-month period. The trainees will receive assistance from Resident Advisors and participate in malaria field assignments and investigations throughout Rwanda. (\$75,000)
- *Support WHO National Program Officer for Malaria:* PMI will support a WHO national program officer who will work on promoting cross-border collaboration and finalizing memorandums of understanding which coordinate border malaria control efforts between Rwanda and its malaria endemic neighbors. (\$60,000)
- *Support for third-year PCVs:* PMI will continue support up to two third-year PCVs for placement with an implementing partner. The PCVs will continue to engage in training and educational activities for other PCVs and Rwandan communities. Technical supervision will be provided by a PMI Resident Advisor and the implementing partner. Costs include housing, a computer, workspace in the central office, local travel, and a phone. (\$20,000)

## **Staffing and Administration**

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

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

The PMI lead in country is the USAID Mission Director. The two PMI RAs, one from USAID and one from CDC, report to the Senior USAID Health Officer for day-to-day leadership, and work together as a part of a single interagency team. The technical expertise housed in Atlanta and Washington guides PMI programmatic efforts and thus overall technical guidance for both RAs falls to the PMI staff in Atlanta and Washington. Since CDC resident advisors are CDC employees (CDC USDD—38), responsibility for completing official performance reviews lies with the CDC Country Director who is expected to rely upon input from PMI staff across the two

agencies that work closely day in and day out with the CDC RA and thus best positioned to comment on the RA's performance.

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

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

- *Staffing and administration:* Support for USAID and CDC Malaria Advisors and support staff within USAID Mission plus associated administrative costs. (\$900,000)

**Table 1  
President's Malaria Initiative - Rwanda  
Planned Obligations by Mechanism FY2015**

<b>Mechanism</b>	<b>Proposed Activity</b>	<b>Geographical Area</b>	<b>Activity Budget</b>
<b>New commodity/supply chain project</b>			
	LLIN procurement	National	5,000,000
	Management fee for LLINs	National	215,000
	Distribution of LLINs	National	500,000
	Procure RDTs	National	380,000
	Management fee for RDTs	National	30,400
	Procure lab supplies	National	100,000
	Procure ACTs	National	574,000
	Management fee for ACTs	National	45,920
	Procure artesunate	National	229,000
	Management fee of artesunate	National	18,320
	Central supply chain management	National	300,000
<b>Subtotal New commodity/supply chain project</b>			<b>7,392,640</b>
<b>TBD</b>			
	Net durability monitoring	Targeted districts	160,000
	Indoor residual spraying	Targeted high burden districts	5,893,360
	Entomological monitoring	12 sites	350,000
<b>Subtotal TBD</b>			<b>6,403,360</b>
<b>CDC</b>			
	IRS technical assistance	National	12,000
	TA for diagnostics	National	12,000
	Support for FELTP trainees in malaria	National	75,000
<b>Subtotal CDC</b>			<b>99,000</b>
<b>MCSP (Maternal and Child Survival Project)</b>			
	Early detection and treatment of malaria in pregnancy (MIP)	National	200,000
	Support NMCP supervision	National	100,000
	Enhanced community surveillance, case investigation, and epidemic response in epidemic-prone districts in the context of pre-elimination	6 epidemic-prone districts	500,000
	Strengthening of BCC	National	100,000
	Support capacity building of the NMCP for M&E, DQA, and dissemination of country success stories	National	250,000
<b>Subtotal MCSP</b>			<b>1,150,000</b>

<b>FHP</b>			
	Integrated community case management	7 districts	1,200,000
	Support Peace Corps	National	20,000
	Drug efficacy survey	3 sites	150,000
	Support data manager for pre-elimination	National	75,000
<b>Subtotal FHP</b>			<b>1,445,000</b>
<b>TBD</b>			
	Integrated community case management	7 districts	300,000
<b>Subtotal TBD</b>			<b>300,000</b>
<b>MACRO</b>			
	Contribute to 2016-2017 Malaria Indicator Survey	National	100,000
<b>Subtotal MACRO</b>			<b>100,000</b>
<b>SFH</b>			
	BCC of LLINs, MIP, and CCM	National	100,000
	Repackage ACTs	National	50,000
<b>Subtotal SFH</b>			<b>150,000</b>
<b>WHO</b>			
	Support WHO National Program Officer for malaria	National	60,000
<b>Subtotal WHO</b>			<b>60,000</b>
<b>USAID/CDC</b>			
	PMI staff (USAID and CDC) and associated administrative expenses	National	900,000
<b>Subtotal USAID/CDC</b>			<b>900,000</b>
<b>Grand Total</b>			<b>18,000,000</b>

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

Proposed Activity	Mechanism	Budget		Geographical area	Description
		Total \$	Commodity \$		
<b>PREVENTIVE ACTIVITIES</b>					
<b>Insecticide-Treated Nets</b>					
LLIN procurement	New commodity/supply chain project	5,000,000	5,000,000	National	Procure 1,000,000 LLINs to contribute to routine coverage of EPI, ANC, and community.
Management fee for LLINs	New commodity/supply chain project	215,000		National	MPDD charge (4.3%) as requested by NMCP (same rate as GF for LLINs)
Distribution of LLINs	New commodity/supply chain project	500,000		National	Distribution of 1 million LLINs from MPDD to HCs (\$0.5)
Net durability monitoring	New commodity/supply chain project	160,000		Targeted districts	Monitor routine efficacy and durability of LLINs distributed through PMI
<b>SUBTOTAL ITNs</b>		<b>5,875,000</b>	<b>5,000,000</b>		
<b>Indoor Residual Spraying</b>					
Indoor residual spraying	TBD	5,893,360	4,000,000	Targeted high burden districts	Support the NMCP in spraying approximately 250,000 structures (includes procurement of insecticide and materials, environmental compliance, etc.)
Entomological monitoring	TBD	350,000		12 sites	Support ongoing entomological monitoring at 12 sites
IRS technical assistance	CDC	12,000		National	CDC entomologist technical assistance for monitoring IRS implementation
<b>SUBTOTAL IRS</b>		<b>6,255,360</b>	<b>4,000,000</b>		
<b>Malaria in Pregnancy</b>					
Early detection and treatment of malaria in pregnancy (MIP)	MCSP	200,000		National	Support and strengthen malaria in pregnancy (MIP) activities including FANC training, supervision of ASMs and distribution of necessary materials

