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PRESIDENT'S MALARIA INITIATIVE



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Malaria Operational Plan (MOP)

RWANDA FY 2011

November 15, 2010

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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
BTC	Belgian Technical Cooperation
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
DHS	Demographic and Health Survey
EIR	Entomologic Inoculation Rate
EPI	Expanded Program for Immunization
ESR	Epidemic Surveillance and Response
FY	Fiscal year
FBO	Faith-based organization
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
LLIN	Long-lasting insecticide-treated bed net
MCH	Maternal and child health
MDG	Millennium Development Goals
MEWS	Malaria Early Warning System
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
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
RPO	Rwanda Partner Organization
SP	Sulfadoxine-pyrimethamine
TRAC+	Treatment and Research AIDS Center
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 six-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 invest \$63 billion over six years to help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns, and children. Rwanda has been selected as a GHI Plus country.

The President's Malaria Initiative (PMI) is a core component of the 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 FY2014. 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.

Although Rwanda officially became a PMI country in FY2007, the USG had been supporting malaria control activities there for several years. During the last three to four years, Rwanda has made significant progress in scaling up malaria control interventions. Ministry of Health (MOH) statistics show declines in malaria cases since 2005 and this was confirmed in a DHS survey carried out in 2008 which showed a 32% reduction in under five mortality since 2005. Between late 2008 and December 2009, however, an upswing in cases was seen. In 2008, the health management information systems (HMIS) recorded 770,000 total malaria cases (confirmed and presumed) and 1,250,000 cases in 2009. In December 2009, the MOH directed that all malaria cases require laboratory confirmation by either microscopy or rapid diagnostic test (RDT); laboratory confirmation has averaged 93% in 2010. The cause of the upswing in cases is unclear, but reported cases of malaria are declining once again.

The most recent national survey data on malaria comes from the interim 2008 Demographic and Health Survey (DHS). Fifty-seven percent of households owned at least one insecticide-treated net (ITN) and 58% of children less than 5 years old and 62% of pregnant women had slept under an ITN the previous night.

During the last year, several national policies and approaches were amended to address increases in malaria cases. The NMCP originally targeted free LLINs to high-risk groups (children under five, pregnant women) with mass distribution campaigns and through routine channels, but has shifted its strategy towards achieving universal coverage (three nets per household) by 2013, starting with a massive influx of LLINs in 2010. Indoor residual spraying (IRS) achieved its largest coverage of approximately 295,000 houses in 2009, and the NMCP continues to support targeted focal spraying in selected, high

burden sectors. In November 2009, the NMCP revised their treatment policy to require diagnostic confirmation of all fever cases regardless of age. The policy extends to the treatment of fever at the community level; and the NMCP intends to expand RDT testing by trained community health workers to all districts by 2011.

The FY2011 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. While universal access to malaria prevention and treatment measures is the goal of most NMCPs, pregnant women and children under five remain the focus of PMI efforts, as they are the most vulnerable to malaria infection. The activities that PMI is proposing to support with FY2011 funding fit in well with the 2008-2012 National Malaria Control Strategy and Plan and build on investments made by PMI and other partners to improve and expand malaria-related services. The proposed FY 2011 PMI budget for Rwanda is \$19 million. Based on discussions and meetings with the NMCP and partners, the following major activities will be supported:

Insecticide-treated nets (ITNs): The Malaria Strategic Plan promotes universal long-lasting ITNs (LLINs) coverage for all age groups, with one for every two people or three nets per household by 2013. The NMCP expects to achieve two nets per household by the end of 2010 with the distribution of approximately 5.7 million LLINs. The main delivery channels are free mass distribution during integrated health and vaccination campaigns, and routine distribution of free nets through antenatal care (ANC) and Expanded Program for Immunization clinics in all health centers.

With FY2011 funding, PMI will procure 500,500 nets to contribute to maintaining the universal coverage target in 2012. 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 to promote correct and consistent net use. In addition, PMI will support the NMCP to assess the durability and longevity of LLINs to guide replacement strategies. Together with contributions from other donors, these activities are expected to bring household ownership of one or more LLINs to more than 85% nationwide.

Indoor residual spraying (IRS): The PMI supports the NMCP's strategy to reduce malaria transmission through IRS in targeted high-risk areas. In September 2010, PMI will support a spray round to reach approximately 295,000 houses using a long-lasting insecticide, to be followed by a smaller second round in March 2011 to protect beneficiaries during the malaria transmission peak in the second quarter of the year. In addition to procuring insecticide and spray equipment, recruiting and training community health workers 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 and a refurbishment of space for an insectary.

With FY2011 funding, PMI will support the Malaria Unit to develop an integrated strategy to control disease vectors and transition to greater local ownership and responsibility for IRS. The PMI will support two spray rounds with FY2011 funding covering 180,000 households in each round.

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 strategy, including purchase of iron/folate tablets for pregnant women. Marked improvements have been made in recent years to strengthen the integration of ANC services with other health programs, including malaria. The Maternal Child Health Program in coordination with the NMCP, the Community Health Program and the Expanded Program for Immunization (EPI) 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 (FANC) package, which is now available in 26 of 30 districts nationwide. With FY2010 funding, PMI is helping to improve the quality of FANC services through training at national and district levels and is providing LLINs and a one-year supply of iron and folic acid for antenatal clinics. An assessment of the clinical burden of malaria in pregnant women in the context of declining malaria incidence is planned this year.

With FY2011 funding, PMI will continue to support the national strategy for the prevention and treatment of malaria in pregnancy by ensuring it is integrated into maternal and child health (MCH) services through training, supervision and capacity-building efforts at national and district levels and providing LLINs to pregnant women attending ANC services.

Health systems strengthening and integration: 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 HMIS, 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 trained community health workers (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 2011 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. The Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) now finances all artemisinin-based combination therapy (ACT) needs and provides other antimalarials and diagnostic support for all health facilities. In November 2009, the NMCP revised their treatment policy to require diagnostic confirmation of all fever cases regardless of age. In line with GHI principles, the PMI has helped develop human resources and systems for integrated community case management of fever; as well as in the private sector, strengthening laboratory diagnostic training, and supportive supervision systems. Among the ten PMI-supported home-based management of fever districts, eight have completed the integration of community case management (CCM) with more than 152,000 children treated for malaria by CHWs in 2009. The PMI also funds the repackaging of ACTs for use at the community level and in the private sector, which ensures 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.

With FY2011 funding, PMI will continue to strengthen efforts to ensure prompt and effective case management of malaria at health facilities, at the household/community level by community health workers through scale-up of CCM, and support of private sector distribution of ACTs. PMI will also help the NMCP to procure and introduce rapid diagnostic tests (RDTs) for the CCM and private sector approaches. 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 now sufficiently complete 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. The strengthening of the HMIS also reflects the work of a National M&E Task Force as well as the support of a technical advisor to the Ministry of Health (MOH) partially funded by PMI. In addition, PMI is co-funding the 2010 nationwide Demographic Health Survey as well as an external evaluation of CCM and private-sector management of malaria.

With FY2011 funding, PMI will continue to support NMCP M&E activities, including implementation of the national strategy, with particular emphasis on strengthening district-level capacity in collection and use of data for decision-making. PMI plans to support malaria surveillance by strengthening the Integrated Disease Surveillance Reporting system by contributing to training and supervision of health workers to ensure timely, complete and accurate malaria case reporting.

INTRODUCTION

Global Health Initiative

In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a six-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 invest \$63 billion over six years to help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns, and children. The GHI promotes a new operational model based on core principles that will 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. The GHI's core principles include: 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.

THE PRESIDENT'S MALARIA INITIATIVE

Malaria prevention and control is a major foreign assistance objective of the U.S. Government (USG). 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 FY2014 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 reaching 85% coverage of the most vulnerable groups — children under five years of age and pregnant women — with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS).

In implementing this initiative, the USG is committed to working closely with host governments and within existing national malaria control plans. Efforts are coordinated with other national and international partners, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund), Roll Back Malaria (RBM), the World Bank Malaria Booster Program, and the non-governmental and private sectors, to ensure that investments and complementary and that RBM and Millennium Development goals are achieved.

