

This Malaria Operational Plan has been endorsed by the U.S. Global Malaria Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. If any further changes are made to this plan, it will be reflected in a revised posting.



**PRESIDENT'S MALARIA INITIATIVE**

**Malaria Operational Plan (MOP)**

**RWANDA FY 2012**

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## **ABBREVIATIONS and ACRONYMS**

ACT	artemisinin-based combination therapy
ANC	antenatal clinic
AQ	amodiaquine
AL	artemether-lumafantrine
ASM	Agents de Sante Maternelle (specialized maternal community health workers)
BCC	behavior change communications
BEST	best practices at scale in the home, community and facilities
CAMERWA	Centrale d'achat des Medicaments Essentiels, Consumables et Equipements Médicaux du Rwanda
CBO	community-based organization
CCM	community case management
CDC	Centers for Disease Control and Prevention
CHD	Community Health Desk
CHW	community health worker
DfID	Department for International Development
DHS	Demographic and Health Survey
EIR	entomologic inoculation rate
EPI	Expanded Program for Immunization
ESR	epidemic surveillance and response
FANC	focused antenatal care
FY	fiscal year
FBO	faith-based organization
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, TB, and Malaria
GOR	Government of Rwanda
HBMF	home-based management of fever
HCC	Health Communication Center
HMIS	health management information system
CCM	integrated community case management
IDSR	Integrated Disease Surveillance and Response
IEC	information, education and communication
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
LLIN	long-lasting insecticide-treated bed net
MCH	maternal and child health
MDG	Millennium Development Goals
MIP	malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health

MOP	malaria operational plan
NGO	non-governmental organization
NMCP	National Malaria Control Program
NRL	National Reference Laboratory
OVC	orphans and vulnerable children
PEPFAR	President's Emergency Plan for AIDS Relief
PLWHA	people living with HIV/AIDS
PMI	President's Malaria Initiative
PMTCT	prevention of mother-to-child transmission (of HIV)
QA/QC	quality assurance/quality control
RBC	Rwanda Biomedical Center
RBM	Roll Back Malaria
RDT	rapid diagnostic test
RPO	Rwanda Partner Organization
SIS-com	community information system
SP	sulfadoxine-pyrimethamine
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

## EXECUTIVE SUMMARY

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

The President's Malaria Initiative (PMI) is a core component of the GHI. The PMI was launched in June 2005 as a 5-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, funding for PMI has now been extended through FY 2014. Programming of PMI activities follow the core principles of GHI: encouraging country ownership and investing in country-led plans and health systems; increasing impact and efficiency through strategic coordination and programmatic integration; strengthening and leveraging key partnerships, multilateral organizations, and private contributions; implementing a woman- and girl-centered approach; improving monitoring and evaluation; and promoting research and innovation. Rwanda officially became a PMI country in FY 2007, although the USG had been supporting malaria control activities for several years before that.

Rwanda has made significant achievements in scaling up malaria control interventions. During an intense 15-month campaign, Rwanda distributed over 6.1 million LLINs and was one of the first African countries to reach universal net coverage in February 2011. The indoor residual spraying program expanded and covered more than 303,000 houses and protected more than 1.3 million Rwandans in 2010; the 2011 spray campaign will commence in August and will target 325,000 houses. Progress in case management is equally impressive. Less than two years after the MOH directed that all presumed malaria cases be laboratory confirmed, reports indicate that 96% of all malaria cases are confirmed by microscopy or rapid diagnostic tests. Community health workers (CHWs) continue to play a pivotal role in malaria case management, and Rwanda's extensive network of 60,000 CHWs are being trained and mobilized to implement integrated community case management.

The results of these efforts were seen in the Demographic and Health Survey (DHS) of 2010. Preliminary survey reports include a net ownership rate of 82% (compared with 57% in the interim DHS of 2007/2008) and usage rates by children and pregnant women of 70% and 72% (compared with 58% and 62% in 2008). These rates do not reflect an additional 2.5 million nets distributed immediately after the survey. National prevalence estimates in children under five continue to decline, from 3% in 2007/2008 to 1.4% in 2010. Malaria control efforts, combined with significant improvements in maternal and child health, vaccinations, and HIV/AIDS, have reduced all-cause under five mortality by

50%, from 152 deaths per 1,000 live births in 2005 to 76 deaths per 1,000 live births in 2010.

The FY 2012 Malaria Operational Plan for Rwanda was developed in close consultation with the National Malaria Control Program (NMCP) and with the participation of all national and international partners involved with malaria prevention and control in the country. The activities that PMI is proposing to support with FY 2012 funding are based in part on recommendations from the recent Malaria Program Review, were designed to support the vision of the 2012-2017 National Malaria Control Strategy and Plan which will be drafted over the next six months, and will build on investments made by PMI and other partners to improve and expand malaria-related services. The proposed FY 2012 PMI budget for Rwanda is \$18.1 million. Based on discussions and meetings with the NMCP and partners, the following major activities will be supported:

**Insecticide-treated nets (ITNs):** The NMCP seeks to maintain universal long-lasting ITN (LLIN) coverage for all age groups, defined as one net for every two people or three nets per household. The main delivery channels will remain free mass distribution during integrated health and vaccination campaigns, and routine distribution of free nets through antenatal care (ANC) and Expanded Program for Immunization (EPI) clinics in all health centers. The NMCP is also exploring other channels (e.g., orphanages and boarding schools) to maintain coverage. In collaboration with the NMCP and other partners, PMI procured and distributed 1.36 million LLINs (581,000 with FY 2008 funding, 388,000 with FY 2009 funding, 390,000 with FY10 funding) which contributed to the 6.1 million LLINs provided to households and vulnerable populations during the 2010/11 household coverage campaigns and were distributed to pregnant women and newborns in July 2011 by health facilities. With FY 2011 funds, 500,500 LLINs will be procured and distributed to households and vulnerable populations during 2012.

With FY 2012 funding, PMI will procure 400,000 nets to contribute to maintaining universal coverage. These nets will be distributed through routine distribution channels targeting pregnant women at ANC and infants in EPI clinics. The PMI is also strengthening LLIN distribution systems to district and community levels to prevent stock-outs, and is increasing information, education, communication/ behavior change communication (IEC/BCC) activities at national and community levels, particularly among CHWs, to promote correct and consistent net use. In addition, PMI will continue to support the NMCP to assess the durability and longevity of LLINs to guide replacement strategies.

**Indoor residual spraying (IRS):** The PMI supports the NMCP's strategy to reduce malaria transmission through IRS in targeted high-risk areas. In September 2011, PMI will support a seventh spray round to reach approximately 325,000 houses. Unlike the 2010 spray campaign, the 2011 campaign will feature blanket spraying (i.e., spraying entire districts as opposed to targeting sectors within districts) in five provinces. Given low transmission rates in the capital, Kigali, the NMCP decided to redirect spraying in Kigali to Gisagara. In addition to procuring insecticide and spray equipment, recruiting and training CHWs as spray operators, and associated IEC activities, PMI supports

technical assistance to the NMCP to build entomological capacity for insecticide resistance monitoring as well as other aspects of the entomology monitoring plan.

With FY 2012 funding, PMI will support the NMCP to implement an integrated vector management strategy based on recommendations from the PMI-supported draft strategy. The PMI will support either one spray round targeting 325,000 to 360,000 houses, or two spray rounds targeting 162,000 to 180,000 houses per round. The frequency of spraying will be determined by analysis of entomological and epidemiological data. Based on financial and technical assessments of district capacity that will begin in 2011, PMI intends to transition elements of spraying operations (e.g., payment of spray operators, transport, etc.) to select districts in 2012 after financial and technical/programmatic audits. As this transition will have budgetary implications, the exact 2012 targets will be refined in mid-2012.

**Malaria in Pregnancy (MIP):** Because of increasing parasite resistance to sulfadoxine-pyrimethamine and decreasing malaria prevalence, the NMCP discontinued intermittent preventive treatment of malaria in pregnancy (IPTp) in 2008. The PMI continues to support other aspects of the prevention and treatment of MIP, including procurement of iron/folate tablets for pregnant women and LLINs for distribution at ANCs. The Maternal Child Health (MCH) Program in coordination with the NMCP, the Community Health Program and the Expanded Program for Immunization, have with support from PMI and other partners developed an integrated approach to deliver quality health care for pregnant women. The services provided by these units, in addition to fetal growth monitoring and birth preparation, make up the focused antenatal care package, which is now available in 26 of 30 districts nationwide. With FY 2010 funding, the NMCP, PMI, and partners are designing a rapid assessment to measure the burden of malaria in pregnancy in Rwanda and the results will be used to inform the MIP strategy.

With FY 2012 funding, PMI will support implementation of the recommendations from the assessment, and will continue to facilitate training and supervision of maternity-specific CHWs, evaluate performance of community outreach to pregnant women, and strengthen linkages between CHWs and health facilities to promote LLIN use and ANC attendance by pregnant women.

**Health systems strengthening and integration:** As evidenced by the 2010 DHS Survey results, Rwanda has made a strong commitment to improve the health of its citizens through a wide range of health systems strengthening efforts. Consistent with GHI principles, PMI has contributed to health system strengthening by supporting human resource needs at the NMCP, strengthening of the Health Management Information System, the National Reference Laboratory, and pharmaceutical management system, and the integration of service delivery within other programs, such as MCH and EPI.

As a part of the GHI, PMI and the Rwandan government are supporting integrated service delivery, including integration of malaria control with MCH and community-based health service delivery. PMI is supporting the integrated community case management approach and partners with the MCH program to ensure children under five

years of age have access to treatment of malaria, diarrhea, and pneumonia through CHWs and health facility staff. Together with PEPFAR, PMI also supports the analysis of critical malaria data collected at the facility level through Rwanda's national HMIS. With FY 2012 funding, PMI will continue to coordinate with PEPFAR in providing integrated training and supervision related to laboratory diagnosis and accreditation.

**Case management:** All health facilities officially transitioned to artemether-lumafantrine (AL) as the first-line treatment for uncomplicated malaria in October 2006. In November 2009, the NMCP revised their treatment policy to require diagnostic confirmation of all fever cases regardless of age. The Global Fund to Fight AIDS, Tuberculosis, and Malaria continues to finance all artemisinin-based combination therapy (ACT) needs and provides other antimalarials and diagnostic support for all health facilities. In line with GHI principles, the PMI has helped develop human resources and systems for integrated community case management of fever; as well as strengthening laboratory diagnostic training, and supportive supervision systems in the private sector. Among the ten PMI-supported home-based management of fever districts, eight have completed the integration of community case management. The PMI also funds the repackaging of ACTs for use at the community level and in the private sector, which ensures easy recognition and compliance among caretakers and facilitates tracking of facility versus community treatments. To promote timely treatment seeking and proper use of AL, PMI has funded BCC/IEC activities. All AL needs have been met by the Global Fund Rounds 3, 5, and 8 for Rwanda. If a gap arises when the current GF grant expires in 2014, PMI could cover ACT gaps.

With FY 2012 funding, PMI will continue to strengthen efforts to ensure prompt and effective case management of malaria at health facilities and at the household/community level by CHWs through scale-up of integrated community case management. PMI will also help the NMCP to procure and continue to introduce rapid diagnostic tests for community case management. At the health facility level, PMI will concentrate on strengthening capacity in laboratory diagnostics and supply chain management. The PMI will strengthen quality assurance/quality control systems at national and district levels for accurate malaria diagnostics, and will support the NMCP's supervisory role to monitor and reinforce the correct use of AL at health facilities and in communities.

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

With FY 2012 funding, PMI will continue to support NMCP M&E activities, with emphasis on strengthening district- and facility-level capacity in collection and use of data for decision-making. As transmission continues to decline, the NMCP has re-prioritized epidemic surveillance and response activities. The PMI will support the Epidemic Surveillance and Response Unit through a seconded epidemiologist and support to develop standard operating protocols for epidemic surveillance. Finally, the

PMI will support a nationwide Malaria Indicator Survey or an interim DHS scheduled to be conducted in 2013.

## INTRODUCTION

### *Global Health Initiative*

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 comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through the GHI, the United States will help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns and children. The GHI is a global commitment to invest in healthy and productive lives, building upon and expanding the USG's successes in addressing specific diseases and issues.

The GHI aims to attain sustainable improvements in health outcomes by achieving measurable goals in HIV, malaria, tuberculosis, maternal and child health, nutrition, reproductive health and family planning, and neglected tropical diseases. The GHI approach of strategic integration and leveraging other programs and partnerships is intended to maximize the impact the United States achieves for every health dollar it invests, in a sustainable way. The GHI's seven core principles are: implementing a woman- and girl-centered approach; increasing impact and efficiency through strategic coordination and programmatic integration; strengthening and leveraging key partnerships, multilateral organizations, and private contributions; encouraging country ownership and investing in country-led plans and health systems; improving metrics, monitoring and evaluation; and promoting research and innovation. The GHI will build on the USG's' accomplishments in global health, accelerating progress in health delivery and investing in a more lasting and shared approach through the strengthening of health systems. Framed within the larger context of the GHI and consistent with the GHI's overall principles and planning processes, BEST (Best practices at scale in the home, community and facilities) is a USAID planning and review process that draws on our best experience in Family Planning, Mother and Child Health and Nutrition to base our programs on the best practices to achieve the best impact.