<b>SUBTOTAL MIP</b>		<b>200,000</b>	<b>0</b>		
<b>SUBTOTAL PREVENTIVE</b>		<b>12,330,360</b>	<b>9,000,000</b>		
<b>Case Management</b>					
<b>Diagnosis</b>					
Procure RDTs	New commodity/supply chain project	380,000	380,000	National	Procure 1 million RDTs for use of CHWs at community level
Management fee for RDTs	New commodity/supply chain project	30,400		National	MPDD charge (8%)
Procure lab supplies	New commodity/supply chain project	100,000	100,000	National	Procure 170 microscopes and other lab consumables
TA for diagnostics	CDC	12,000		National	CDC technical assistance for pre-elimination diagnostics
<b>SUBTOTAL - Diagnosis</b>		<b>522,400</b>	<b>480,000</b>		
<b>Treatment &amp; Pharmaceutical Management</b>					
Procure ACTs	New commodity/supply chain project	574,000	574,000	National	Procure 350,000 ACTs for community
Management fee for ACTs	New commodity/supply chain project	45,920			MPDD charge (8%)
Procure artesunate	New commodity/supply chain project	229,000	229,000	National	Procure 100,000 doses of artesunate
Management fee for artesunate	New commodity/supply chain project	18,320		National	MPDD charge (8%)
Integrated community case management	FHP	1,200,000		7 districts	Implementation of iCCM in 7 districts including training, supervision, support, tools, and supplies
Integrated community case management	TBD	300,000		7 districts	Implementation of iCCM in 7 districts including training, supervision, support, tools, and supplies.
Central supply chain management	New commodity/supply chain project	300,000		National	Support strengthening electronic LMIS, CPDS, and quality control of antimalarials

<b>SUBTOTAL - Treatment &amp; Pharmaceutical Management</b>		<b>2,667,240</b>	<b>803,000</b>		
<b>SUBTOTAL CASE MANAGEMENT</b>		<b>3,189,640</b>	<b>1,283,000</b>		

<b>Monitoring and Evaluation</b>					
Support NMCP supervision	MCSP	100,000		National	Support supervision visits to the district, HC, and community including case management, QA/QC for diagnosis, and data
Enhanced community surveillance, case investigation, and epidemic response in epidemic-prone districts in the context of pre-elimination	MCSP	500,000		6 epidemic-prone districts	Support implementation of case investigation and response for pre-elimination
Drug efficacy survey	FHP	150,000		3 sites	Support routine monitoring of the treatment efficacy of first- and second-line antimalarials at three sites
Contribute to 2016-2017 Malaria Indicator Survey	MACRO	100,000		National	Support planning and TA for implementation of 2016-2017 Rwanda Malaria Indicator Survey
<b>SUBTOTAL M&amp;E</b>		<b>850,000</b>	<b>0</b>		
<b>Operational Research</b>					
N/A					
<b>SUBTOTAL OR</b>		<b>0</b>	<b>0</b>		
<b>Behavior Change Communication</b>					
BCC for LLINs, MIP, and CCM	SFH	100,000		National	Support to BCC for the community level, including printed and radio messages, interpersonal activities
Strengthening of BCC	MCSP	100,000		National	Central level support and capacity building to the Health Communication Center and the NMCP to implement national strategy and continue to design messaging as it relates to pre-elimination goal
Repackage ACTs	SFH	50,000		National	Repackage ACTs with pictorial dosing information and BCC information in the local language (Kinyarwanda) to ensure proper dosing
<b>SUBTOTAL -BCC</b>		<b>250,000</b>	<b>0</b>		

<b>Health System Strengthening/Capacity Building</b>					
Support data manager for pre-elimination	FHP	75,000		National	Support data manager in monitoring and evaluating pre-elimination activities
Support capacity building of the NMCP for M&E, DQA, and dissemination of country success stories	MCSP	250,000		National	Support NMCP staff to attend trainings, conferences, and M&E capacity building
Support for FELTP trainees in malaria	CDC	75,000		National	Support for FELTP trainees in malaria and disease surveillance for capacity building
Support WHO National Program Officer for malaria	WHO	60,000		National	Support WHO National Program Officer
Support Peace Corps	FHP	20,000		National	Support up to 2 PCVs for the PC/PMI STOMP initiative
<b>SUBTOTAL - HSS</b>		<b>480,000</b>	<b>0</b>		
<b>In-country Staffing and Administration</b>					
PMI staff (USAID and CDC) and associated administrative expenses	USAID/CDC	900,000		National	Support for USAID and CDC Malaria Advisors and support staff within USAID Mission plus associated administrative costs
<b>SUBTOTAL - In-Country Staffing</b>		<b>900,000</b>	<b>0</b>		
<b>GRAND TOTAL</b>		<b>18,000,000</b>	<b>10,283,000</b>		