Rwanda was in the second group of countries selected to participate in PMI. Large-scale implementation of ACTs and IPTp began in mid-2006 and has progressed rapidly with support from PMI and other partners. Artemisinin-based combination therapies (ACTs)

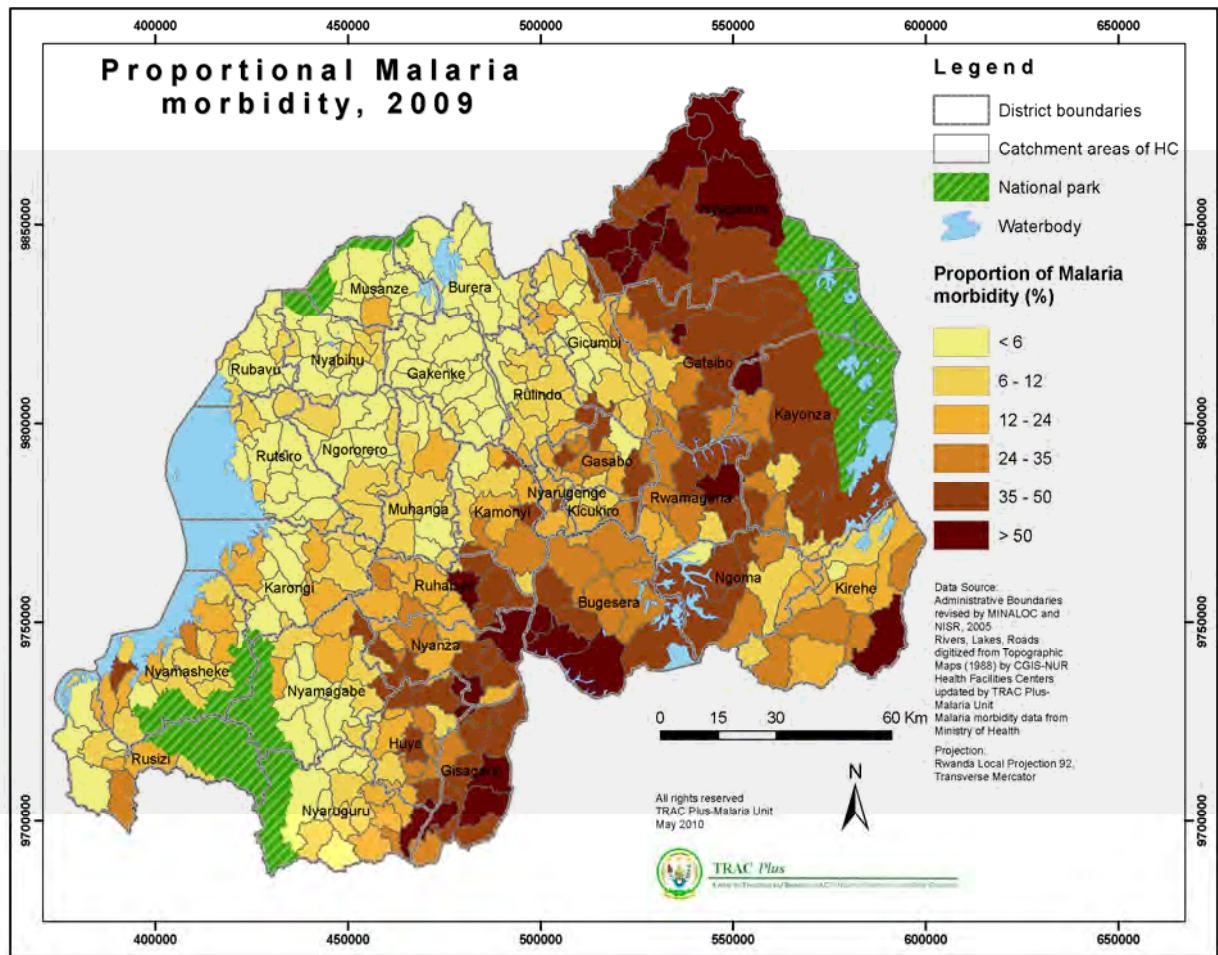
are now available and being used in all public health facilities nationwide. Several large-scale free ITN distribution campaigns have resulted in high levels of household ownership of nets. PMI has also supported IRS in seven districts covering approximately 295,000 households.

This FY2011 PMI Malaria Operational Plan presents a detailed implementation plan for the fifth year of PMI in Rwanda based on the PMI Multi-Year Strategy and Plan and the National Malaria Control Program's (NMCP) Five -Year Strategy. It was developed in consultation with the NMCP, with participation of national and international partners involved with malaria prevention and control in the country. The activities that PMI is proposing to support fit in well with the 2008-2012 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 5 and 8 malaria grants. This document briefly reviews the current status of malaria control policies and interventions, describes progress to date, identifies challenges and unmet needs if the targets of the NMCP and PMI are to be achieved, and provides a description of planned FY2011 activities. The total amount of PMI funding requested in FY2011 for Rwanda is \$19 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 1.8 million children under five and 450,000 pregnant women/year (2002 Census, 2010 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, transmission occurs year round with two peaks (April-May, Nov-December) following distinct rainy seasons. The map below shows the proportional morbidity (% of outpatient visits attributed to malaria) of confirmed and presumed malaria cases by district reported to HMIS in 2009 and indicates that the highest burden of malaria remains mainly in the districts historically classified as endemic.



The primary sources of information used to track changes in malaria prevalence and coverage indicators are aggregated case reporting 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 health centers and district hospitals. However, in late 2009, the NMCP directed that all malaria cases should be laboratory confirmed either by microscopy or rapid diagnostic test (RDT) before treatment and only confirmed cases should be reported. Completeness of reporting is reinforced through performance-based financing; and data quality audits, while preliminary, are demonstrating concordance between clinic registers and HMIS reports. Community-level reporting systems, which will be integrated into HMIS, are under development; but private sector providers (primarily based in urban areas in Kigali, Butare and Gisenyi) do not report at all.

HMIS-based analyses show declines in malaria cases from 1.5 million reported in 2005 to a low of 772,197 cases in 2008. However, increases were reported in late 2008 through 2009. The HMIS recorded more than 1.2 million cases of presumed and confirmed malaria for 2009. The proportion of outpatient consultations attributed to malaria rose

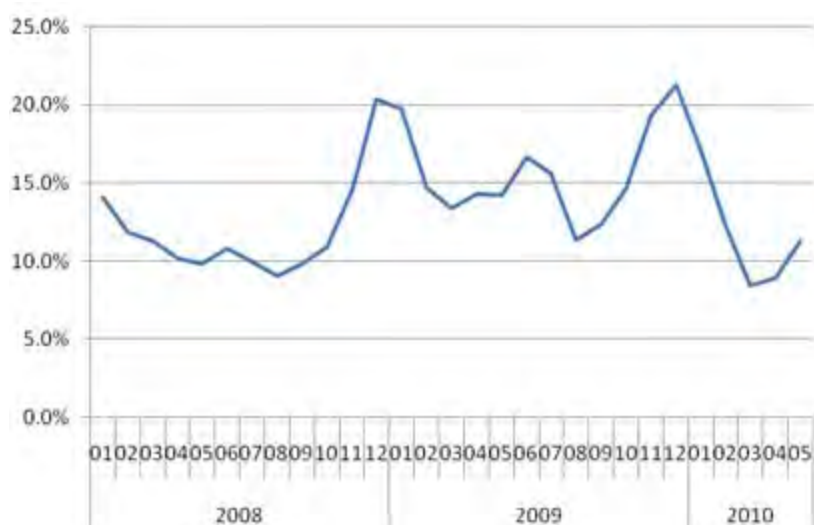
from 11.4% in 2008 to 15.6% in 2009. The number of deaths attributed to malaria rose from 643 in 2008 (16.3% of all deaths) to 862 in 2009 (19.2%).

Table 1: Summary of HMIS data for 2008 and 2009

	2008	2009	2010 (Jan-March)
Total cases reported	772,197	1,247,583	392,353
% Confirmed	40.6%	50.3%	95.7%
% Morbidity	11.4%	15.6%	11.0%
Slide positivity rate	18.0%	26.8%	27.3%
Malaria attributed mortality	16.3%	19.2%	17.2%

Figure 1 shows the increased monthly trends in malaria morbidity for 2008 to early 2010 and also highlights the seasonality of malaria cases with the highest burden in November and December each year. In 2008, 41% of cases of presumed malaria were diagnostically confirmed, with a slide positivity rate of 18%. In 2009, these figures were 51% and 27% respectively. Following the revision of treatment policy to require diagnostic testing in late 2009, 93% of cases reported from January-March 2010 were diagnostically confirmed with a slide positivity rate of 27%. This high laboratory confirmation rate was also confirmed by a Global Fund audit in 2009.

Figure 1: Proportion of outpatient consultations reported as malaria cases (presumed and confirmed) by month 2008-2010



In addition to PMI, other development assistance for malaria comes from the Global Fund and UNICEF. Rwanda has two active Global Fund grants in malaria: Round 3 (\$38,597,403, of which \$32,414,495 has been disbursed) and Round 8 (\$52,835,617, of which \$35,985,693 has been disbursed). Global Fund grants support the expansion of community case management with the inclusion of RDTs, antimalarials for treatment at health facilities, procurement of LLINs and resources for health communication needed to achieve universal coverage.