### *The President's Malaria Initiative*

The President's Malaria Initiative (PMI) is a core component of the GHI, along with HIV/AIDS, and tuberculosis. The PMI was launched in June 2005 as a 5-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, funding for PMI has now been extended through FY 2014 and, as part of the GHI, the goal of the 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), malaria in pregnancy (MIP) interventions, and indoor residual spraying (IRS).

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

This FY 2012 PMI Malaria Operational Plan presents a detailed implementation plan for the sixth year of PMI in Rwanda based on gaps and priorities addressed in the Malaria Performance Review (MPR) of 2011. These recommendations will be adapted into the new National Malaria Control Program's (NMCP's) Five-Year Strategy 2013-2017. Strategy development is spearheaded by the NMCP with participation of national and international partners involved with malaria prevention and control. This document briefly reviews the current status of malaria control policies and interventions, describes progress to date, describes challenges and unmet needs if the targets of the NMCP and PMI are to be achieved, and provides a description of planned FY 2012 activities. The activities that PMI is proposing to support in FY 2012 are aligned with the 2013-2017 National Malaria Control Strategy and Plan and build on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund Rounds 3, 5, and 8 malaria grants. The total amount of PMI funding requested in FY 2012 for Rwanda is \$18.1 million.

### ***Malaria Situation in Rwanda***

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 10 million, making it the most densely populated country in continental Africa. Administratively the country is made up of 30 districts which are divided into sectors and "cellules," and then into 14,953 "umudugudus" (villages of 50-100 households). The entire population is at risk for malaria, including an estimated 1.9 million children under five and 460,000 pregnant women/year (2002 Census, 2012 projection).

The country has been divided into four malaria ecologic-zones based on altitude, climate, level of transmission, and disease vector prevalence. Malaria is mesoendemic in the plains and epidemic-prone in the high plateaus and hills. The NMCP, referred to as the Malaria Unit in Rwanda, has classified 19 of the country's 30 districts as endemic and the remaining 11 as epidemic-prone. In both areas, malaria transmission occurs year-round with two peaks (May-June, November-December) following distinct rainy seasons. In addition to climate and altitude, other factors that influence malaria in the country include high human concentration (e.g. boarding schools in proximity to marshlands); population movement (especially in the areas of low transmission to high transmission area); irrigation schemes (especially in the eastern and southern parts of the country); and cross-border movement of people (especially in the eastern and south-east parts of the country).

However, given the significant decline in the burden of malaria in Rwanda accompanying high coverage of malaria control interventions nationwide, the NMCP intends to stratify based on the changing malaria epidemiology and update the malaria risk map.

The primary sources of information used to track trends in malaria prevalence and coverage indicators are aggregated case reports from health facilities and national household surveys. The national health management information system (HMIS) collects monthly data on the number of reported cases of malaria and deaths attributed to malaria (presumed and confirmed) by age group from the over 450 health centers and district hospitals. In December 2009, the NMCP directed that all presumed malaria cases should be laboratory confirmed either by microscopy or rapid diagnostic test (RDT) before ACT treatment. This directive led to a rapid reduction of reported presumed cases and a concomitant increase in confirmed malaria cases. As a result, the malaria case definition for surveillance purposes was effectively changed/refined to include laboratory confirmation. Completeness of reporting is reinforced through performance-based financing, and monthly data quality audits (DQAs), which have demonstrated concordance between clinic registers and HMIS reports. Community-level reporting systems, used to track integrated community case management by community health workers (CHWs), will soon be integrated into HMIS reporting systems; private sector providers (primarily based in urban areas in Kigali, Butare and Gisenyi) do not report.

Rwanda has seen a significant decline in malaria cases from 1.5 million reported in 2005 to a low of 663,785 cases in 2010 based on HMIS data, representing a significant reduction in transmission even in the context of the change in malaria case definition. A reduction of malaria transmission was seen in 2010 following an upsurge reported in late 2008 through 2009. As shown in Table 1, HMIS recorded more than 1.3 million cases of presumed and confirmed malaria for 2009. The proportion of outpatient consultations attributed to malaria rose from 11.8% in 2008 to 15.9% in 2009, and the number of deaths attributed to malaria rose from 643 in 2008 (16.3% of all deaths) to 862 in 2009 (19.2%). In response to the upsurge, the NMCP, with support from various partners, instituted an LLIN campaign with the goal of universal coverage (defined as one LLIN per two persons or three nets per household). The campaign incorporated messaging on LLIN use and maintenance and emphasized the importance of effective case management in the public sector. By the end of 2010, these malaria control efforts resulted in a substantial decline in malaria morbidity and mortality; with only 663,785 reported cases, of which 96% were laboratory confirmed. Malaria-attributed morbidity (fever cases with laboratory confirmation of malaria) decreased from 15.9% in 2009 to 7.8% in 2010.

**Table 1:** Summary of malaria data reported through the Health Management Information System from 2008 to 2010

	<b>2008</b>	<b>2009</b>	<b>2010</b>
Total cases reported	772,197	1,322,622	663,785
% confirmed <sup>1</sup>	41%	51%	96%
% morbidity <sup>2</sup>	11.8%	15.9%	7.8%
Slide positivity rate <sup>3</sup>	18%	25%	24%
Malaria attributed mortality <sup>4</sup>	16.3%	19.2%	12.9%

<sup>1</sup>confirmed relates to laboratory confirmation by microscopy or rapid diagnostic test (RDT)

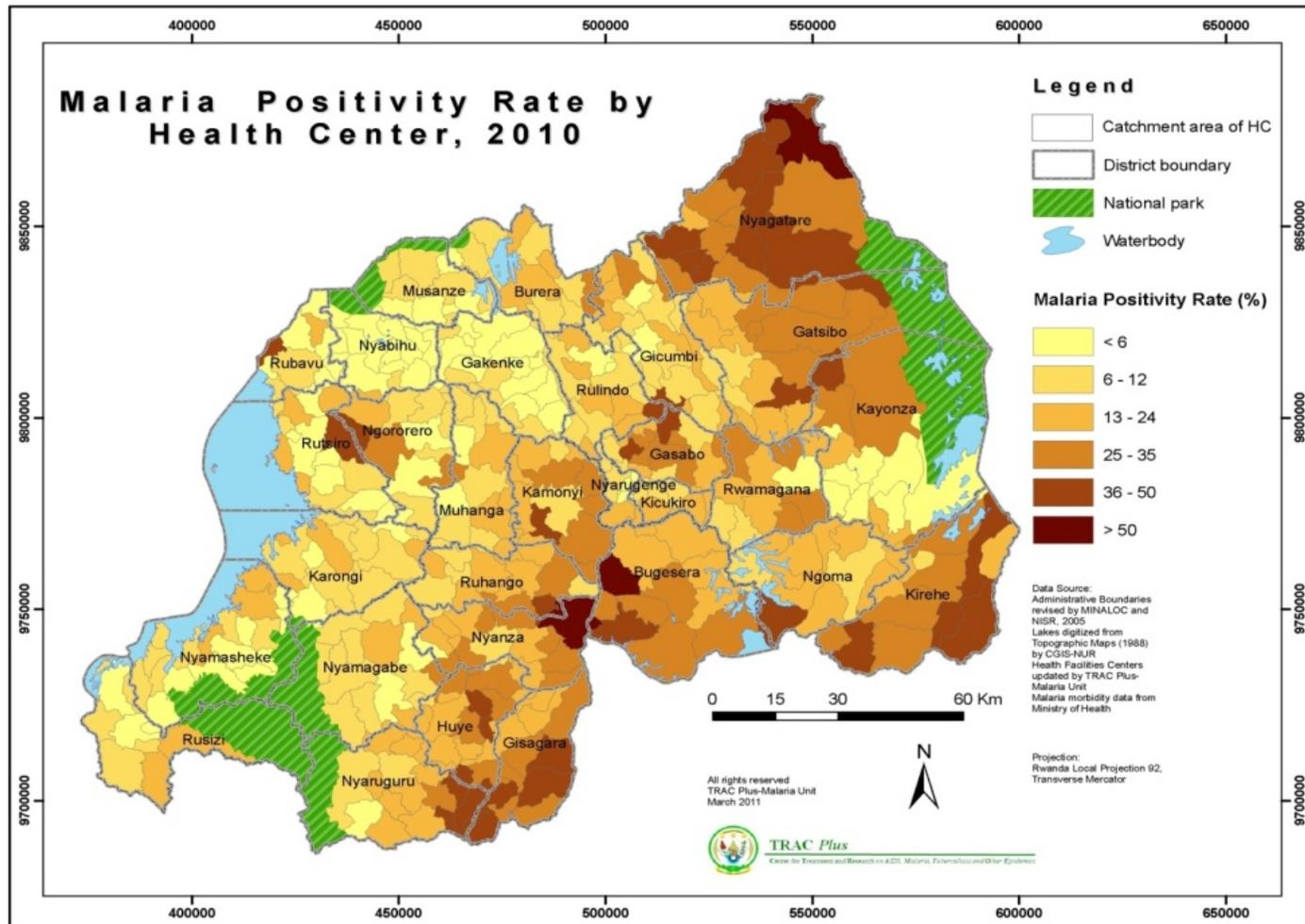
<sup>2</sup>morbidity relates to % of fever cases with malaria

<sup>3</sup>slide positivity rate – malaria positive slides over total slides

<sup>4</sup>malaria-attributed mortality in all age groups – proportion of deaths attributed to malaria by laboratory confirmation

The HMIS also collects slide positivity rates (number of positive malaria slides found among all slides tested [SPR]) on an annual and monthly basis. In 2008, 41% of presumed malaria cases were diagnostically confirmed, with a slide positivity rate of 18%. In 2009, these figures were 51% and 25%, respectively. Following the revision of treatment policy to require diagnostic testing in late 2009, 96% of cases reported in 2010 were diagnostically confirmed with a slide positivity rate of 24%. Figure 1 below illustrates the variation in epidemiology and burden of malaria, as measured by SPRs. Given such high confirmation rates, the NMCP plans to use slide positivity rates instead of parasite prevalence to stratify malaria burden by district and monitor the impact of interventions.

Figure 1: Malaria slide positivity rate per health center in Rwanda, 2010



In addition to PMI, other development assistance for malaria comes from the Global Fund, Roll Back Malaria (RBM), WHO and UNICEF. Rwanda has two active Global Fund grants in malaria: Round 3 (now in phase 2 of Rolling Continuation Channel) and Round 8 (Phase 2 started in July 2011). In July 2011, all Global Fund malaria grants were consolidated into a single source funding stream. Global Fund grants support the expansion of community case management with RDTs, antimalarials for treatment at health facilities and in the community, procurement of LLINs, support to strengthen monitoring and evaluation systems, and resources for health communications needed to encourage knowledge and practices in order to promote malaria control including LLINs, IRS, MIP, and case management. The NMCP intends to apply for a Round 11 grant in 2011.

### *National Malaria Control Plan and Strategy*

Drafted in 2008, Rwanda's National Malaria Control Strategy outlines priority malaria control interventions through 2012. The strategy time period and goals and objectives are aligned with three of the Government of Rwanda's primary strategic documents: Vision 2020, which is the overarching strategy used to guide long-term development in Rwanda; Economic Development and Poverty Reduction Strategy for 2008 – 2012, and Rwanda's mid-term development plan; which in turn serves as the framework for the national Health Sector Strategic Plan II for 2009 – 2012. The NMCP in collaboration with RBM, WHO, Global Fund, PMI, and partners is currently developing a new National Malaria Control Strategy (2013 – 2017) which will address challenges and gaps identified in the MPR and emphasize surveillance and refine malaria control interventions to respond to the changing epidemiology of malaria.

Specific targets as stated in the National Malaria Strategic Plan include:

- *At least 90% of all children under five years suffering from malaria will receive timely, correct, and affordable treatment within 24 hours after the appearance of symptoms.*
- *At least 90% of all cases of uncomplicated malaria in health facilities will be treated in accordance with the national treatment policy.*
- *At least 80% of patients who receive antimalarials in facilities will be parasitologically confirmed before treatment; 80% confirmation in community settings.*
- *At least 85% of pregnant women and children under five years will sleep under an ITN.*
- *At least 90% of households will possess at least one ITN; 80% at least two.*
- *At least 90% of malaria epidemics that are detected will be controlled within two weeks following detection.*

- *At least 90% of houses in targeted areas will be sprayed according to the national vector control guidelines.*

Rwanda completed a MPR in 2011, resulting in specific recommendations by each intervention area to assist the program to refine or redefine the strategic direction and focus. The NMCP intends to use the recommendations from this review to guide the development of the next five-year National Malaria Control Strategy (2013 – 2017) by the end of 2011.

### ***Current Status of Malaria Indicators***

Rwanda’s recent Demographic and Health Surveys (DHS) include a full survey in 2005, an interim survey in late 2007-early 2008 and a full survey completed in 2010. The NMCP also conducted a National Malaria Indicator Survey (MIS) in mid-2007. These surveys show marked improvements in key preventive indicators, as summarized below. For example, in 2005, 15% of households owned an ITN, and 13% of children under five years and 17% of pregnant women had slept under one the night before. The 2010 DHS showed that 82% of households owned at least one ITN, and that 70% of children and 72% of pregnant women had slept under one. It is important to note that 2.5 million LLINs were distributed after the DHS data collection and therefore a MIS is planned in 2012 to update LLIN ownership and use rates in Rwanda. These gains in bednet 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% as seen in the 2010 DHS.