NATIONAL MALARIA CONTROL PLAN AND STRATEGY

Drafted in 2008, Rwanda's current National Malaria Control Strategy outlines priority malaria control interventions through 2012. While the strategy has not changed significantly during the past year, several specific policies and approaches were amended.

- The NMCP originally targeted free LLINs for high risk groups (children under five and pregnant women) with mass distribution campaigns and through routine channels starting in late 2006. NMCP policy has now shifted towards achieving universal coverage (three nets per household) by 2013 starting with a massive influx of LLINs (minimum two per household) during 2010.
- Indoor residual spraying (IRS) reached approximately 200,000 households in 2008 (September) and 295,000 in 2009 (January and September); however, the NMCP is finalizing an integrated vector management strategy with the inclusion of additional districts targeted for IRS depending on availability of additional resources.
- In November 2009, the NMCP revised the treatment policy to require diagnostic confirmation of all fever cases regardless of age. The policy extends to treatment of fever at the community, and the NMCP intends to expand RDT testing by community health workers to all districts by 2011.
- Intermittent presumptive treatment (IPTp) of malaria in pregnancy reached relatively high coverage levels in 2007 and 2008, but was then suspended due to reported resistance to sulfadoxine/pyrimethamine (SP).

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.*

CURRENT STATUS OF MALARIA INDICATORS

Rwanda's most recent Demographic and Health Surveys (DHS), include a full survey in 2005 and an interim survey in late 2007-early 2008. The NMCP also conducted a National Malaria Indicator Survey (MIS) in mid-2007 although results were not officially released. These surveys show marked improvements in key preventive indicators, as summarized below. For example, 15% of households owned an ITN in 2005 and 13% of children under five and 17% of pregnant women had slept under one the night before. The interim DHS showed that 57% of households owned at least one ITN, and that 58% of children and 62% of pregnant women had slept under one. The parasitemia level in children under five was 2.6% in 2008. The full malaria module including anemia and parasitemia testing will also be included in the 2010 DHS, due to commence in September 2010.

Indicator	DHS 2005	Interim-DHS 2008
Proportion of households with at least one ITN	15%	57%
Proportion of children under five years old who slept under an ITN the previous night	13%	58%
Proportion of pregnant women who slept under an ITN the previous night	17%	62%

Sources: Rwanda 2005 DHS; Interim-DHS 2008

EXPECTED RESULTS – YEAR FIVE

The PMI and the NMCP have agreed on the following outcomes for FY 2011:

Prevention

1. LLIN: Procure and distribute 500,500 nets through routine health facility services. The proportion of households that own at least two ITNs is expected to increase to over 80%.
2. IRS: Support bi-annual spraying of 180,000 households to provide protection over two transmission periods for an estimated 825,000 residents.

Treatment

1. Diagnosis in public and private sectors: 90% of reported malaria cases will have parasitological confirmation of malaria either by microscopy or RDTs prior to

- treatment in public and private sectors. A quality control and assurance system will be implemented throughout the health system (central to community) to ensure the diagnostic results are accurate and used appropriately.
2. Diagnosis in the community: Procure 500,000 RDTs to support laboratory diagnostic confirmation prior to treatment in community case management and the private sector.
 3. Community case management: Expand community case management of fever (CCM) integrated into the community health care package into ten out of 30 districts.

INTERVENTIONS - Insecticide-treated Nets

Background

The NMCP uses two primary delivery channels for LLIN distribution and expects to reach every Rwandan household with at least two nets by the end of 2010. The two channels are mass distribution aimed at all households, and targeted distribution to mothers and infants through antenatal care (ANC) and Expanded Program on Immunizations (EPI) visits. Rwanda defines universal coverage as three nets per household, a level to be achieved in 2013. The NMCP supports LLIN distribution with multi-media, multi-level IEC/BCC encouraging correct and consistent use; strengthening the supply chain; and sound monitoring and evaluation (M&E) to track net ownership and use, insecticide resistance, and net durability and insecticide decay.

Even with more limited distribution in 2006 and 2007, 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 are positive findings, a key concern is whether some nets may have become ineffective due to physical deterioration or insecticide decay. During 2009, NMCP and malaria partners reported nationwide LLIN stock outs with limited quantities available for distribution in integrated health campaigns and at health facilities, due in part to procurement delays. A rise in reported malaria cases over the past year has underlined the urgency for net replacement as well as for expanded coverage in all districts.

As shown below, there have been massive distributions of LLINs between December 2009 and December 2010 (planned):

Month	Quantity	Recipients	Funding
December 2009	500,000	Mass distribution: Nyagatare, Kayonza, Gatsibo (partial)	PMI (MOP07)
	184,610		UNICEF
January 2010	581,000	Mass distribution: Bugesera, Kirehe, Ngoma, Rwamagana, Gatsibo (remainder)	PMI/PEPFAR (MOP08)
April 2010	1,793,200	Nationwide, targeted mothers and infants	Global Fund
July 2010	512,579	Mass distribution: 4 districts	Global Fund
	388,000		PMI (MOP09)
September 2010 (expected)	650,000	Mass distribution planned	Global Fund
October 2010 (expected)*	700,000	Mass distribution planned	Global Fund
November 2010 (expected)*	700,000	Mass distribution planned	Global Fund
December 2010 (expected)*	300,000	Mass distribution planned	PMI (MOP10)
	550,000		Global Fund

*information from manufacturer

Thus, new nets to be supplied between December 2009 and December 2010 will total 6,859,389, including those for universal coverage and vulnerable groups. Based on the number of LLINs planned and pledged for 2010, the following LLIN needs/gaps are projected for the next three years:

- Total population in 2010 = approximately 10.2 million
- Ratio of 1.8 persons per net so total number of nets needed by end of 2010 = 5.7m
- LLIN balance expected in December 2010 = 6.9m – 5.7m = 1.2m
- LLINs needed for (4%) increase in population in 2011 = 408,000
- LLINs needed for (4%) increase in population in 2012 = 425,000
- LLINs needed for replacement of old 2009 nets (684,610) + (4%) increase in population in 2013 (442,00) = 1.13 m

PMI will procure 500,500 nets to support maintenance of universal coverage in 2012 and to contribute to a potential LLIN gap in early 2013, replacing old 2009 nets. Procurement of LLINs to replace those distributed in 2010 and achieve universal coverage is also planned with Global Fund support during 2012.

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 of all LLINs that come into the country at the central level. LLINs are distributed through a different system since CAMERWA does not have sufficient space to store them centrally and must move supplies quickly to districts. Only a small reserve stock remains at CAMERWA for emergencies. Stock outs may occur at health facilities because there is no routine distribution from the central level to the districts, and potential users may need to wait until subsequent shipments arrive in country. There is a system in place to track LLIN stocks at district levels and allow redistribution between facilities, but it needs to be strengthened. Although CAMERWA has increasingly taken on more responsibility for active distribution of medications (described in the supply chain section), distribution of LLINs to district level and health facilities has been supported by Population Services International (PSI) and in the recent MCH campaign, the Rwandan National Police.

The Malaria Unit will work with CAMERWA to strengthen the routine distribution system for nets and monitor health facility stocks. Recently, health centers have included monthly LLIN distribution quantities in their HMIS reports which will allow CAMERWA to forecast LLIN needs in the health facilities. Given the large quantities of nets available, there is also a need to determine replacement and disposal strategies that consider environmental impact. The Government of Rwanda (GOR) bans the use of plastic bags, and as a result, the NMCP and partners re-package each LLIN with a paper bag at the point of distribution. The lack of international guidelines for the collection and disposal of huge quantities of old/expired nets continues to be a challenge, particularly with all of the mass campaigns. In addition, the NMCP considers monitoring of LLIN durability and longevity a current priority in Rwanda. Initial efforts began this year to gather information about LLIN durability and insecticide decay rates and to monitor insecticide resistance for the development of an integrated vector management strategy using LLINs and IRS. Although still in the very early stages of discussion, the GOR has recently asked partners to support the development of in-country LLIN production capacity through a local textile firm.

Progress during the last 12 months

The PMI procured and distributed 581,000 LLINs (FY 2008 funding) in January 2010 to households in five districts that had reported increases in malaria cases. The PMI's contribution was part of a phased mass distribution campaign which provided two LLINs per household in high transmission districts. The campaign was led by the NMCP in collaboration with other malaria partners who assisted with distribution and transportation. The PMI also procured 388,000 LLINs (FY 2009 funding) for distribution in July 2010 for the continuation of the phased mass campaign to reach all households nationwide with two nets. The PMI plans to procure an additional 300,000 LLINs (FY 2010 funding) to contribute to a mass distribution campaign in late 2010 or to re-stock health facilities for distribution through ANC/EPI clinics. 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). The PMI intends to conduct an end-use verification assessment before the end of 2010 for all PMI malaria commodities, including LLINs distributed in mass campaigns and to health facilities.

The PMI has supported 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 also works with local NGOs and Rwandan partner organizations to carry out intensive interpersonal communication sessions, community mobilization and sensitization, following household LLIN distributions.

The PMI is providing technical assistance and support to the NMCP to establish surveillance of LLIN insecticidal loss and physical deterioration among a selected group of LLINs to monitor durability and longevity and to inform strategies for replacement and maintenance of nets in houses. Results from the LLIN monitoring will also help guide the development of an integrated vector management strategy that includes the use of LLINs and IRS and provide insight into net durability in the field.

Proposed FY 2011 Activities (\$5,275,000):

The PMI will support the NMCP's efforts to achieve universal LLIN coverage at household level by procuring and supporting distribution of LLINs for routine services. The PMI will continue to support strengthening of the supply chain management and distribution systems through various partners and explore opportunities for building longer-term capacity in the NMCP, at district level, and among local NGO partners. 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 5 include:

- *Procure and distribute 500,500 LLINs:* Support the procurement and distribution of LLINs to contribute to routine distribution channels targeting pregnant women and infants. Other potential channels to vulnerable groups include orphanages, boarding schools, and in-patients at hospitals depending on the NMCP's distribution strategy. Five hundred LLINs will be used to replace those collected for monitoring of durability and longevity (see following activity). Expenditures 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. (\$5,200,000)
- *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 for the second 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. He or she will have skills in data analysis and could be a recent graduate from the school of public health. (Salary support will be limited to two years, at which point NMCP will decide whether or not to continue the position under other funding.) (\$75,000)

INTERVENTIONS - Indoor Residual Spraying

Background

Indoor residual spraying has featured in malaria control strategies in Rwanda since 2007. Beginning in 2008, declining malaria incidence in some areas prompted adjustments, from district-wide IRS coverage, to more targeted focal spraying to cover high risk areas. These focal targets are now being reconsidered because of recent generalized increases in malaria caseloads, but expansion to cover entire districts will depend on available resources. With the exception of GOR spraying in four sectors, all IRS in Rwanda has been funded by PMI.

Five spray rounds with a synthetic pyrethroid have been conducted to date, with a sixth planned for September 2010:

Round	Date	Districts	Target area	Number of structures	Coverage level
1	2007: August- September	3 Kigali districts	Full districts, 35 sectors	152,072	96%
2	2008: August- September	Kigali + Nyanza and Kirehe	36 targeted sectors	189,756	94.2%
3	2009: January- February	Kigali + Nyanza and Kirehe	36 targeted sectors	191,051	97.4%
4	2009: August- September	Kigali + Nyanza, Kirehe, Bugesera and Nyagatare	54 targeted sectors	295,174	97.7%
5	2010: March	Gasabo and Kicukiro (Kigali)	14 targeted sectors	63,395	*87.4%

* Lower coverage found in the 5th round discussed in text

The program strives to reach at least 85% of targeted households within a given community, to achieve public health benefits; and it has always succeeded except within three of fourteen urban sectors in Round 5. Decreased coverage in Round 5 may have been due in part to the short planning period and thus reduced time for community IEC activities and involvement of local leaders; however, further steps appear necessary to build local ownership and responsibility in future rounds.

Since Round 3, the insecticides used for IRS have shifted from short-acting wettable powder to longer-lasting granular formulations. The World Health Organization Pesticide Evaluation Scheme (WHOPES) certifies pyrethroids for only three to six months although field experience from some African countries shows that the insecticide may sometimes remain effective for up to 11 months. In the absence of scientific evidence demonstrating long-term effectiveness in typical Rwandan structures,

GOR policy will continue to call for two spray rounds a year to cover the two transmission periods. WHOPES does not typically revisit effectiveness estimates once made, but local evidence of durability may be available soon based on serial wall bioassays in typical Rwandan structures.

The PMI is working closely with the Malaria Unit to facilitate transition in IRS implementation to build local capacity and ownership. Responsibility for mobilization of community support and participation during spray operations is seen as a first step in the transition process, and three districts in Round 6 will conduct their own mobilization processes using PMI resources.

Based on results of supervision visits from past rounds, the NMCP and PMI determined that the quality of IRS operations requires greater attention. Preliminary evidence identified incorrectly/inconsistently cleared and sprayed residences. Preliminary wall bioassay monitoring showed varying insecticide efficacy on different parts of some walls as well as a lower than expected insecticide efficacy two and three months after spray operations were completed. Until further bioassay results are available to evaluate trends over time, it is unclear whether the bioassay results are due to the quality of the spraying itself, inadequate preparation of the houses, or inherent factors such as inconsistent wall surfaces. In response, the IRS implementing partner intensified training and supervision for Round 5; and NMCP and partners are exploring ways to improve mobilization and communications to increase community responsibility and acceptance of IRS.

The Malaria Unit with PMI support has intensified entomological monitoring and other data collection (e.g. rainfall, cases) to inform the development of an integrated vector management strategy (IVM) during 2011. The IVM strategy will consider the continued need for spraying in Kigali as well the appropriateness of targeting individual sectors as opposed to full districts. Although countries in the region have reported increasing pyrethroid resistance, insecticide resistance testing conducted by the Malaria Unit continues to show mosquito susceptibility to pyrethroids. The Malaria Unit plans to conduct insecticide resistance testing every six months. With routine collection of entomological data and the development of a national IVM strategy, NMCP and partners will be able to make informed decisions about the need and timing of alternative insecticides.

Progress during the last 12 months

The fourth IRS spray round conducted in September 2009 (completed in early October) was the largest in terms of household coverage to date, reaching 295,000 households and adding two of Rwanda's highest transmission districts (Nyagatare and Bugesera) to the targeted area. Although PMI proposed to shift the IRS strategy in the FY 2010 MOP to support one spray round per year during the peak transmission season beginning in the fall, the evidence and data were not yet available to support this change in strategy. As a result, a small fifth round was planned for Kigali on short notice and conducted in March 2010. PMI subsequently adjusted the malaria operational plan for 2010 to support twice annual spraying, using available IRS resources to cover 295,000 structures in Round 6 (September 2010) and a smaller number (approximately 100,000) in March 2011.

In the past year, significant progress has been made in strengthening the Malaria Unit's entomologic monitoring capacity. The PMI has supported the establishment of a central insectary in Kigali, an ELISA-based entomology laboratory (to be upgraded with PCR capability by the end of 2010), training of laboratory and entomology technicians, development of monitoring protocols and implementation of wall bioassay and insecticide resistance testing. Basic entomologic evaluations including monthly mosquito collection for species identification, vector density and biting behavior has been initiated in seven of twelve entomologic monitoring sites. Coupled with results from the sporozoite testing, which shows an overall parasite infection rate of 2.5% (48/1938), the Malaria Unit has calculated preliminary entomological inoculation rates (EIR) for baseline use as monthly monitoring continues. Annual EIRs, from the seven sites quantified using standardized collection procedures, range from 8.8 to 69.1. Given the progress made in entomologic monitoring and the time constraints of the sole entomologist who oversees management of the LLIN, IRS and entomologic monitoring activities, the Malaria Unit requested a seconded IVM advisor to provide additional support for these activities. Recruitment is in process and the additional technical staff person will further strengthen these activities.

Early in 2010, used insecticide sachets accumulated from previous spray rounds were destroyed using an incinerator located at Kanombe Military Hospital. Waste management and particularly medical waste has been identified as a serious problem in Rwanda. The MOH is mobilizing support from multiple donors to procure a national industrial incinerator and medium-sized incinerators at the provincial levels. In 2011, US Government agencies will contribute to Rwanda's efforts to protect the environment by leveraging funds across health programs to procure an incinerator in support of the Government of Rwanda's waste management strategy.

Proposed FY2011 Activities (\$6,980,000):

In 2011, PMI will support the Malaria Unit to develop an IVM strategy and to transition to greater local ownership and responsibility. The PMI supports the NMCP's policy to spray twice per year until scientific evidence shows this to be unnecessary; however, to ensure adequate protection for beneficiaries, PMI resources will be spread evenly between two rounds (September 2011 and March 2012). By early 2011, NMCP and PMI should have data on which to base decisions about future IRS activities.