<b>Indicator</b>	<b>DHS 2005</b>	<b>Interim-DHS 2008</b>	<b>DHS 2010</b>
Proportion of households with at least one ITN	15%	57%	82%
Proportion of children under five years old who slept under an ITN the previous night	13%	58%	70%
Proportion of pregnant women who slept under an ITN the previous night	17%	62%	72%
Malaria prevalence			
Children under five		2.6%	1.4%
Women of childbearing age		1.4%	0.7%
Under five all cause mortality (per 1,000 live births)	152	103	76

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

### ***Goal and Target of the President’s Malaria Initiative***

The goal of PMI is to reduce malaria-associated mortality by 70% compared to pre-Initiative levels in the 15 original PMI countries and to reduce malaria-associated mortality by 50% in new countries added to the PMI in FY2010 and later. By the end of

2014, 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 women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and
- 85% of children under five with suspected malaria will have received treatment with ACTs within 24 hours of onset of their symptoms.

### ***Expected Results – Year Six***

The PMI and the NMCP have agreed on the following outcomes for FY 2012:

#### Prevention

1. LLIN: Procure and distribute approximately 400,000 LLINs through routine distribution channels or to new populations to contribute to maintenance of universal coverage.
2. IRS: Support annual spraying of 325,000-360,000 houses or semiannual spraying of 162,000-180,000 structures (exact target to be determined by availability of resources).

#### Treatment

1. Diagnosis in the community: Procure 500,000 RDTs to support laboratory diagnostic confirmation prior to treatment in community case management.
2. Community case management: Expand community case management of fever (CCM) integrated into the full community health care package in up to ten out of 30 districts.

#### Surveillance, Monitoring, and Evaluation

1. Enhance decentralized surveillance to generate timely and quality data to track, analyze, and respond to malaria trends.
2. Epidemic Surveillance and Response: continue to strengthen the ESR system by developing new epidemic thresholds and developing standardized operating protocols (SOPs).

3. Document increases in malaria indicators, reductions in malaria burden both in terms of entomological and epidemiological parameters, and measure outcome and impact through surveys.

## GENERAL VECTOR CONTROL – Entomology

### *Background*

Entomological monitoring and analysis for decision-making is crucial for Rwanda given its significant investment in vector control. With support from PMI, the NMCP has established a functional laboratory and affiliated insectary and animal house (for mosquito feeding) at the Kigali Health Institute. However, the demand for insectary-reared mosquitoes to conduct entomological monitoring exceeds current capacity of the insectary. Fortunately, the NMCP has been offered space at the School of Public Health in Kigali to increase the insectary capacity to rear susceptible and field mosquitoes of this facility. In 2011, PMI will provide support for minor refurbishment and renovation to ensure the continued generation of quality and timely entomological data.

The NMCP has planned a 12-site entomologic surveillance system (four in each of the three affected sectors of the southwest, southeast, and northeast), which is to be integrated with the activities of malaria sentinel sites. Each station is to be staffed by two entomology technicians and supervised by a nurse/health worker at the clinic. The vision is for sites to conduct monthly mosquito collections through landing catches to determine vector density, biting behavior and species compositions. Sites will also assist with performance of monthly wall bioassays following IRS and semi-annual insecticide resistance testing. Currently, with PMI and Global Fund support, seven sites are fully operational and have collected monthly entomologic data for the past year. For example, entomological inoculation rates are presented in the table below:

District	Location	No. of <i>An. Gambiae</i> collected	<i>An. Gambiae</i> positive (%)
Kirehe	SE Tanzania border	264	6/264 (2.3%)
Kayonza	E Central	176	9/176 (5.1%)
Burera	N Central Uganda border	2	0/2 (0%)
Kicukiro	Kigali per-urban	704	25/704 (3.6%)
Ruhango	W Central	88	1/88 (1.1%)
Nyanza	S Central	352	3/352 (0.9%)
Rusizi	SW Burundi border	352	4/352 (1.1%)

Monitoring conducted at entomologic sites with the support of NMCP staff, combined with ELISA testing capacity, will generate critical entomological data for timely assessment and improvement of ongoing interventions. The use of these entomologic sentinel sites will monitor vector transmission, biting behavior, and insecticide resistance, which will inform and improve IRS targeting and LLIN efficacy to meet national objectives going forward.

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

Over the past 12 months, Rwanda has made significant progress in terms of generating quality entomological data that monitors IRS efficacy, longevity, and insecticide resistance. These data are crucial in guiding implementation of vector control programs. For example, entomological (and epidemiological) data collected over the past year provided the NMCP with sufficient evidence to justify the withdrawal of IRS in Kigali and transition into a new highly endemic district (see IRS section below). The availability of quality entomological data will continue to help guide integrated vector management (IVM) as well as decisions about IRS frequency and insecticide selection.

Given the NMCP's promotion of IVM, and their goal of revising individual intervention strategies to reflect the Rwanda IVM strategy, PMI supported the NMCP in the development of the vector control needs assessment, the draft of an IVM management plan and supported an IVM advisor seconded to the NMCP to coordinate the development of the draft national IVM strategy. The IVM strategy will be finalized and integrated into the new Malaria Strategic Plan and will be disseminated among stakeholders and approved by the end of 2011. The PMI also continued to provide support for seven entomological sentinel sites by provision of equipment, per diem for field technicians, and supervision and refresher training for field staff.

***Proposed Activities with FY 2012 Funding (\$262,100):***

Specific activities for Year 6 include:

- *Entomological Monitoring and Evaluation:* Provide continued support for central planning for entomological monitoring and district implementation, including support for insectary operations, vector resistance monitoring, and ELISA/PCR testing. Provide support for field technicians to conduct mosquito collection and testing for density and indoor/outdoor biting ratios at eleven sites. (\$100,000)
- *Procurement of entomological equipment:* Procurement of specialized supplies and equipment for entomologic monitoring such as CDC bottle assay, ELISA reagents, and light traps. (\$25,000)
- *1 TDY from CDC-Atlanta:* CDC staff will provide technical support to vector control activities and entomological monitoring and analysis. (\$12,100)
- *IVM Advisor:* Provide a third year of technical assistance through an IVM advisor seconded to the NMCP. The original scope of work of this advisor was to coordinate the development of the IVM strategy. The position was filled in January 2011, and the draft strategy is being finalized. Given the advisor's anticipated role in the implementation and evaluation of the IVM strategy, and his technical support to the sole NMCP Entomologist, PMI proposes to support this position for an additional year. The PMI Technical Working Group will reassess support for this position beyond FY 2012 if the need arises. (\$125,000)

## **INTERVENTIONS - Insecticide-treated Nets**

### ***Background***

Rwanda promotes universal coverage of free LLINs as part of its vector control strategy. The NMCP defines universal coverage as one net for every two people or three nets per household, reaching all population groups nationwide through two primary delivery channels: mass distribution aimed at all households, and targeted distribution to mothers and infants through antenatal care (ANC) and Expanded Program on Immunizations (EPI) visits. To promote universal coverage, the NMCP supports developing multi-media, multi-level IEC/BCC encouraging correct and consistent use of LLINs, strengthening the supply chain management system, and sound monitoring and evaluation (M&E) to track net ownership and use, insecticide resistance, and net durability and insecticide decay.

In 2006, Rwanda significantly increased LLIN coverage among children under five with a mass LLIN distribution linked to a nationwide integrated health and measles vaccination campaign. As a result, the 2008 interim DHS showed that 57% of households owned an ITN (approximately 98% of which were LLINs); and 58% of children under five and 62% of pregnant women had slept under one the night before interview. While these were positive findings, in 2009, it is believed that net coverage decreased to less than 25% based on modeling of loss of LLIN efficacy, which is considered a primary cause leading to upsurges in malaria cases.<sup>1</sup> The NMCP maintains that this increase was due to a year lag in LLIN replacement of the 2006 LLINs that expired in 2009, resulting from prolonged funding and specification negotiations and procurement delays. There were also concerns that some nets may have become ineffective due to physical deterioration or insecticide decay.

### ***Mass Campaigns***

The NMCP and partners quickly mobilized and distributed 6.1 million LLINs over a 15-month period (December 2009 – February 2011). The continuous rolling phased mass campaigns targeted all households nationwide with one net for every two people. Under NMCP coordination, LLIN distribution was carried out at health centers for newborns and pregnant women and through community outreach and CHW networks to households with the help of the national police, CAMERWA (central medical store), district hospitals, health centers, community authorities, and malaria partners. Rwanda's extensive network of community health volunteers (60,000 CHWs nationwide) carried out quarterly door-to-door household visits to ensure nets were received and hung correctly. To ensure remaining gaps in LLIN coverage are addressed, the NCMP is planning to carry out "mop-up" household campaigns targeting households that may have been missed during the rolling phased 2010/11 campaigns.

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<sup>1</sup> Rwanda Malaria Programme Performance Review, March 2011, Ministry of Health; page 4.

### *Routine LLIN Distribution*

The NMCP supports distribution of free LLINs through routine health service channels targeting pregnant women attending ANC clinics, infants who have completed immunizations at EPI clinics, as well as vulnerable groups including orphans, PLWHAs and students at boarding schools. The Central Purchasing Agency of Essential Drugs, Medical Consumables and Equipment in for Rwanda, (CAMERWA; French acronym), is the principal procurement agent for the Global Fund LLINs and is responsible for warehousing and stocking all LLINs that come into the country at the central level. Nets are distributed through a different system since CAMERWA lacks sufficient space to store them centrally and therefore moves most supplies quickly to districts, maintaining a small reserve at CAMERWA for emergencies. There is a new harmonized paper-based logistic and reporting system (LMIS) to track LLIN stocks at district and facility levels and health facilities report monthly LLIN distribution quantities in their HMIS reports. These reporting systems will allow CAMERWA to receive consumption data and strengthen the ability to forecast LLIN needs at health facilities. Currently, LLINs for routine services such as ANC and EPI are distributed by Population Services International (PSI), however, the PSI contract ends in 2011. With the establishment of a new Rwanda Biomedical Center, CAMERWA may assume more responsibility for distribution of LLINs to districts and health facilities. A fiduciary and technical capacity assessment of CAMERWA will be conducted in late 2011 and transition of LLIN distribution to CAMERWA will commence based on favorable assessment results.

### *Planning and Monitoring*

The NMCP plans to maintain universal coverage levels of LLINs by developing a long-term LLIN procurement and distribution plan to ensure a continuous supply of replacement nets and identifying additional targeted populations and new delivery channels. This plan also calls for sustained financing to ensure the predictability and availability of resources, establishing country specific net replacement guidelines that include addressing LLIN disposal issues, continuing to monitor the lifespan of insecticide efficacy and net durability, strengthening procurement mechanisms to avoid delays, and quarterly monitoring and reporting of net use through community health volunteers. Because the GOR bans the use of plastic bags, the NMCP and partners re-package each LLIN with a paper bag at the point of distribution. Initial efforts began last year to gather information about LLIN durability and insecticide decay rates and to monitor insecticide resistance as part of the development of the IVM strategy. In addition, the Department for International Development is negotiating an agreement with the GOR to focus on prevention interventions potentially including support for the development of in-country LLIN production capacity.

### *2013 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). In order to keep up and

maintain coverage levels, the NMCP calculates a projected LLIN rate of loss since distribution at 8% for year one (0-12 months), 20% for year two (13-24 months), and 50% for year three (25-36 months). Preliminary findings from the Rwanda LLIN longevity and durability study confirm these estimates. Among the sample of 3,000 LLINs provided to study households in six sites in March 2011, approximately 10% of the nets were not found in the households one month after distribution.

To maintain high coverage levels and protect against a similar upsurge in malaria cases as was seen in 2009, the NMCP's policy is to replace old, expired LLINs every three years through mass campaigns and to keep up high net coverage levels by targeting high risk vulnerable and new populations with new delivery channels and accounting for LLIN loss rates in households as well as newborns and pregnant women. The following table is an estimated projection of LLIN needs and gaps over the next three years (2012-14):

<b>LLIN target groups and delivery channels</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Infants/newborns reached through health facility EPI services	460,000	470,000	0
Pregnant women reached through health facility ANC services or new households reached with marriage registration	115,000	120,000	0
Orphans and students at boarding schools	175,000	0	0
Households with lost, damaged nets based on standard percent loss per year <sup>1</sup>	488,000	1,220,000	3,050,000
Replacement LLINs in 2014 for universal coverage through mass campaigns <sup>2</sup>	0	0	6,377,883
<b>Total estimated LLINs needed</b>	<b>1,238,000</b>	<b>1,810,000</b>	<b>9,427,883</b>
<b>Planned LLIN Contributions</b>			
<b>Source</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Estimated PMI support	500,000	400,000	TBD
Global Fund Round 8	0	0	6,400,000
<b>Total Estimated Gap</b>	<b>738,000</b>	<b>1,410,000</b>	<b>3,027,883</b>

<sup>1</sup>Loss rates of nets are calculated at 8% for Year 1, 20% for Year 2, and 50% Year 3 since distribution of the 6.1 million LLINs in 2011 (per RBM HAWG recommendations).