In FY 2011, PMI expects to support the following activities:

- *Semi-annual IRS implementation in targeted sectors for approximately 180,000 houses:* Support two equal-size spray rounds (September 2011 and March 2012) plus procurement of essential commodities. Sectors will be targeted in accordance with the Malaria Unit's evolving integrated vector control strategy and increasing data availability. The PMI will support the Malaria Unit in a joint search for innovative implementation approaches based on cost-sharing and distribution of funds through lower cost, preferably Rwandan, mechanisms able to manage US Government funds and meet legally-required environmental safeguards. These may include private sector companies or local NGOs. This

transition may impact the number of structures that can be sprayed with the available resources. (\$6,600,000)

- *Entomological monitoring*: Support central coordination and district implementation of entomologic monitoring. At the central level, PMI will continue to provide ongoing support for insectary operations, vector resistance monitoring, the ELISA lab and PCR testing. PMI will assist the field technicians from entomologic sentinel sites to conduct monthly mosquito collection and testing. In addition, this activity will include the procurement of specialized supplies needed for additional entomologic monitoring, including insecticide resistance testing and LLIN longevity testing (activity described under LLIN section). (\$225,000)
- *IVM Advisor*: Provide a second (final) year of 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. This will be a senior level international specialist working across ministries (Health, Agriculture, Environment, etc.) to coordinate strategy development. The IVM Advisor position would be phased-out after 18-24 months, once the strategy has been validated and essential capacity strengthened in the respective Ministries. (\$125,000)
- *Environmental compliance and monitoring*: External monitoring of the environmental compliance of the IRS operations including the management of side effects and disposal of sachets and other contaminated materials. (\$30,000)

INTERVENTIONS - Malaria in Pregnancy

Background

Rwanda's initial malaria in pregnancy (MIP) strategy encompassed WHO's three-pronged approach, which included two doses of IPTp with SP, the use of ITNs, and case management. According to the 2007 MIS, coverage of two doses of IPTp was 27.8%. However, Rwanda discontinued IPTp with SP in 2008 based on evidence of high therapeutic failure of SP in studies carried out in 6-59 month olds and the falling prevalence of malaria. The decision to discontinue IPTp was further supported by a study conducted by the Malaria Unit and a Belgian group that looked at maternal birth outcomes and saw no benefit of SP IPTp versus placebo (results not published).

Without IPTp, the NMCP has focused on prevention and prompt treatment of malaria during pregnancy. Therefore, the MIP strategy, which PMI supports, is to provide FANC including LLINs during the first ANC visit, effective case management and treatment of malaria, and distribution of folic acid and mebendazole. Although 94% of pregnant women visit an ANC at least once, the median gestational age at first visit is six months, and only 43% of women make two or more ANC visits (interim DHS, 2008). The aim therefore, is to encourage early FANC attendance through targeted BCC/IEC, combined with innovative community- and facility-level performance-based financing and high enrollment in community health insurance schemes (*mutuelles*) that reduce ANC

attendance fees to 150 Rwandan Francs (\$0.25). In addition, the NMCP has increased efforts to ensure that LLINs are available for distribution at every facility during routine ANC attendance. As per GOR policy, LLINs are to be given free at the first ANC visit to protect pregnant women from infection. The 2007 MIS reported that 56% and the interim 2007-2008 DHS reported 62% of pregnant women slept under an ITN the previous night.

Recently, integration of all programs into ANC services has been strengthened through the leadership of the MOH Maternal Child Health (MCH) Desk. The MCH Desk oversees the technical working group, which is comprised of staff from the Malaria Unit, TRACPlus, the Community Health Desk, and EPI. The services provided by these units include prevention of mother-to-child transmission of HIV (PMTCT), immunizations, MIP, newborn care as well as fetal growth monitoring and birth preparation that comprise the FANC package. FANC services are now available in all districts nationwide. Specialized CHWs called Agents de Sante Maternelle (ASM), who focus specifically on pregnant women and their newborns, have been key implementers of the MIP strategy. As part of the community MCH approach, ASMs will identify pregnant women to encourage early attendance and the four recommended ANC visits as well as LLIN use. A newly launched community performance-based financing program reinforces the ASM's efforts with the inclusion of incentives for pregnant women who attend ANC before four months of pregnancy.

Maternal mortality is high in Rwanda (1071/100,000 births in DHS 2000 and 750/100,000 in DHS 2005), but the burden of malaria-attributable maternal mortality is unknown. The 2008 interim DHS showed 0.9% of pregnant women had peripheral malaria parasitemia. The HMIS is one method of collecting information about malaria cases among pregnant women; and with the upsurge in malaria cases in late 2008, the M&E committee has recently analyzed peripheral parasitemia in pregnant women. This analysis documents malaria cases among pregnant women; however, it is limited in providing data on the burden of MIP as it misses placental malaria infection and birth outcome complications such as maternal anemia, low birth weight, or even death. In MIP, peripheral parasitemia in pregnant women is the tip of the iceberg, since many more problems may be harder to detect. In other settings, IPTp reduces placental malaria and consequently reduces complications such as maternal anemia, low birth weight, and stillbirths. The NMCP recognizes the limitations of passive surveillance and routine clinical reporting for measuring the burden of malaria in pregnant woman and intends to institute active surveillance. A rapid MIP assessment which analyzes ANC (peripheral parasitemia/anemia) and delivery service (placental malaria, low birth weight, maternal anemia) data would provide a better picture of the current burden of MIP in Rwanda. The assessment could also provide recommendations to improve the revised strategy and develop a surveillance system to reduce the burden of MIP and improve ANC in Rwanda.

Progress during the last 12 months

PMI has helped improve the quality of FANC services at health facilities through training and capacity-building efforts at national and district levels. 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), nutrition

education, promotion of breast-feeding and family planning. Job aids for FANC services are ready for validation prior to dissemination. At the community level, full support for the ASMs has been provided in three districts, including training, supervision and monitoring and the provision of materials such as job aids, referral cards, registers and tools for daily duties (bags, boots and umbrellas). With FY 2010 funding, PMI plans to support an assessment to provide data about the burden of malaria in pregnancy and work closely with the NMCP to prioritize this activity. The NMCP and PMI are discussing the assessment and the design and development of a surveillance system.

Proposed FY 2011 Activities (\$400,000):

In Year 5, PMI will continue to support the national strategy for the prevention and treatment of malaria in pregnancy. The PMI will collaborate 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. Specific PMI-supported activities will include:

- *Strengthening of malaria in pregnancy interventions within MCH strategy:* PMI will continue to support MCH and MIP interventions by providing technical assistance and coordination at the national level through the MCH technical working group and contribute resources for implementation of community ASM activities. Emphasis will be placed on prompt identification of malaria in pregnant women in both settings and strengthen linkage between ASMs and health facilities to promote consistent LLIN use and routine ANC attendance by pregnant women. (\$400,000)

INTERVENTIONS-CASE MANAGEMENT

Malaria diagnosis

Background

As of November 2009, Rwanda's national policy for malaria diagnostics states that all cases of presumed malaria should be laboratory confirmed before treating with an ACT. This policy applies to all age groups and at health facilities, for community case management, and in 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, supervision visits conducted by the National Reference Laboratory (NRL) have 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 National Malaria Treatment Policy has limited the role of RDTs in health facilities, but they may be used in emergency situations and when the laboratory technician is not available.

The NRL has developed and implemented a system of quality assurance for microscopy. The 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 the health center laboratories. Supervisors use a standardized checklist to review supplies and monitor performance. There are two levels of quality control for blood smears: at the district hospital and at the NRL. Ideally, supervision should occur every three months, but personnel shortages and lack of materials and logistical support limit the frequency of these visits. Feedback is provided to the district through printed reports and in instances where the proportion of discordant results reaches a critical threshold, a supervisory visit is conducted to provide a refresher training. Improved analysis of supervision and QA/QC results at the central level may allow for focused and timely feedback to the districts and health centers.

As part of the expansion of integrated community case management (CCM), the NCMP hopes to expand RDT testing for malaria treatment to all 30 districts by the end of 2010. Training in RDT use for CHWs and health center supervisors, including laboratory technicians has been completed in 14 districts. The NMCP has selected First Response® as the RDT of choice. A quality assurance system for the performance of RDTs in CCM is being developed by the NMCP and may incorporate standardized initial training, proficiency evaluation, and periodic comparison of the RDT result with smear microscopy. Although the role of the NRL in RDT implementation has been limited to date, standardized QA/QC for RDTs across health facilities and community case management 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 in MOP FY 2008 and MOP FY 2009 commenced in May 2010. Following a review of program needs and gaps, the NRL developed a workplan will focus on malaria specific refresher trainings, supporting regular supervision and improving QA/QC capacity at both the district and national levels. The NRL will coordinate with the Malaria Unit to develop a QA/QC system for the implementation of RDTs at the community level in the upcoming months. 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 (AQ-SP) to artemether-lumefantrine (AL) as the first-line treatment for uncomplicated malaria. ACTs are provided at a highly subsidized cost at health facilities, for CCM by CHWs, and in the private sector (e.g., RFW 200 (\$0.35) for community treatment, RFW 250 (\$0.44) at the facility with *mutelles* and RFA 250 (\$0.44) at registered private sector

pharmacies). 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. Parenteral formulations of artemether or quinine are also recommended for pre-referral treatment of severe malaria cases prior to transfer from a health center to a district hospital. Recent changes in malaria treatment guidelines requiring laboratory confirmation of malaria prior to treatment were disseminated in nationwide provider trainings in November 2009. Provider acceptance of the 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 Malaria Unit 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 will support the NMCP to monitor the implementation of the new treatment guidelines at health facilities. Specifically, technical assistance will be provided to develop systems for assessing whether providers adhere to diagnostic and treatment algorithms, and support will be provided for refresher training for health providers and for Malaria Unit and district staff to make supervisory visits.

Malaria Treatment in the Community

Background

In Rwanda, malaria treatment at the community level started in 2004 and has expanded to treatment with ACTs in 19 endemic districts and the 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. CHWs charge a small fee (200 Rwandan Francs or ~\$0.35) for the evaluation and treatment. The Malaria Unit is currently scaling up RDTs used by CHWs to all 30 districts in order to align community treatment of malaria with the revised treatment guidelines and testing will be included in the current fee structure without any additional cost. A potential new addition to the management of fever in the community is the introduction of pre-referral treatment with rectal artesunate for cases of severe malaria seen by CHWs. Results from a district-level pilot of rectal artesunate will inform the pre-referral treatment strategy.

Building on the home-based management of fever (HBMF) model, the MOH Community Health Desk (CHD) has introduced and consolidated integrated Community Case Management (CCM) to include pneumonia, diarrhea and other components (nutrition, hygiene). The CCM package will be implemented by an estimated total of 60,000 CHWs countrywide; 45,000 of these received CCM training in July 2009. Many partners, including PMI and the Global Fund, support the expansion efforts by supporting CHW

training, provision of materials (CHW kits, registries, job aids, etc.) and supervision and monitoring. Among the 30 districts, eight districts have CCM with RDTs and the remaining districts are in different phases of transition to the full CCM package.

Progress during the last 12 Months

The MOH has made significant progress in scaling up CCM country wide. Among the ten PMI supported HBMF of malaria districts, eight have completed the conversion to HBMF into CCM with a total of 152,868 children treated for fever in 2009. Although RDT implementation has not yet commenced in these districts, support including training, supervision, and provision of equipment for the treatment of malaria, diarrhea and pneumonia has been ongoing for 6,177 CHWs in six of the districts. Transition between implementing partners in four districts led to some delays but following an assessment of implementation gaps, activities have recommenced. In order to guide the CCM 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. The results of this evaluation are pending.

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 CCM (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; in one district (Kirehe) it was up 99%. Availability of drugs was evaluated and found to be a problem. 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 at a time. The underlying problem 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 CCM drugs on the essential drugs list. Orientation meetings started in August last year and community level medicines were included in the new Essential Medicines List that was signed by the Minister of Health in April 2010.

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 recently suspended by the NMCP while the revised policy to only treat confirmed malaria was being introduced.

The NMCP is currently planning to conduct an assessment of malaria treatment in private sector clinics and pharmacies to guide the revision of the strategy. The possibility of including subsidized malaria treatment for adults to prevent misuse of the highly-subsidized pediatric treatments by adult family members is being considered. GOR policy does not allow pharmacies to perform diagnostic tests. The Malaria Unit may separate the roles of private clinics (which can perform diagnostic tests) and pharmacies (which cannot perform diagnostic tests) and include the training and use of RDTs at the private clinics with provision of subsidized ACTs from pharmacies once a client presents with a prescription. Currently Rwanda has a total of 205 drug shops, 82 retail pharmacies, 42 wholesalers, and 40 private clinics which have at least one microscope as this is a requirement to obtain a license.

Progress during the last 12 months

The 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 specially packaged AL (branded with the name “PRIMO”) at a highly subsidized price of FRW 250 (~\$0.45). A total of 204,400 PRIMO treatments were distributed to the private sector in 2009. 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. The Malaria Unit has requested a private sector assessment to evaluate case management and dispensing practices of the private providers.

Drug Supply and Pharmaceutical Management

Background

The MOH procures antimalarials and supplies for health facilities through two main providers. CAMERWA, an autonomous non-profit organization considered to be the national medical store, currently procures about 60% of all facility drugs and supplies. CAMERWA is the only institution in Rwanda that can legally procure ACTs for the public sector. With support from PEPFAR, MCH and the Global Fund, CAMERWA is improving procurement, accounting, human resources, customer service, and storage practices to qualify as a USG direct funding recipient. The second, less active, supply provider is the Bureau des Formations Medicales Agrées du Rwanda (Office for the Not-for-Profit Medical Facilities in Rwanda, or BUFMAR), another autonomous non-governmental and non-profit organization established by faith-based organizations (FBOs) in Rwanda.

Working with the Pharmacy Task Force and with support from PEPFAR, CAMERWA launched active distribution of medicines to the district pharmacies in April 2010. Five district pharmacies have started the new system and six more will be added by August 2010. CAMERWA provides transportation for medicines for the primary health care system to the district-level pharmacies. Health facilities pick up their stocks from district pharmacies and CHWs replenish their stocks from health facilities.

Currently, most district pharmacies are still placing orders at CAMERWA and are responsible for collecting their monthly 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 has not been adequate to prevent frequent stock-outs of essential drugs at lower levels. The Malaria Unit works with district pharmacists and health centers to forecast antimalarial needs. Prior to placing ACT orders at CAMERWA, districts must review requested quantities with the Malaria Unit and receive official approval. Stock outs at the community level and at health centers continue to be an issue, which may in part be due to difficulties in coordination between health centers and district pharmacies.

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 will require support to carry out duties including quality control of incoming and circulating drugs. In 2007, the Malaria Unit 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; however, minimal testing has been done so far. 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), 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. 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.

In vivo drug efficacy testing has been ongoing in three Rwandan sites under the East African Network for Monitoring Antimalarial Treatment, in collaboration with the Prince Leopold Institute of Tropical Medicine and London School of Hygiene and Tropical Medicine. Drugs tested include AL, dihydroartemisinin-piperaquine (Artekin®) and chlorproguanil-dapsone (Lapdap) plus artesunate. In addition, in response to unpublished reports of artemisinin resistance in Kenya, the NMCP plans to conduct a therapeutic efficacy trial comparing AL, dihydroartemisinin-piperaquine, and pyronaridine-artesunate (Pyramax®) from Korea. The Malaria Unit has three therapeutic monitoring

sites (Rukara, Mashasha and Kicukiro) where ACT efficacy monitoring has taken place. The last *in vivo* efficacy study was conducted in 2004 - 2005 and showed that PCR-adjusted 28d adequate clinical and parasitological responses were 96.7% for AL and 79.4% for AQ-SP among Rwandan children. The NMCP plans to conduct monitoring at least every 24 months starting again in 2010 with PMI support.

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 community level. District pharmacists were called together to discuss their role in CCM activities including planning their involvement in CHW training and supervision. The CHD, with support from PMI and other partners, finalized and produced 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.

Regulation and drug quality control: PMI's support for drug regulation and quality control included an initial assessment of Rwanda's current drug quality capacity and recommendations to develop a comprehensive drug quality control system. Following the results of this assessment, an action plan was developed to cover building human resource and technical capacity to carry out drug testing.

Pharmacovigilance: Significant progress has been made in the establishment of a national pharmacovigilance system, based on MOH leadership with Global Fund and joint PMI-PEPFAR support. All supporting documents are in place (policy and guidelines, reporting forms, and training manuals) and are awaiting official MOH approval. Once received, and following a cascade training for providers, the passive reporting system will commence. In addition, the PTF with support from partners worked together with the MCH, EPI and Malaria Units to develop a reporting form that would be used to collect information on adverse events during the MCH week and measles vaccine/malaria integrated campaign. The Malaria Unit also operates a hotline for community members to ask questions about IRS and to report any adverse events; the latter have decreased in recent rounds because of a switch from Icon to Deltamethrin during recent rounds. The PTF and the Malaria Unit have developed a protocol for adverse events reporting for PRIMO used at the community level and in registered pharmacies. Private sector reporting has not commenced but work continues with the PTF to determine the best approach to introduce pharmacovigilance activities in this sector. Pharmacovigilance activities are a joint effort in which PMI plays only a minor role.