<sup>2</sup>Replacement of net needs in 2014 are calculated at 1 net for every 2 people or a ratio of 1.8 persons per net (per RBM HWG recommendations). Total population estimated in 2014 is 11.48 million.

The PMI will procure 500,500 LLINs with FY 2011 funds (described below) and approximately 400,000 LLINs with FY 2012 funds (also described below) to contribute to maintaining universal coverage and to address LLIN gaps/needs in CY2012 and CY2013, including reaching targeted vulnerable populations through specific delivery channels. Therefore there is a gap of approximately 2.15 million LLINs over the next two years (738,000 LLINs in 2012 and 1,410,000 in 2013). The PMI will work with the NMCP to coordinate and identify additional LLINs from other funding sources to help fill this gap. Global Fund Round 8 Phase 2 support will cover procurement of an estimated 6.4 million LLINs in 2014 to replace the 6.1 million distributed in 2011 and to maintain universal coverage.

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

The PMI procured and distributed a total of 1,519,000 LLINs of which 550,000 LLINs (FY 2007 funding) were targeted to poorest of the poor populations and pregnant women in July 2009, and 969,000 LLINs (581,000 with FY 2008 funding, 388,000 with FY 2009 funding) contributed to the 6.1 million LLINs provided to households and vulnerable populations during the 2010/11 household coverage campaigns. The rolling phased campaigns were led by the NMCP in collaboration with other malaria partners who assisted with distribution and transportation. The PMI procured an additional 390,000 LLINs (FY 2010 funding) that will be distributed to pregnant women and newborns in July 2011 by health facilities. The PMI also helped to strengthen the LLIN supply chain management system by supporting the logistics advisor in the NMCP who assists with planning, forecasting and tracking LLINs (as well as other malaria commodities). With FY 2011 funding, the PMI will procure 500,500 LLINs to help reach vulnerable populations through ANC/EPI clinics and new households (newly married couples or new residents) identified by CHWs.

The PMI continues to support district- and community-level BCC/IEC activities. The NMCP and partners have developed a national integrated BCC/IEC strategy for malaria control interventions which includes the promotion of correct LLIN use. The PMI and NMCP work with local NGOs and Rwandan partner organizations, as well as the 60,000 CHWs nationwide, to carry out intensive interpersonal communication sessions, community mobilization and sensitization following household LLIN distributions. Finally, the PMI is providing technical assistance and support to the NMCP to establish surveillance of LLIN insecticidal loss and physical deterioration to monitor durability and longevity in the Rwandan context and to inform strategies for replacement and maintenance of nets in houses.

### ***Proposed Activities with FY 2012 Funding (\$3,682,100):***

The PMI will support the NMCP's efforts to maintain universal LLIN coverage by procuring and distributing LLINs for routine distributions and new delivery channels targeting vulnerable populations. The PMI will continue to support strengthening of the supply chain management and distribution systems and explore opportunities for building longer-term capacity in the NMCP and at district level (described under Supply Chain). Support will include focused BCC/IEC efforts at national and community levels to promote correct and consistent usage (described under BCC). Specific activities for Year 6 include:

- *Procure and distribute 400,000 LLINs:* Support the procurement and distribution of free LLINs through routine distribution channels for distribution targeting first-time pregnant women and newborns. Other potential channels to vulnerable groups include orphanages, boarding schools, and in-patients at hospitals depending on the NMCP's strategy. The PMI will also support procurement of paper bags for repackaging nets at the final distribution points. The PMI continues to explore biodegradable packaging options with partners and net manufactures to replace plastic bags. (\$3,550,000)

- *Technical assistance for LLIN durability study:* Provide continued technical assistance from CDC entomology branch to the NMCP to monitor the durability and longevity of LLINs. (\$12,100)
- *Monitoring the durability and longevity of LLINs:* Provide continued support to the NMCP to monitor the durability and longevity of LLINs to help inform programmatic options for replacement and maintenance of nets in houses. Specific activities for the third year of monitoring for LLINs includes support for ongoing field work (household interview, LLIN collection and testing) and a technician who will coordinate the field operations, conduct LLIN testing and data analyses, and provide operational support for the insectary. This is the last of two years of salary support for the technician and the NMCP will decide whether or not to continue the position under other funding. (\$120,000)

## INTERVENTIONS - Indoor Residual Spraying

### *Background*

Indoor residual spraying was added as a component to Rwanda's malaria control strategy in 2007. Since then, coverage has increased annually and has changed in two regards. First, while the 2007 spray round covered all three Kigali districts in their entirety (blanket spraying), all subsequent spray rounds have targeted select sectors within districts (focal spraying). Second, semi-annual application started after Round 2 to cover Rwanda's eight-month transmission season, with a small round covering a subset of districts prior to the May/June transmission season, and a large round covering targeted sectors (54 total) in seven districts prior to the November/December transmission season.

Districts and sectors are targeted for IRS based on malaria burden as measured by health facility epidemiological case data and, when available, entomological inoculation rates (entomological inoculation rates are collected at the seven entomology sentinel sites). Six spray rounds with a synthetic pyrethroid have been conducted to date:

<b>Round</b>	<b>Date</b>	<b>Districts</b>	<b>No. of structures (% coverage)</b>
1	Aug-Sep 2007	Kigali (all three districts)	152,072 (96%)
2	Aug-Sep 2008	Kigali + Nyanza (South Province) and Kirehe (East Province)	189,756 (94%)
3	Jan-Feb 2009	Kigali, Nyanza, and Kirehe	191,051 (97%)
4	Aug-Sep 2009	Kigali, Nyanza, and Kirehe + Bugesera (East Province) and Nyagatare (East Province)	295,174 (98%)
5	Mar 2010	2 Kigali districts (Gasabo and Kicukiro)	63,395(87%)

6	Sep-Oct 2010	Kigali, Nyanza, Kirehe, Bugesera, and Nyagatare	303,659 (99%)
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The PMI supports the majority of IRS implementation in Rwanda, although the NMCP has resources to conduct small scale IRS in cases of confirmed epidemics or localized outbreaks. The most recent spraying for control of a localized upsurge in cases occurred in Gisagara in January 2011.

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

The sixth IRS spray round was conducted from September to October 2010 and covered more than 303,000 houses and protected more than 1.3 million Rwandans. The campaign was the largest to date and resulted in over 99% acceptance.

As Table 2 indicates, the NMCP and PMI agreed to forgo the smaller spray round in March 2011 as a longer-lasting pyrethroid had been used in the September 2010 round. This decision was based in part on evidence from other PMI countries showing that longer-lasting pyrethroid formulations were effective for up to nine months, and in part on Rwanda’s attainment of universal net coverage in February 2011.

PMI supported IRS insecticide efficacy monitoring (cone bioassays of bio-efficacy) of the 2010 spray round at regular intervals to determine if insecticides were indeed still present on various substrates (mud, plaster, etc.) at levels comparable to other countries. However, data indicate that efficacy dropped below the recommended 80% threshold between the fifth and seventh month post-IRS sampling:

Surface Type	Number of months post spray		
	+ 1 month	+ 5 months	+ 7 months
Mud	95%	95%	73%
Plaster (not-painted)	92%	96%	74%
Plaster (painted)	91%	92%	73%

Although the reduced operational impact of IRS when bio-efficacy falls below 80% is unknown, the findings have renewed discussion about whether one spray round is sufficient.

The seventh spray round, targeting 325,000 structures, began in September 2011 and was completed on October 1. Preliminary results indicate that 352,731 structures were sprayed (97.9% acceptance) and 1,527,881 people were protected. As six months of preparation are needed for spraying to allow timely delivery of insecticides, compliance with environmental safeguards, and completion of micro-planning, only one round of IRS is scheduled for 2011. Based on resistance testing, pyrethroids will continue to be used as susceptibility remains above 97%. There will be two notable changes to the upcoming spray round based on data from insecticide efficacy monitoring and the MPR findings. First, based on limited impact seen in at least two sprayed districts, spraying will be

district-wide rather than focused or sector-specific. Second, after six rounds of spraying, Kigali will no longer be targeted for IRS based on the changes in epidemiological and entomological profiles. The NMCP will continue to target Nyagatare, Bugesera, Kirehe, and Nyanza – all of which have sectors with slide positivity rates of 25% or more – and the NMCP has identified one new district (Gisagara in South Province) based on high transmission rates. Since Gisagara is a new spray district, the NMCP, PMI, and partners plan on evaluating the impact of IRS in the context of universal LLIN coverage to evaluate the incremental impact of IRS. Data will be collected through the HMIS, entomological data, and focused NMCP-supported serial anemia and parasitemia studies.

In coordination with Peace Corps/Rwanda, PMI has arranged for a third-year Peace Corps Volunteer (PCV) to work with the IRS implementing partner. The third year PCV is supporting the development and implementation of a country-wide community IRS information, education, communication, and mobilization strategy to engage stakeholders both at the national, regional, district, and community levels. The PCV is currently developing and reviewing the pre- and post-implementation evaluation tools for IEC activities for IRS in Rwanda.

***Proposed Activities with FY 2012 Funding (\$7,630,000):***

The NMCP, with the support of PMI, Global Fund and WHO, will continue to use entomological and epidemiological data to guide IRS decisions. Continued bio-efficacy monitoring will provide another set of data points to determine the length of efficacy of pyrethroids in Rwanda. Careful monitoring of HMIS data and review of 2010 DHS data will provide an updated picture of the burden of malaria by region and by district, as the NMCP with the support of PMI will continue to target IRS to those districts with the highest malaria burden. Finally, analyses of the anemia and parasitemia data will help elucidate the benefit of combining IRS and LLINs in Rwanda. Therefore, only a targeted range of structures to be sprayed, rather than specific districts or number of spray rounds, is defined below. A final decision regarding district selection and the number of rounds will be made by the NMCP in consultation with PMI, WHO, and GF based on entomological and epidemiological data and availability of resources in February 2012 to enable timely micro-planning and procurement.

In Year 6, PMI expects to support the following activities:

- *Annual IRS implementation covering approximately 325,000-360,000 houses or semiannual IRS implementation covering 162,000-180,000 houses:* Districts and/or sectors will continue to be targeted based on available data. As this will be the eighth round of spraying and significant capacity has been built at both the national and district level, PMI support will be split between an implementing partner and direct support to districts (the latter in one to two districts that have undergone repeated spray rounds). PMI will support a technical and financial review of the IRS transition process in one or two districts during the September 2011 spray round to validate district capacity, environmental compliance, and adherence to USG regulations. However, direct support to districts is contingent upon completion of financial audits and demonstration of technical capacity.

Quality of spraying will be monitored closely and technical assistance will continue to be provided. Support for IRS implementation covers 2012 spraying and nine months of 2013 IRS activities. (\$7,630,000)

## **INTERVENTIONS – Malaria in Pregnancy**

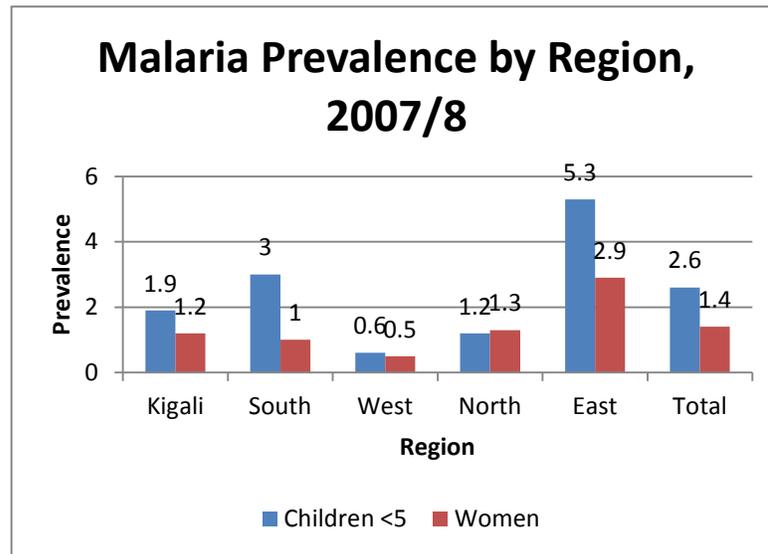
### ***Background***

Malaria in pregnancy (MIP) is a serious health risk for the pregnant woman, the fetus and ultimately the newborn and infant. Pregnant women (especially primigravidae) are at risk even in high endemic areas because the placenta is naïve to the malaria parasites although immunity is acquired with additional pregnancies. A pregnant woman may be asymptomatic but have malaria parasites in the placenta which are harming the fetus resulting in inter-uterine growth retardation, low birth weight, miscarriage, still birth, greater susceptibility to malaria during infancy and higher neonatal and infant mortality. As malaria prevalence decreases, pregnant women in low and unstable malaria transmission areas are subject to both acute malaria attacks as well as placental infections that harm the fetus and newborn. Pregnant women themselves are at risk of anemia from malaria.

The WHO recommends a three-pronged approach for MIP which includes two doses of IPTp with sulfadoxine-pyrimethamine (SP), the use of ITNs, and case management for acute malarial illnesses. At present, all pregnant women in Rwanda receive two of the three possible MIP control interventions. First, a LLIN is provided on first visit to an antenatal care (ANC) clinic. Second, treatment of pregnant women with fever occurs after parasitological diagnosis by microscopy, but women with placental parasitemia may be asymptomatic and cases may be missed. Intermittent preventive treatment of pregnant women with SP (IPTp with SP) was 17% in the 2007/2008 interim DHS. However, Rwanda discontinued IPTp with SP in 2008 based on: 1) evidence of high therapeutic failure of SP in 6-59 month olds; 2) an additional unpublished study that found no added benefit of IPTp with SP compared to placebo in regards to maternal hemoglobin, newborn weight, and placental parasitemia; and 3) decreasing malaria prevalence nationwide.

As previously mentioned, Rwanda has experienced a significant reduction in malaria cases nationwide. Malaria prevalence decreased in children under five and women of reproductive age from 2.6% and 1.4% (2007/2008 interim DHS) to 1.4% and 0.7% (2010 DHS), respectively. Figure 2 illustrates the regional variability of prevalence among these groups. A national prevalence of 0.9% was reported for pregnant women by the 2007/2008 interim DHS, but the number of such women in the survey was too small to present in regional findings (n=642).

Figure 2: Proportion of children under five and women with positive malaria test by Region, 2007/2008



In light of decreasing prevalence and regional variation in the burden of malaria, Rwanda is re-evaluating its MIP approach for inclusion in the 2012 – 2017 Malaria Strategic Plan.

According to the 2010 DHS, 98% of pregnant women visit an ANC at least once, although the median gestational age at first visit is late at six months, and 35% of women make four or more ANC visits. The MOH Maternal Child Health (MCH) Desk has coordinated with the NMCP, the Community Health Desk (CHD), and EPI to strengthen integration. The services provided by these units, in addition to fetal growth monitoring and birth preparation, make up the focused antenatal care (FANC) package and are now available in all ANCs nationwide. Specialized CHWs (*Agents de Sante Maternelle* [ASM]) focus specifically on women in communities, including pregnant women and their newborns, and are included in the MIP strategy. The ASMs identify pregnant women early, distribute a first dose of iron, folic acid, and mebendazole for anemia prevention, and promote LLIN use and early and regular (up to four) ANC visits. Early FANC attendance is also encouraged by providing targeted BCC/IEC, combined with innovative community- and facility-level performance-based financing and high enrollment (98%) in community health insurance schemes (*mutuelles*) that reduce ANC attendance fees.

Net usage among pregnant women rose from 17% (2005 DHS) to 62% (2007/2008 interim DHS) to 72% (2010 DHS). In order to maintain universal coverage, routine distribution of LLINs is crucial and the NMCP has increased efforts to ensure that LLINs are available for distribution at every facility during routine ANC attendance.

Maternal mortality in Rwanda was 750 deaths per 100,000 live births (DHS 2005), and preliminary results from the 2010 DHS show a substantial decrease (exact figure is still preliminary, hence not included in the MOP). Other notable achievements include a

decrease in total fertility rate (from 6.5 (2005 DHS) to 4.6 (2010 DHS) and increasing contraceptive prevalence from 10.3% (2005 DHS) to 45% (2010 DHS).

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

The MoH with the support of partners including PMI has continued to improve the quality of FANC services at health facilities through training and capacity-building efforts at national and district levels. The PMI supported integrated FANC training in 9 of 30 districts, resulting in training of 17 supervisors, 17 trainers of trainers and approximately 235 providers in district hospitals and health centers. The PMI procured a one-year supply of iron and folic acid for ASMs. In collaboration with PEPFAR, PMI also assisted the MOH to develop and review training materials for strengthening integrated ANC services including FANC, prevention of mother-to-child transmission (PMTCT) of HIV, nutrition education, promotion of breast-feeding and family planning. PMI has also supported trainings and procurements to scale up and strengthen the role of ASMs in MIP.

As the malaria epidemiology in Rwanda is changing and the burden of asymptomatic and clinical malaria in pregnant women is still unknown, the NMCP and partners are adapting and refining malaria control interventions to respond to the changes. The NMCP with the support of PMI and partners are finalizing a rapid assessment protocol to measure the burden of MIP with microscopy, RDTs, and PCR during routine ANC attendance. The study is planned for late 2011 and will feed into the development of the 2013-2017 MSP.

***Proposed Activities with FY 2012 Funding (\$200,000):***

In Year 6, based on the data obtained from the MIP burden assessment, PMI will support the development and implementation of a new national strategy for the prevention and treatment of malaria in pregnancy with decreasing malaria prevalence. PMI will continue to support collaboration with the MCH desk and the NMCP in the training, supervision and implementation of the community outreach approach and focus on links between ASMs and health facilities to ensure that pregnant women receive and use LLINs correctly and consistently, attend ANC early and regularly, and receive prompt treatment for malaria.

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

## **INTERVENTIONS – Case Management**

### *Malaria diagnosis*

#### ***Background***

Rwanda's National Malaria Treatment Policy states that all cases of presumed malaria should be laboratory confirmed prior to treatment with an ACT. The policy applies to all age groups and health facilities, communities, and the private sector. The infrastructure for malaria diagnosis has improved in the past few years, such that 98% of health facilities currently have a functioning microscope and at least one laboratory technician (District Health Report, CHAI/MOH, 2009). However, immediately after the policy change, supervision visits conducted by the National Reference Laboratory (NRL) revealed stock-outs and problems with the quality of reagents and slides. As the change in treatment policy increases demand on health center laboratories, there is a need to improve coordination of the supply chain for laboratory commodities at both the central and district levels. The policy also limits the role of RDTs in health facilities to use in emergency situations and when laboratory technicians are not available. Health providers and laboratory technicians have received training on the proper use of RDTs.

The NRL has developed and implemented a system of quality assurance for microscopy, and NRL supervisory visits to clinical laboratories are integrated to review HIV, tuberculosis and malaria services. In addition, district hospitals have assumed increased responsibility for providing supervision and quality assurance/quality control (QA/QC) for health center laboratories. Supervisors use a standardized checklist to review supplies and monitor performance. Routine feedback is provided to health centers and adherence is in part due to the inclusion of QA/QC reports as one of the performance-based financing indicators. The NRL also conducts district hospital supervision to provide a second level of quality control for blood smears. Feedback is provided to districts through printed reports and, in instances where the proportion of discordant results reaches a critical threshold, supervisory visits are conducted to provide refresher training.

As part of the expansion of integrated community case management (iCCM), training in RDT use for CHWs and health center supervisors, including laboratory technicians, has been completed in 28 districts. The NMCP selected First Response® as the RDT of choice. A quality assurance system for the performance of RDTs in iCCM is being developed by the NMCP and may incorporate standardized initial training, proficiency evaluation, and periodic comparison of RDT results with microscopy. Although the role of the NRL in RDT implementation has been limited to date, standardized QA/QC for RDTs across health facilities and iCCM will require coordination with the NMCP and the NRL.

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

The PMI support to the NRL to strengthen malaria diagnostics in health facilities has been established through a direct funding agreement. Following unanticipated contracting delays, activities planned for FY 2008 and FY 2009 commenced in May 2010. After a review of program needs and gaps, the NRL developed a work plan to

provide malaria specific refresher trainings, support regular supervision, and improve QA/QC capacity at both the district and national levels. The PMI also procured slides and reagents to contribute to the annual needs for health center laboratories.

### ***Malaria Treatment at Health Facilities***

#### ***Background***

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

Provider acceptance of the diagnostic policy change is reflected in an increased number of blood smears performed in 2010 and the decreased number of presumed malaria cases treated and reported. The NMCP intends to continue to revise the treatment policy guidelines with the inclusion of diagnostic algorithms for RDT or smear negative fever cases.

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

Antimalarials for health facilities continue to be covered under Global Fund grants. With FY 2010 funding, PMI supported the NMCP to reinforce the implementation of the new treatment guidelines at health facilities. Specifically, technical assistance has been provided to assess challenges in provider adherence to diagnostic and treatment algorithms for malaria. In addition, refresher trainings and supervisory visits from the NMCP and district staff will be conducted to promote the implementation of quality Integrated Management of Childhood Illness (IMCI).

### ***Malaria Treatment in the Community***

#### ***Background***

Community health interventions started in Rwanda in 1995 as the first level of entry into the health system with a total of 15,000 community health workers (CHWs). The current number of CHWs has grown to nearly reach the national target of 60,000 CHWs nationwide. Malaria treatment at the community level started in 2004 and has expanded to treatment with ACTs beyond the 19 endemic districts to include 11 epidemic-prone

districts with a phased introduction of RDTs to confirm cases prior to treatment. Trained CHWs provide treatment to children under five in the community with prepackaged ACTs. Blister packaging for children under five is branded with the name “PRIMO” and includes IEC materials in the local language (Kinyarwanda) to ensure proper dosing. Evaluation and treatment are provided at a subsidized price (\$0.35). CHWs are unpaid, but the MoH, with support from other donors, established CHW cooperatives that help generate income linked to community performance-based financing. The NMCP continues to scale up RDTs by CHWs to cover all 30 districts in order to align community treatment of malaria with the revised treatment guidelines; testing will be provided at no additional cost.

Building on the home-based management of fever (HBMF) model, the MOH Community Health Desk (CHD) has introduced and consolidated iCCM to include pneumonia, diarrhea and other components (nutrition, family planning, hygiene, palliative care). The iCCM package will be implemented by 30,000 CHWs. Training of the CHWs was completed in July 2009 and included training in the use of phones for data reporting. PMI and the Global Fund have supported the expansion through CHW training, provision of materials (CHW kits, registries, job aids, etc.) and supervision and monitoring. Twenty-eight of the 30 districts have introduced RDTs into the CCM package and all districts are in different phases of transition to the full iCCM package as outlined in the revised Community Health Strategy.

#### ***Progress during the last 12 Months***

The MOH has made significant progress in scaling up iCCM country wide. Among the ten PMI-supported home-based management of malaria districts, eight have completed the conversion to iCCM districts with the support of Global Fund and more than 10,500 CHWs were trained (both original and refresher trainings); more than 235,000 children were treated for fever between January 2010 and April 2011. Although RDTs are not fully implemented in all ten districts, iCCM support includes training, supervision, and provision of equipment for the treatment of malaria, diarrhea and pneumonia. Changes in implementing partners in four districts led to some delays but following an assessment of implementation gaps and review of individual district work plans, activities are now on track. In order to guide the iCCM strategy, several evaluations have been conducted by the MOH with PMI and other partner support. As part of the effort to develop the community level RDT policy, PMI provided technical assistance for a retrospective evaluation of the outcomes of RDT negative children. This study demonstrated good reliability of RDT results. As home-based management of malaria has transitioned into iCCM, the addition of RDTs at the community level will enhance the ability to differentiate among the different causes of fever and thus provide more appropriate treatment.

In May 2009, the CHD, together with partners, conducted a one-week evaluation of CHW performance in treatment and drug management in four districts that had at least two months of implementation of iCCM (Ruhango, Gisagara, Nyamagabe and Kirehe). Ninety-five CHWs were included in the evaluation. Results showed that performance was generally high; over 80% of the decisions taken were appropriate with the child’s health

status. However, availability of drugs was problematic. On the day of the visit, only 58% (55/95) of the CHWs had all of the medications available, and during the month before the visit, all four districts had experienced stock outs of one or more medications. Of all the medications, PRIMO stock outs occurred most often and sometime lasted for greater than three months due primarily to delays in repackaging. Stock outs also resulted from inefficient movement of drugs from the district pharmacies to the CHWs via health centers. One recommendation following the evaluation was to organize orientation meetings with the district pharmacists to identify the best way to supply drugs to the community and to advocate for including iCCM drugs on the essential drugs list. Orientation meetings started in August last year and have been included as part of the training package. Community level medicines were also included in the new Essential Medicines List that was signed by the Minister of Health in April 2010 and also in the Logistics Management System (LMIS).

### ***Malaria Treatment in the Private Sector***

#### ***Background***

The GOR support for treatment of children under five in private sector pharmacies and over-the-counter outlets (*comptoirs*) commenced in 2008. The private sector approach included training providers from registered pharmacies in malaria diagnosis and treatment followed by the provision of subsidized ACTs for children under five. In addition to increasing accessibility to AL, this strategy discouraged the sale and use of non-recommended antimalarials that are either no longer efficacious (e.g. SP) or that could undermine the efficacy of the newly introduced treatment by promoting drug resistance (e.g., artemisinin monotherapy). Provision of PRIMO for treatment of children under five in the private sector was suspended by the NMCP in 2010 while the revised policy to only treat confirmed malaria was being introduced since GOR policy does not allow pharmacies to perform diagnostic tests.

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

Since 2008, PMI has provided the majority of support for case management of children under five in the private sector including the training of pharmacists and repackaging and distribution of “PRIMO” branded AL at a highly subsidized price. In addition to provider training, BCC/IEC efforts were continued to promote recognition of malaria symptoms, and the importance of prompt treatment, and adhering to treatment regimens. Following the diagnostic policy change, the NMCP plans to conduct an assessment of the private sector to evaluate the extent of private sector utilization for malaria treatment and dispensing practices of the private providers to guide whether further support from PMI or other partners will be needed in this sector.