Proposed Case Management FY2011 Activities (\$3,470,000):

Diagnostics (\$450,000)

PMI considers accurate diagnostic capacity a critical component of malaria case management and will continue to support the Malaria Unit and the National Reference Laboratory in efforts to strengthen the use of laboratory confirmation using microscopy or RDTs for case management. The Malaria Unit and the NRL will coordinate with PMI and the Global Fund, to improve the quality and availability of malaria diagnostics.

Specific activities include:

- *Laboratory diagnostic commodities:* PMI will procure equipment and supplies for malaria laboratory diagnosis and the quality control system, including slides, Giemsa stain, safety boxes, gloves and replacement microscopes. One specific gap for 2011 includes replacement of microscopes at health centers that are broken or provide microscopes for new health centers, especially with the change in treatment policy to include mandatory laboratory confirmation. The needs will be based upon coordinated quantification by the Malaria Unit, NRL and other partners. (\$250,000).
- *Strengthen malaria laboratory diagnostics in health facilities:* Continue direct funding to the NRL 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 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. (\$200,000).

Case Management in health facilities, community, and private sector (\$2,545,000):

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

- *Support for integrated community case management implementation:* PMI will continue to support the malaria/fever component of the CCM 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. PMI will support CHWs to provide appropriate health communications and BCC messages to encourage understanding and adherence to the most current treatment algorithms. PMI will continue to support the CHD to coordinate all community health implementing partners to ensure that community health materials (e.g., training modules, job aids, motivation/incentive packages, per diem rates, supervision protocols, and key messages) are reviewed and standardized across partners. PMI, with leveraged funds from other USG MCH programs, will support all CCM in

currently supported districts or other districts depending on priorities of the MOH. (\$1,670,000)

- *Procure 500,000 RDTs for CCM and private sector:* PMI will procure 500,000 RDTs (400,000 for CCM and 100,000 for private clinics) as a contribution to the overall estimated need of 1.2 million RDTs. (\$500,000)
- *Procure ACTs for the private sector:* Procure approximately 55,000 treatments of ACTs for private sector treatment of adults in the urban areas of Rwanda. Adult treatments for the private sector are not covered under current GF grants. (\$100,000)
- *Strengthen private sector treatment:* Strengthen private sector capacity to diagnose and appropriately treat children and adults for malaria with ACTs including the introduction of RDTs; support the timely distribution of ACTs to private sector outlets nationwide. Coordinate with laboratory partners to develop diagnostic strategy in the private sector to promote QC/QA and the use of RDT. (\$175,000)
- *Repackaging of ACTs:* Support to the community health program and private sector by printing and re-packaging of approximately 800,000 AL treatments for CCM and private sector distribution in a blister package for children. AL treatments will also be repackaged for adult ACT treatments for use in the private sector in urban areas. (\$100,000)

Drug Supply and Pharmaceutical Management (\$550,000)

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:* Continue support to the Malaria Unit for reinforcing supply chain systems by supporting a logistics officer at the Malaria Unit. 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. (\$150,000)
- *Continue supporting the national pharmacovigilance system and active pharmacovigilance of ACTs at the community level:* The PMI, in collaboration with PEPFAR and Global Fund, will support the implementation of the pharmacovigilance system including training, development and distribution of job aids and integration in community and private sector case management. (\$100,000)
- *Drug quality:* Continued support to the Malaria Unit and Pharmacy Task Force to establish a quality control system to identify sub-standard antimalarial drugs in

the country. Key activities will include training of technicians and the procurement of materials for the testing of antimalarials. (\$100,000).

- *Monitoring Drug Efficacy:* The PMI will continue to provide logistic and technical support for ACT drug efficacy monitoring to the Malaria unit in three monitoring sites using accepted WHO drug efficacy protocols. (\$200,000)

INTERVENTIONS - Behavior Change Communication (BCC)

Background

The malaria unit has developed an integrated Behavioral Change and Communication strategy. Given the rapid scale up of malaria interventions in Rwanda, the strategy integrates malaria prevention and control communications in the form of mass media to build knowledge and awareness of the relative roles of different interventions. Then, with mass media implemented as a “back-drop,” community participation is used to engage and mobilize communities in malaria prevention and control. Community health workers, local leaders, Rwandan NGOs and other civil society networks are key players in the community mobilization efforts. BCC challenges in the upcoming year include continued emphasis on improving correct use of LLINs, household acceptance of IRS, and changing provider and caretaker behavior towards acceptance of only treating confirmed malaria cases.

Progress during the last 12 months

The PMI has supported the development of the integrated BCC strategy and the revision of materials including the posters and counseling cards. All PMI partners whose activities include BCC components use a variety of communication strategies to educate people about specific health behavior changes. These include: building a community’s agenda for prevention; increasing the likelihood of sustained behavior change through interpersonal communication via CHWs, (through songs, drama, story-telling, role-playing, group discussions, and real-life testimonials) at community meetings; and mobilizing community opinion leaders to reinforce messages during religious services and other community social processes. Both the community mobilization and BCC approaches appear to have been effective in contributing to initial changes in behaviors regarding malaria prevention. However, there is still a strong need to develop a formal process at the national level to ensure consistency and harmonization in BCC activities across the districts.

PMI partners have delivered appropriate malaria prevention and control messages to more than 75% of their target audiences in their respective districts. Training modules, job aids, and assessment tools for BCC have been developed and are being used widely in health provider and CHW trainings. Each partner has a list of monitoring and evaluation indicators to chart progress of BCC activities; and each is undertaking baseline, mid-term, and final evaluations to chart BCC progress, along with periodic performance assessments. PMI is supporting capacity building of local NGOs through sub-grants to implement community treatment of malaria and other malaria prevention and control activities.

Proposed FY 2011 Activities (\$600,000)

The PMI will support the development and implementation of a formal process for coordinating BCC/IEC at all levels to ensure consistency and harmonization in technical messages, while ensuring that channels are adapted as appropriate for the intended target audiences. In addition, PMI will work with partners through CHWs and Rwandan NGOs to support community engagement and mobilization, to ensure that effective BCC methods are being utilized, and that routine monitoring and program revisions are conducted as necessary to maximize desired behavioral outcomes.

- *National Integrated BCC/IEC*: The PMI, in close collaboration with the Malaria Unit and Health Communications Center, will support national level BCC/IEC activities as outlined in the integrated BCC strategy. Mass media approaches (e.g., through radio, television, newspapers, mobile media) as part of national campaigns or ongoing communications, will be used to promote correct use of LLINs, awareness and acceptance of IRS, and other integrated malaria messages. National level activities will be coordinated with community partners to ensure consistency and harmonization in technical messages in community mobilizations and BCC activities. (\$200,000)
- *Community mobilization and health communications for IRS implementation, 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. (\$400,000)

MONITORING AND EVALUATION

Background

The Malaria Unit works within a data-rich environment, but needs and priorities are shifting as malaria epidemiology changes. Routine data on malaria cases in health facilities are reported through the HMIS, which is vital for understanding the epidemiology of malaria in Rwanda. However, reliance on HMIS for tracking malaria trends has been confounded by changes in the reporting system, increased health care utilization over the past few years with the adoption of health insurance schemes (*mutuelles*), case definition changes (facilities have been instructed to report only confirmed cases), and the rapidly increasing proportion of cases treated in the community. Impact evaluation requires entomological data as well as case reporting, and both should be supported through periodic parasitemia estimates. Systems are also monitoring commodity flows and supply levels, although these have been inadequately used for decision making and overall monitoring and evaluation.