### ***Drug Supply and Pharmaceutical Management***

#### ***Background***

The MOH procures antimalarials and supplies for health facilities through CAMERWA, the national medical store which sits under the Rwanda Biomedical Center. CAMERWA currently procures about 60% of all facility drugs and supplies and is the only institution

in Rwanda that can legally procure ACTs for the public sector. With support from PEPFAR, USAID MCH and family planning programs and the Global Fund, CAMERWA is improving procurement, accounting, human resources, customer service, and storage practices to qualify as a USG direct funding recipient.

Working with the Pharmacy Task Force and with support from PEPFAR, in the last year, CAMERWA has begun what it calls active distribution of medicines to district pharmacies. This is a delivery mechanism where CAMERWA oversees delivery of medicines to district pharmacies on a monthly basis, and contracts with a company for transportation. HIV-related products are also prepackaged for cross docking at each health facility, limiting the amount of time that district pharmacies must receive, shelve and issue products that health facilities do not buy. Health clinics then travel to the district pharmacies to pick up their order, thus decreasing opportunity costs to district pharmacies and health facilities for resupply. Active distribution has been launched in 24 of Rwanda's 30 districts.

Previously, district pharmacies placed orders at CAMERWA and were responsible for collecting their orders from CAMERWA's warehouse. In the past, large quantities of ACTs were procured at one time, leading to losses of expired drugs as consumption levels decreased. Since 2008, smaller, more widely-spaced procurements have resolved this problem. However, the supply chain of CAMERWA from central to community-levels continues to struggle to prevent stock-outs of essential drugs at lower levels. The NMCP works with district pharmacists and health centers to forecast antimalarial needs. A new consumption reporting mechanism for all program-related commodities was just rolled out this year. The NMCP continues to provide approval for district pharmacy orders, but it is hoped that improved consumption data will help avoid stock outs.

The MOH created the Pharmacy Task Force (PTF) in 2005 to oversee retailers and serve as the national drug regulatory authority. Responsibilities of PTF include quality control, inspection, licensure, and ensuring a basic package of pharmaceutical products. While the PTF has the regulatory authority, capacity is nascent and it will require support to carry out its duties including quality control of incoming and circulating drugs. With the establishment of the new Rwanda Biomedical Center, it is unclear if the PTF's role will change.

The Logistics Management Office is expected to sit at the CAMERWA offices and will be in charge of all the logistics data entry, aggregation, and analysis, used to make policy decisions and to aid in decision making during forecasting and quantification.

In 2007, the NMCP used Global Fund resources to purchase a high performance liquid chromatograph, located at the National University of Rwanda in Butare, for drug quality testing at port of entry. A pharmacist/chemist who is also a staff member of the university has received training on operational procedures of the equipment. There are several partners ready to offer support for strengthening the drug quality monitoring system in Rwanda once the PTF, MOH and National University of Rwanda develop a coordinated strategy.

National pharmacovigilance systems are needed to monitor adverse reactions to ACTs and other health products. Reporting of adverse events is important so that follow-up investigations can be conducted to determine causality and severity as well as provide recommendations for continued care and treatment. The MOH and various health programs, especially TRACPlus (which includes malaria and HIV programs and now resides under the management of the Rwanda Biomedical Center), have recognized the need for a national pharmacovigilance system and are supporting the development of an integrated system. Both PMI and PEPFAR have contributed to this effort under the leadership of the PTF. The pharmacovigilance law was just recently approved by the senior management team at the Ministry of Health. Because the needs of each program are different, the pharmacovigilance unit of the Pharmacy Task Force will continue to work closely with all health programs, to promote a smooth integration of ongoing pharmacovigilance activities into the national system.

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

In the past 12 months, PMI supported several specific technical areas within the drug supply chain and for pharmaceutical management:

***Strengthening antimalarial drug availability and management at the facility level.***

Antimalarials for health facilities are currently provided through Global Fund grants. PMI has assisted in the development of new standard operating procedures for the supply chain of all products, including malaria products, through a harmonized LMIS with the support of a the logistics advisor for two years who sits at the NMCP and other partners. . This paper-based data collection system, launched in March 2011, collects consumption data of selected commodities at health facilities and district pharmacies. The same logistics data is collected across commodity categories using the same form for products used in malaria, TB, family planning, maternal and child health and essential medicine tracer products. This will assist NMCP to quantify and procure the appropriate amounts of commodities, leading to a leaner supply chain and overall cost savings.

An assessment of the supply chain will be conducted in August of 2011 using both PMI and PEPFAR funds to ensure successful implementation of the new LMIS and measure product availability at the facility and district pharmacy level for a variety of products, including those for malaria.

***Strengthening antimalarial drug availability and management at the community level:***

District pharmacists were brought together to discuss their role in iCCM activities including planning their involvement in CHW training and supervision. The CHD, with support from PMI and other partners, provided stock cards for CHW stock management, developed job aids on rational medicine use, revised CHW materials to include medicine management, oriented CHW trainers in medicine management, and revised the supervision check list for CHWs and health centers.

***Rational drug use:*** PMI has coordinated with PEPFAR to provide technical assistance to the Pharmacy Task Force to build MOH capacity to establish pharmaceutical policies in

rational drug use. The Pharmaceutical Law is awaiting approval at the Ministry of Health. USG-supported consultants worked with the faculty of the pharmacy school to revamp the pre-service training curriculum to include modules in both rational drug use and antimicrobial resistance.

*Regulation and drug quality control:* PMI has been working closely with PTF to develop a Food and Drug Regulatory Authority. Currently, the PTF has the mandate to regulate drugs, but there is no official mechanism in place that facilitates this regulation. Through PMI's support, the Rwanda Food and Drug Regulatory Authority will be able to monitor food, drugs, and supplements.

*Pharmacovigilance:* Through collaboration with MOH leadership, Global Fund and joint PMI-PEPFAR support, a national pharmacovigilance system was approved by the Ministry of Health. A national adverse drug effect reporting system has been developed which will report events using a passive reporting system. The NMCP also operates a hotline for community members to ask questions about IRS and to report any adverse events. The PTF and the NMCP have developed a protocol for adverse events reporting for PRIMO used at the community level and in registered pharmacies but have not yet implemented the reporting. Pharmacovigilance activities are a joint effort in which PMI plays only a minor role.

***Proposed Activities with FY 2012 Funding (\$3,800,000):***

**Diagnostics**

PMI considers accurate diagnostic capacity a critical component of malaria case management and will continue to support the NMCP and the NRL in efforts to strengthen the use of laboratory confirmation using microscopy or RDTs for case management. Specific activities include:

- *Procure laboratory diagnostic commodities:* PMI will procure equipment and supplies for malaria laboratory diagnosis and the quality control system as determined by coordinated quantification by the NMCP, NRL and other partners. Specific gaps for FY 2012 include ongoing needs for replacement microscopes. Global Fund grants will provide other diagnostic commodities such as slides, Giemsa stain, safety boxes, and gloves. (\$150,000).
- *Strengthen malaria laboratory diagnostics in health facilities:* Continued activities to strengthen malaria diagnostics by supporting an integrated national quality control system for microscopy at health facilities and providing continued training for malaria diagnostics including RDTs. PMI contributions in conjunction with PEPFAR will reinforce training at health centers; increase availability of supervisory staff at the national, regional and district levels; and support supervisory visits to district hospitals and health centers. (\$100,000).

## **Case Management in health facilities and community**

The PMI will continue to support prompt and effective case management of malaria with a specific focus on the community. Specific activities to be funded by PMI are:

- *Support for integrated community case management implementation:* PMI will continue to support implementation of the iCCM package, including 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. The PMI will support CHWs to provide appropriate health communications messages to encourage understanding and adherence to the current treatment algorithms. The PMI will continue to support the CHDs to coordinate all community health implementing partners and to ensure that community health materials (e.g. training modules, job aids, motivation/incentive packages, per diem, supervision protocols, and key messages) are reviewed and standardized across partners. The PMI, with leveraged funds from other USG MCH programs, will support the complete package of iCCM interventions which include malaria, pneumonia, diarrhea, malnutrition, and family planning, in currently supported districts or other districts depending on priorities of the MOH. (\$2,400,000)
- *Procure 500,000 RDTs and safety boxes for iCCM:* PMI will procure 500,000 RDTs as a contribution to the overall estimated need of 1.2 million RDTs. In addition, PMI will procure safety boxes for RDT disposal to supply CHWs in PMI supported districts. (\$600,000)
- *Support for Third-year Peace Corps Volunteer:* As part of the ongoing collaboration with Peace Corps, PMI will support one third year PCV for placement with the iCCM implementing partner. The PCV will live in Kigali and work out of the implementing partners office with regular (at least once a week) site visits to multiple communities within one district. His/her responsibility would include mentoring and supporting CHWs and their supervisor in each of three to five communities in one district. This will allow cross-fertilization across communities of ideas, best practices and lessons learned. Other duties may include piloting new interventions or systems across various communities; compiling and disseminating lessons learned and best practices to the central level; and working closely with health center supervisors in ongoing trainings, routine supervision visits, quality assurance of diagnostics, case management, reporting, stock management, behavior change communication and monthly meetings. Technical supervision will be provided by a PMI Resident Advisor and the implementing partner's technical advisor for iCCM. In addition, the PCV would be responsible for providing technical support to health PCVs in Rwanda. Costs are included in overall budget for iCCM implementation and include housing, a computer, workspace in the central office, local travel and phone. (support included in support for iCCM implementation)

- *Repackaging of ACTs:* Support to the community health program by printing and re-packaging of approximately 600,000 AL treatments for iCCM in a blister package for children. (\$150,000)

### **Drug Supply and Pharmaceutical Management**

PMI will continue support for prompt and effective case management of malaria by strengthening the drug supply chain and promoting rational use of antimalarials.

- *Strengthening commodity supply chain management for drugs and other commodities at the central level:* The PMI will continue to support the NMCP in reinforcing supply chain systems by supporting a logistics officer at the NMCP for the third year and will promote integration of malaria commodities into existing reporting formats and systems, including the addition of malaria commodities in the Coordinated Procurement and Distribution System for routine quantification, forecasting and procurement and for the LMIS. The PMI Technical Working Group will reassess support for this position beyond FY 2012 if the need arises. As the role of iCCM expands in Rwanda, PMI will continue to support the NMCP and the CHD to ensure strong pharmaceutical management at all levels. A project funded by the Bill and Melinda Gates Foundation is currently piloting best practices in strengthening the supply chain at the community level. PMI will assist in bringing to scale the successful pilot interventions adopted by the CHD. (\$300,000)
- *Monitoring drug efficacy:* The PMI will continue to provide logistic and technical support for ACT drug efficacy monitoring to the NMCP in two monitoring sites using accepted WHO drug efficacy protocols in order to ensure that the first line (artemether-lumefantrine) remains effective in treating malaria. (\$100,000)

### **INTERVENTIONS - Behavior Change Communication (BCC)**

Behavior change communication and social mobilization play an important role in the overall effectiveness and uptake of interventions to address correct and consistent use of insecticide-treated nets, acceptance of indoor residual spraying and adherence to treatment and prevention therapies.

Given the rapid scale up of malaria interventions in Rwanda, and following the adoption of a national BCC strategy to harmonize communication activities and messages, the NMCP launched an integrated BCC strategy. The NMCP BCC strategy stresses advocacy for leadership and direction, social mobilization with a focus on positive change of social norms and BCC, and integrates malaria prevention and control communications with other Child Survival, Maternal Health, and infectious disease interventions. BCC activities include a combination of interpersonal communication, community education and mobilization, information, education and communication, trainings, and media campaigns to influence and/or modify behaviors and environmental factors that indirectly or directly increase malaria risks.

To achieve changes in behaviors of individuals and communities around malaria treatment and prevention, NMCP will continue to emphasize strategies addressing risk perception. In addition, continued priorities include social mobilization around new and replacement nets, provider and caregiver acceptance of case management policy, and household acceptance of IRS. Moreover, following the 2011 Malaria Program Review, the NMCP refined and shifted some of their BCC priorities. New focuses on research include LLIN utilization and perception as well as operational research to measure the effects of IEC/BCC programs and use this data to strengthen IEC/BCC strategies and emphasize those with the most impact.

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

Over the past 12 months, PMI supported BCC activities for malaria prevention and treatment covering 14 administrative districts in Rwanda. In support of MOH's malaria targets and priorities, PMI, through international and local partners, prioritized and targeted the 'poorest of the poor' and pregnant women. The BCC interventions included a combination of IEC campaigns, trainings to effectively implement BCC campaigns, distance learning radio programs for CHWs, community radio spots, community sensitization (e.g. community dialogues, interpersonal communication and town hall meetings), and mobile video shows. Examples of some key BCC activities include PMI's support to the MOH's Malaria Campaign aimed at addressing barriers to malaria control, prevention and treatment; the use of radio for broad outreach with 16 talk shows and 500 radio spots, which aired on five local radio stations focusing on the benefits of IRS, precautions and improving the acceptability of preventive methods like IRS. In order to strengthen iCCM, a distance learning radio program aimed at building the capacity of CHWs was broadcast twice a week on two popular radio stations, covering topics such as malaria causes, consequences, and prevention. All malaria BCC activities were grounded in improving community ownership and facilitating empowerment for improved uptake and sustained behavior change.

In summary, BCC for malaria prevention used a comprehensive, multi-dimensional approach to behavior change. The following results were achieved: 67,483 people were reached with malaria prevention messages; 611 community events were conducted on malaria prevention; 60,685 individuals were reached with prevention messages through community events; 1,253 IPC sessions were held; 25,562 individuals were reached with messages through IPC and 3,706 people were trained in malaria prevention.

### ***Proposed Activities with FY 2012 Funding (\$250,000)***

The PMI will support continued BCC/IEC through mass media campaigns and social mobilization. As IRS enters its sixth spray round and universal coverage of LLINs is attained and information from research about high impact BCC messages become available, PMI will be able to focus resources in a more effective way.

- *National integrated BCC:* The PMI, in close collaboration with the NMCP and Health Communications Center, will support national level BCC activities as outlined in the integrated BCC strategy. Mass media approaches (e.g. through

radio, television, newspapers, mobile media, etc.), as part of national campaigns or ongoing communications, will be used to promote continued use of LLINs despite declining malaria transmission and risk perception; awareness and acceptance of IRS, especially in new districts; and other integrated malaria messages. National level activities will be coordinated with community partners to ensure consistency and harmonization in messages. (\$100,000)

- *Community mobilization and health communications for LLIN use and case management:* The 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. (\$150,000)

## MONITORING AND EVALUATION

### *Background*

The epidemiology of malaria in Rwanda is shifting as evidenced by reductions in outpatient malaria cases measured by the HMIS and drastic declines in parasitemia and anemia in children under five measured by household surveys (DHS and MIS). The Rwanda MOH and the NMCP work within a data-rich environment which has seen major improvements over the past years. The key is for the NMCP and districts to analyze and use the data to make programmatic decisions to refine malaria control interventions to a dynamic and rapidly changing environment.

Health facilities report routine data on malaria cases through the HMIS, which is vital for tracking malaria trends. However, malaria trends in Rwanda have been confounded by numerous changes, including implementation of new reporting systems, increased health care utilization with the adoption of health insurance schemes (*mutuelles*), case definition changes, and the rapidly increasing proportion of cases treated in the community with the scale up of iCCM. An upsurge in malaria cases occurred in late 2008 and 2009. This experience reinforced the need to generate quality data and move to web-based dashboards to allow timely analysis of the data both at the central and district levels. The recent MPR reported that Rwanda has an “excellent routine information system that provides timely and complete weekly and monthly data for action.” The recommendations from the MPR highlighted the need to use this quality surveillance data to provide a better understanding of the changing malaria epidemiology in Rwanda and strategically target malaria control interventions to respond effectively with high impact.

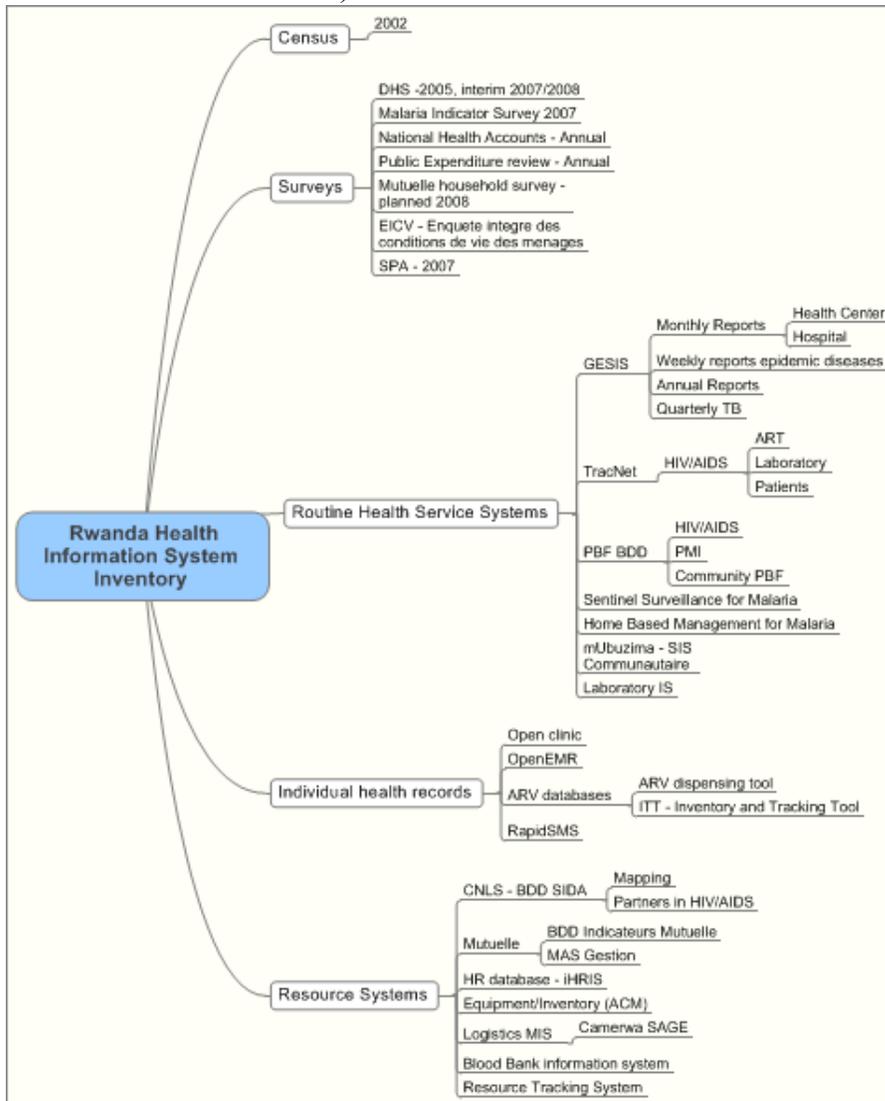
The following information sources guide MOH's programmatic decision-making:

- *HMIS:* The HMIS indicators and forms were revised and a new web-based platform (DHIS 2), with geospatial information system capacity, was launched in 2010. The HMIS receives data from all public health facilities, with timely and accurate reporting reinforced through performance-based financing. As of late 2010, the system provides data on only laboratory-confirmed malaria outpatient cases, inpatient cases, and deaths; as well as data by age and gender on all-cause

morbidity and mortality at individual facilities. Private sector and community treatment are currently not reported. Cell phone based reporting of the HMIS is being piloted.

- *Community information system*: This system which originally included two systems – a paper-based with performance-based financing where CHWs linked to the HMIS by reporting to the nearest health facility, and a cell phone based system which sends data directly from the CHW to the Community Health Desk – has been transitioned into the community-based SIS-com (*mUbmizima*) and includes community diagnosis, treatment, and essential drug logistic information. The SIS-com is separate from the HMIS and incorporates a real time, web-based data platform. There is a minimum set of indicators, and the registers and reporting formats were designed specifically to collect community data generated by the CHWs using cell phones.
- *Integrated Disease Surveillance and Response (IDSR)*: Surveillance activities are coordinated and streamlined throughout all levels of the health system from the community, health facility, district hospital and central levels. The MOH has conducted a surveillance assessment and is in the process of updating the current IDSR as well as computerizing the reporting and monitoring system. The IDSR is also being piloted for cell phone based reporting.
- *Entomological surveillance*: See Vector Control/Entomology Section.
- *Logistics management information system (LMIS)*: A harmonized paper-based system was launched in early 2011 and provides basic data on drug consumption and stock outs at health facilities, independent of the HMIS. Reports flow from health facilities to district offices to CAMERWA and are used for quantification. Pending availability of resources, the LMIS will be computerized by the end of 2011.
- *DHS/MIS*: These comprehensive household surveys provide a broad range of population-based data, including bednet indicators (ownership and use by vulnerable populations), and malaria parasitemia and anemia. Population-based indicators change rapidly in Rwanda; thus, the GOR repeats surveys every two years. A full DHS was completed in 2010 and preliminary results are now available.
- *Research studies*: Several of these are described in individual MOP sections, e.g., for tracking household use of LLINs and monitoring their efficacy and for evaluating community case management, efficacy studies, entomological surveys, etc.

Figure 3. Health related data sources, Rwanda, 2011 (provided by Randy Wilson – Rwanda eHealth Initiative)



Many donors have supported improvements in the HMIS including PMI, PEPFAR, USG Maternal and Child Health and Global Fund. The PMI specifically has supported trainings in use of the HMIS database (reporting, quality, analyses) by all M&E coordinators and data managers. The PMI has also contributed to the support for an M&E technical advisor who has worked with the NMCP in improving HMIS reporting and quality as well as setting up a parallel SIS-com.

Training has been provided to district and implementing partner staff and to individual community health workers in two areas: community performance-based financing and RapidSMS (reporting with cell phones). Training of CHWs is done at the health center level by data managers and CHW supervisors. The malaria-related information captured

by the SIS-com includes information such as number of febrile children evaluated, number of malaria cases treated, and number of fever cases referred. The SIS-com now interfaces with the HMIS and the data may be identified as community based as it is no longer aggregated.

The Rwanda HMIS and SIS-com report complete and timely data. Data quality is ensured with monthly data quality audits and reinforced with performance-based financing. Both systems are transitioning to cell phone reporting and moving to web-based platforms which will afford the opportunity to analyze the data in real time. The analysis and use of these data in decision making continues to be a challenge, thus trainings are underway to increase capacity for M&E analysis and response capacity at the district level. PMI is supporting two staff: one who works on developing and implementing an effective epidemic surveillance and response system (ESR) and another who works on implementing improvements in the HMIS and SIS-com.

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

Rwanda has showed significant reductions in malaria in 2010 and these decreases have been well documented based on the substantial progress made in M&E and improvements in the HMIS, the SIS-com, a completed 2010 DHS, and entomological monitoring. The PMI continued to strengthen the HMIS Unit through its support for a technical advisor who works closely with the MOH M&E unit and staff at the NMCP. A server has been installed which links to the HMIS database to allow for direct access for the NMCP to routinely track HMIS data. Therefore, anyone in the NMCP can access the web-based HMIS platform and analyze the data. The NMCP, with PMI support, conducted monthly data quality assessments of reported malaria cases, and found high concurrence between HMIS records and health facility registers. Based on results from the Malaria Program Review and the changing epidemiology of malaria, the NMCP prioritized epidemic surveillance and response and shifted from sentinel sites to an IDSR system which is also moving to cell phone reporting. PMI has also supported an ESR advisor who is a trained epidemiologist and is in the process of mapping and stratifying the malaria burden, developing new epidemic thresholds and standardized protocols for epidemic surveillance and response.

#### ***Proposed Activities with FY 2012 Funding (\$875,800)***

The PMI will reinforce the capacity of the NMCP to collect, analyze and use the data generated by the program for evidence-based decision making at all levels of the health information system including, community, health centers and district hospitals and the monitoring and evaluation unit at the NMCP. The PMI in Year 6 will continue to support routine information systems, disease and entomologic surveillance and program evaluations.

- *Strengthen national- and district-level M&E activities:* The PMI will support facility and community information systems and use of data through the M&E working group of the Malaria Steering Committee as well as other venues; capacity-development and training to facilitate data-for decision making at district and facility levels. (\$100,000)

- *Strengthen epidemic surveillance and response (ESR) activities:* The PMI will support the Epidemic Surveillance and Response Unit through the seconded epidemiologist in developing new epidemic thresholds based on data to respond to the changing epidemiology in Rwanda. The ESR unit will also develop standard operating protocols for epidemic surveillance, investigations, and adequate epidemic responses. (\$150,000)
- *Support for Field Epidemiology and Laboratory Training Program (FELTP) in malaria:* The PMI will support capacity building within the Rwandan MOH by contributing to the FELTP which is designed to train leaders in applied epidemiology and public health laboratory management, while providing epidemiologic services to national and sub-national health care workers and supervisors. (\$200,000)
- *Support for MIS:* The PMI will support the MIS scheduled for 2013 (\$250,000 in FY 11 funds were allocated for the MIS, for a combined PMI contribution in FYs 11 and 12 funds of \$575,800). (\$325,800)
- *M&E reporting systems in USAID/Rwanda:* The PMI will contribute to a USAID/Rwanda Mission contract for harmonizing partner reporting systems and ensure USAID reporting requirements. The contractor will train implementing partners and collate quarterly data for mission and PMI annual reports. (\$100,000)

## **CAPACITY BUILDING WITHIN NATIONAL MALARIA CONTROL PROGRAM**

### ***Background***

The organizational relationships within the Ministry of Health have been restructured with consolidation of many public and private health entities into an overarching center, the Rwandan Biomedical Center. The NMCP forms one part of the newly approved larger MOH unit known as the Malaria Unit and other parasitic diseases division, whose mandate not only covers all parasitic diseases but also includes Neglected Tropical diseases.

Rwanda's NMCP consists of 29 professional staff, including internationally trained staff, and is led by a public health physician. The PMI team and WHO also provide direct technical assistance, especially on M&E, surveillance, entomology and case management. During 2012, PMI will continue to support three fully seconded positions (housed at the NMCP):

- 1) Logistics officer who started in 2010

- 2) IVM advisor who started in early 2011
- 3) Epidemiologist in charge of updating ESR thresholds and responses who started in mid-2011.

The NMCP is located in its own building apart from other MOH units (as are other technical units) and faces space constraints as the team expands. Vehicles have been provided by other international donors and the Global Fund. The NMCP has adequate internet access and with support from PMI are being supported to establish direct access to the HMIS database.

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

The PMI supported training and capacity building of the NMCP in the following areas.

- *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 Malaria Unit to the implementation and monitoring of the new LMIS system for routine quantification, forecasting and procurement. (included in case management section)
- *IVM Advisor:* Provide technical assistance through an IVM advisor seconded to the Malaria Unit/TRAC-PLUS, to support the development, implementation and evaluation of the national IVM strategy. The advisor will also assist in the development of the malaria strategic plan 2013-2017 and the Global Fund Round 11 application. (included in IRS section)

*Monitoring the durability and longevity of LLINs:* Provide continued technical assistance to the NMCP to monitor the durability and longevity of LLINs to help inform programmatic options for replacement and maintenance of nets in houses. Specific activities of monitoring for LLINs include support for ongoing field work (household interview, LLIN collection and testing) and a technician who will coordinate the field operations, conduct LLIN testing and data analyses, and provide operational support for the insectary.

*Support for Capacity Building is incorporated in intervention-specific activities.*

## **HEALTH SYSTEMS STRENGTHENING**

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

PMI as part of the USG efforts invests significantly in ensuring the availability of pharmaceuticals, equipment and supplies for health service delivery. This includes capacity building of the national medical store to forecast, procure, store, and distribute health commodities; as well as assistance to the coordinated procurement and distribution system for all health commodities; technical assistance for the Pharmacy Department in MOH; and plans to support the establishment of the planned National Medicines Authority and the national pharmacovigilance system.

Improving the quality of services is another key area of both GOR and USG support. The USG is providing technical and financial assistance to the MOH to develop a national accreditation system for tertiary and secondary health facilities, as well as the laboratory network. Quality improvement modules are being incorporated into pre-service curricula at institutions receiving USG assistance and a central level cadre of quality improvement supervisors is being developed with technical support from USG partners. PMI specifically supports human resource needs at the Malaria Unit, quality of laboratory services through the NRL, and strengthening of overall M&E systems including HMIS and community information systems.

## **COMMUNICATION AND COORDINATION WITH OTHER PARTNERS**

Several mechanisms have been established by the NMCP with the support of PMI and other partners to ensure effective communication and coordination between all partners involved in malaria control interventions.

*PMI Partners' Meeting:* The PMI and the NMCP organize quarterly individual and all-partner review meetings as part of the review process for PMI-funded activities to inform progress, identify challenges, and provide solutions and approaches for effective implementation.

*Malaria stakeholder meetings:* The NMCP routinely organizes malaria stakeholder meetings which involve all international and local partners.

*Country Coordinating Mechanism (CCM) for the Global Fund:* The CCM for the Global Fund continues to meet every month. The PMI team attends malaria specific meetings and has participated in proposal development and review, most recently for the Round 8 malaria proposal and in discussions about Affordable Medicines Facility for Malaria (AMFm).

*Roll Back Malaria (RBM) activities:* The NMCP continues to hold monthly phone calls with the RBM group, and partners involved in malaria control activities. Members are particularly active during preparations for Africa Malaria Day.

*The Community Health Desk (CHD):* The CHD has elaborated an integrated community health policy and has taken the lead in bringing together all stakeholders in community

health including HBMF, community IMCI, community performance-based financing, other child survival, family planning, and HIV palliative care partners.

## **INTEGRATION WITH OTHER GLOBAL HEALTH INITIATIVE PROGRAMS**

The U.S. Government is pursuing a comprehensive, whole-of-government approach to global health through the GHI. The GHI promotes a new operational model to meet its dual objectives of achieving significant health improvements and creating an effective, efficient and country-led platform that ensures the sustainable delivery of essential health care and public health programs. One of the pillars of GHI is to increase impact and efficiency through strategic coordination and integration. The PMI program is strategically integrating with other USG programs in the following areas:

### *Maternal and Child Health/Family Planning*

Integrated community case management is a key component of the PMI program. PMI/Rwanda will support community-based diagnosis and treatment of childhood fever. Community health workers will be given refresher trainings on diagnosis and treatment of illnesses, including malaria, pneumonia, and diarrhea, as well as RDTs, medicines, and other supplies. This work is closely coordinated with the USAID/MCH program and the GOR Community Health Desk. In addition, LLINs will be distributed to first-time pregnant women and infants/newborns through ANC and EPI services at health facilities. The USG uses an integrated approach to strengthening the logistics system in country, especially as a harmonized system and common central medical store are used. Technical assistance in logistics and procurement provided by PMI is integrated with that for MCH, family planning, and HIV/AIDS.

### *HIV/AIDS*

Rwanda is a focus country for the President's Emergency Plan for AIDS Relief (PEPFAR). In FY 2012, collaboration between PMI and PEPFAR will include health systems strengthening and behavior change communication. Efforts to strengthen the HMIS, LMIS, and laboratory capacity are done jointly, with co-funding, from PEPFAR and family planning (LMIS only). In BCC, the national policy is to disseminate integrated messages, so campaigns that include malaria prevention and treatment messaging also focus on HIV/AIDS, MCH, and family planning.

## **STAFFING AND ADMINISTRATION**

Three full-time malaria specialists have been hired to oversee PMI in Rwanda, within the context of an integrated strategic objective team. The core team includes two international specialists and one Rwandan physician. All are part of a single interagency team led by the USAID HPN officer who has been delegated that authority by the USAID Mission Director. The CDC staff is supervised technically and administratively by CDC. Working alongside other Health Team activity managers,

the team develops and implements PMI strategies and work plans, coordinates with national authorities, manages collaborating agencies, and supervises day-to-day activities. They also monitor and evaluate outcomes and impact and manage the reporting of results. PMI specialists coordinate closely with the MOH/NMCP and other national and international partners, including the WHO, UNICEF, the Global Fund, World Bank and the private sector.

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

**Table 1**  
**President's Malaria Initiative - Rwanda**  
**(FY 2012) Budget Breakdown by Partner**

<b>Partner</b>	<b>Geographical Area</b>	<b>Activity</b>	<b>Budget (\$)</b>	<b>%</b>
IRS IQC 2 Task Order 4	Targeted districts	Indoor residual spraying in 325,000-360,000 houses	\$7,730,000	43%
TBD	Central	Integrated vector management	\$150,000	1%
CDC		TDY technical assistance	\$24,200	0%
DELIVER	Nationwide	Procure LLINs, laboratory and CCM commodities, and central level SCM	\$4,250,000	23%
New BCSM award	Nationwide	Distribute LLINs and repackaging of PRIMO ACTs	\$500,000	3%
SPS		Net durability monitoring and therapeutic efficacy monitoring	\$220,000	1%
MCHIP		Strengthen MIP interventions	\$200,000	1%
TBD		Strengthen diagnostic capacity	\$100,000	1%
FHP	Nationwide	Support integrated community mobilization and iCCM	\$2,550,000	14%
TBD	Central	Support national IEC/BCC for iCCM	\$100,000	1%
IHSSP		Support M&E, including ESR activities	\$250,000	1%
CDC		Support for FELTP trainees in malaria	\$200,000	1%
MEMs		M&E for Mission	\$100,000	1%
Administration			\$1,400,000	8%
MACRO		Support for MIS	\$325,800	2%
<b>Total</b>			<b>\$18,100,000</b>	<b>100%</b>

**Table 2**  
**President's Malaria Initiative - Rwanda**  
**Planned Obligations for (FY 2012)**

Proposed Activity	Mechanism	Budget		Geographical area	Description
		Total \$	Commodity \$		
<b>PREVENTIVE ACTIVITIES</b>					
<b>Vector Control - Entomology</b>					
Entomologic M&E	IRS IQC 2 TO 4	100,000		IRS districts	Support for ongoing entomologic monitoring at 11 sites
Entomologic equipment	IVM	25,000	25,000		Procure equipment for entomology lab
Vector Control/Entomologic monitoring technical assistance	CDC	12,100	0		One CDC TDY for technical assistance to vector control activities and entomologic monitoring
Support for IVM Advisor	TBD	125,000		Central	Entomologist for implementation of IVM strategy and technical support to Malaria Unit's Entomologist
<b>SUBTOTAL VECTOR CONTROL - ENTOMOLOGY</b>		<b>262,100</b>	<b>25,000</b>		
<b>Insecticide Treated Nets</b>					
Procure 400,000 nets	DELIVER	3,200,000	3,200,000	Nationwide	Nets to contribute to 2012 needs/gaps to maintain universal coverage
Distribute 400,000 nets	New BCSM award	350,000	250,000	Nationwide	Distribution of nets through routine distribution channels (ANC and EPI clinics)
Technical assistance for LLIN durability study	CDC	12,100	0		One CDC TDY for technical assistance to vector control activities and entomologic monitoring

Net durability and insecticide resistance monitoring	SPS	120,000	10,000		Continued support for prospective monitoring of LLIN durability and longevity; support for two 6-month follow-up surveys and LLIN testing
<b>SUBTOTAL ITNs</b>		<b>3,682,100</b>	<b>3,460,000</b>		
<b>Indoor Residual Spraying</b>					
IRS implementation	IRS IQC 2 TO 4	6,600,000	2,250,000	Targeted districts	IRS spray activities for at least 325,000 structures. Includes procurement of insecticides and other supplies/equipment, training, and other operational costs.
IRS implementation	IRS IQC 2 TO 4	1,030,000	1,000,000	Targeted districts	Procurement of insecticide and preparation for 2013 spray campaign.
<b>SUBTOTAL IRS</b>		<b>7,630,000</b>	<b>3,250,000</b>		
<b>Intermittent Preventive Treatment in Pregnancy</b>					
Strengthening of MIP interventions	MCHIP	200,000	0		Support the development and implementation of national strategy for the prevention and treatment of malaria in pregnancy at national and district level
<b>SUBTOTAL IPTp</b>		<b>200,000</b>	<b>0</b>		
<b>SUBTOTAL PREVENTIVE</b>		<b>11,774,200</b>	<b>6,735,000</b>		
<b>Case Management</b>					
<b>Diagnosis</b>					
Laboratory commodities	DELIVER	150,000	150,000		Procurement of replacement microscopes
Strengthen decentralized diagnostic capacity	TBD	100,000	0		Support for QA/QC of microscopy in the health facilities

<b>SUBTOTAL -- Diagnosis</b>		<b>250,000</b>	<b>150,000</b>	
<b>Treatment &amp; Pharmaceutical Management</b>				
Integrated community case management	FHP	2,400,000	0	Integrated CCM training and supervision support, QA/QC of RDTs and SCM for ACTs, and tools and registers for CHWs. Includes support for 3rd year Peace Corps Volunteer.
Procurement of CCM commodities	DELIVER	600,000	600,000	Procurement of 500,000 RDTs for CCM and safety boxes for RDT disposal
Support for 3rd year PCV to support CCM activities	Peace Corps	0	0	10,000 included in CCM for PCV support
Repackaging of PRIMO ACTs	New BCSM award	150,000	150,000	Contribute to repackaging needs for community and private sector ACTs
Central level supply chain management	DELIVER	300,000	0	Support LMIS and CPDS and seconded logistics officer at the NMCP
Therapeutic efficacy/ACT resistance monitoring	SPS	100,000	0	Monitor in vivo ACT resistance
Support National IEC/BCC for CCM	TBD	100,000	0	Work with HCC and MU for national level integrated malaria IEC/BCC for CCM
Integrated community mobilization and communication	FHP	150,000	0	Support to CHWs and local NGOs for integrated community IEC/BCC
<b>SUBTOTAL - Treatment &amp; Pharmaceutical Management</b>		<b>3,800,000</b>	<b>750,000</b>	
<b>SUBTOTAL CASE MANAGEMENT</b>		<b>4,050,000</b>	<b>750,000</b>	
<b>Monitoring and Evaluation</b>				
Strengthen national and district level M&E activities	IHSSP	100,000	0	Support evidence-based decision making at the district and national

				levels
Strengthening ESR activities	IHSSP	150,000	0	Support for ESR system including salary for seconded ESR Epidemiologist
Support for FELTP trainees in malaria	CDC	200,000	0	Support for FELTP trainees in malaria and disease surveillance and investigation, cross border simulation
Support for MIS	MACRO	325,800	0	Support for MIS in 2013
M&E and reporting unit in Mission	MEMs	100,000	0	Contribute to USAID Mission M&E requirements and responsibilities as they relate to PMI
<b>SUBTOTAL - M &amp; E</b>		<b>875,800</b>	<b>0</b>	
<b>In-country Staffing and Administration</b>				
PMI staff (USAID and CDC) and associated administrative expenses	USAID/CDC	1,400,000	0	Support for USAID and CDC Malaria Advisors, Malaria Program Specialist and support staff within USAID Mission plus associated administrative costs.
<b>SUBTOTAL - In-Country Staffing</b>		<b>1,400,000</b>	<b>0</b>	
<b>GRAND TOTAL</b>		<b>18,100,000</b>	<b>7,485,000</b>	