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

- *Health management information system (HMIS)*: The nationwide system receives data from all public health facilities, with timely and accurate reporting reinforced through performance-based financing. The system provides data on both

- presumed and 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. Laboratory data are also collected. Private sector and community treatment are currently not reported.
- *Community information systems*: Two systems are in use, though neither currently provides national data, with decisions still pending on their continued use. The first system is paper-based, and linked with performance-based financing. In this system, community health workers report to the nearest health facility, which then includes data into HMIS reports. The second system, which has been recently launched, uses cell phones to send data directly from CHWs to the Community Health Desk. The need for a national community reporting system is critical, given the number of cases treated at that level. The GOR plans to expand one of these systems to be fully installed by the end of 2010.
 - *Integrated Disease Surveillance and Response (IDSR)*: This strategy aims to improve the availability and use of surveillance and laboratory data for control of malaria and other priority infectious diseases that are the leading cause of death, disability, and illness in Rwanda. Surveillance activities are coordinated and streamlined throughout all levels of the health system from the community, health facility, district hospital and central levels. The IDSR framework uses standardized indicators and encompasses early detection, reporting, analysis/interpretation, investigation, response, feedback, evaluation and recommended improvements to the system. 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.
 - *Entomological surveillance*: The Malaria Unit has planned a 12-site entomologic surveillance system, linked to selected district health centers. Each station will be staffed by two entomology technicians and supervised by a nurse/health worker at the clinic. An initial seven sites are equipped and have initiated monitoring activities. 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. Monitoring conducted at entomologic sites with the support of the central insectary and ELISA testing capacity will generate critical entomological data for timely assessment and improvement of ongoing interventions. Effective use of targeted IRS, in support of universal LLIN coverage, requires entomological data as well as case information (case data, without verification of where infections occur, can be misleading in a small country with a large mobile population). Mosquito - *P. falciparum* infection data from 6 of 7 operating sites document ongoing transmission everywhere, except the NW. The use of 12 sites, four in each of the three affected sectors (SW, SE, NE), will better inform LLIN replacement and IRS targeting to meet national objectives going forward. A demonstrated commitment to entomological monitoring indicates that resources for 12 sites will not be wasted.
 - *Logistics management information system (LMIS)*: This paper-based system provides basic data on drug consumption and stock outs, independent of the HMIS. Reports on malaria commodities flow from health facilities to district

offices to the Pharmacy Task Force and are used for quantification. The Malaria Unit does not currently access these reports. The LMIS will be computerized by April 2011.

- *DHS/MIS*: These comprehensive household surveys provide a broad range of population-based data, especially related to LLIN coverage indicators including LLIN ownership and use by vulnerable populations, as well as malaria parasitemia. Population-based indicators change rapidly in Rwanda; thus, the GOR repeats surveys every two years. A full DHS will be initiated in September 2010, with an interim survey tentatively scheduled for 2012.
- *Special studies*: Several of these are described in individual MOP sections, e.g., for tracking household use of LLINs and monitoring their efficacy, for evaluating community case management, and for monitoring the end-use of PMI commodities.

The HMIS system has been supported by PMI, PEPFAR, USG MCH and Global Fund. PMI specifically has supported trainings in use of the HMIS database (reporting, quality, analyses) by all M&E coordinators and data managers. 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 community information system (CIS). PMI along with partners also supports performance-based financing (PBF); PBF in turn encourages data quality, completeness, and timeliness by withholding payments from districts which do not meet required standards.

The community information system (CIS) is separate from the HMIS and incorporates a web-based data system. There is a minimum set of indicators, and the registers and reporting formats were designed specifically to collect community data generated by the CHWs. Training has been provided to district and implementing partner staff (ToT) and to individual community health workers in two areas: community PBF and RapidSMS (reporting with cell phones). Training of CHWs is done at the health center level by the data managers and CHW supervisors based in each health center. The malaria related information captured by the CIS include number of febrile children evaluated, number of malaria cases treated, number of fever cases referred, for example.

The computerized interface between the HMIS and CIS is being negotiated at the moment. The long term goal is for CIS data to be entered into the same web-based reporting system as HMIS.

Therefore, Rwanda HMIS and CIS provide complete, timely, and quality data which flow up the chain. The analysis and use of these data in decision making, however, is a persistent problem as in most of Africa and trainings are planned to improve on this and build M&E analysis and response capacity at the district level.

The Malaria Unit currently has two staff trained in M&E, supported by PMI and WHO. An M&E committee at the Malaria Unit has recently been established and has taken significant steps to enhance data analysis and use and a number of essential analyses are underway exploring issues around the malaria case upsurge and possible impact of the change in MIP policy.

Progress during last 12 months

Substantial progress was made in M&E this year, including improvements in the HMIS 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. The Malaria Unit routinely tracks HMIS reports and will shortly install a server linked to the HMIS database to allow for direct access. The Malaria Unit, with PMI support, conducted a data quality assessment of reported malaria cases in late 2009, finding only minor discrepancies between HMIS records and health facility registers. The Malaria Unit intends to shift epidemic surveillance, which in the past was conducted through sentinel sites, to the IDSR system; therefore progress in PMI support for ESR will be more limited until IDSR becomes operational. The WHO malaria advisor, supported fully by PMI, has provided ongoing technical assistance to the NMCP in M&E and overall program management.

Entomological monitoring has also advanced substantially during the past 12 months, and data will soon be available to guide decision making. Results from insecticide resistance testing from four sites have found no resistance in Rwanda, indicating that the current choice of deltamethrin for IRS remains effective. An insectary to raise susceptible mosquitoes for quality assessment of insecticide efficacy is scheduled to become fully operational this year. Wall bioassays have been conducted using field mosquitoes following the last two rounds of IRS and will continue on a monthly basis in IRS districts once the susceptible colony of mosquitoes has been fully established. Finally, the sporozoite ELISA test for detection of malaria parasites in individual mosquito-vectors has been successfully implemented in 2010 and will provide the ability to calculate and monitor entomological inoculation rates (EIRs) over time. EIRs can guide IRS program implementation in conjunction with malaria case surveillance. For example, the need for ongoing IRS around Kigali has been a program question; however a preliminary calculated EIR from the Kicukiro entomology monitoring site, on the outskirts of Kigali, show a very high EIR of 69.1 justifying the use of some IRS resources around the capital. The rapidly increasing availability of entomological data will help guide integrated vector management as well as decisions about IRS frequency and insecticide selection.

Proposed FY2011 Activities (\$700,000)

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 5 will continue to support routine information systems, disease and entomologic surveillance and program evaluations.

- *Strengthen national-and district-level M&E activities:* Support for 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. (\$200,000)

- *Integrated Disease Surveillance and Response (IDSR)*: Following the recommendations from the completed assessment, the PMI will support the development and implementation of the new IDSR system along with other funding agencies. (\$150,000)
- *Entomologic M&E*: The PMI will continue to include technical and operational support for the national entomological monitoring system (described further under IRS) to support vector control interventions.
- *MIS/Interim DHS for 2011*: Contribute to other USG and GOR funding to support a malaria indicator survey or include a malaria module in an interim DHS. (\$150,000)
- *PMI Impact evaluation support*: The PMI will support the evaluation which will occur across all 15 PMI countries to assess the impact of scaled-up interventions on malaria-specific mortality. All available reports and data on malaria intervention coverage levels, malaria case burden, anemia/parasitemia measurements, all cause and cause-specific child mortality, entomologic data, and other related health program data and indicators will be compiled and analyzed from multiple in-country sources for this evaluation. (\$100,000)
- *M&E reporting systems in USAID/Rwanda*: The PMI contribution 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 and HEALTH SYSTEMS STRENGTHENING

Background

Rwanda's NMCP consists of 29 professional staff, including those on international training, 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 2010, PMI will assume support for three fully seconded positions (housed at the NMCP): logistics officer, an IVM advisor, and an entomology technician for the LLIN monitoring study.

The NMCP forms one part of a larger MOH group known as the Treatment and Research HIV/AIDS, Malaria, TB and other epidemic infectious disease Center (TRACPlus), whose mandate covers all infectious diseases. Organizational relationships within the Ministry of Health are being restructured with consolidation of many public and private health entities, including TRACPlus into an overarching center, the Rwandan Biomedical Center. The Rwandan Biomedical Center implementation will commence by 2011 pending the outcome of higher-level government discussions and final approval.

The NMCP is housed 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 Global Fund. The NMCP has adequate internet access but no direct access to the HMIS database or TRACPlus systems.

Progress during the last 12 months

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

- *Entomology:* The PMI supported the technology transfer of CS-ELISA testing to three Malaria Unit staff. The seven day on-site training included orientation to and setting up of the laboratory equipment. The staff learned to dissect mosquitoes, prepare samples, and run and interpret the tests. The three staff currently manage all the ELISA lab operations.
- *Supply Chain Management:* The PMI supported an advanced commodities management course for the PMI-funded logistics officer who is based at the Malaria Unit.
- *Monitoring and Evaluation:* The PMI supported a three day training course for 16 MOH and partner M&E staff to enhance the capacity of central- and district-level staff to use and disseminate data to monitor achievements and respond to programmatic challenges. In addition, the recently hired M&E officer at the Malaria Unit participated in a workshop in M&E for malaria programs in Ghana.

Proposed FY2011 Activities (included in other sections)

The PMI will reinforce the staff capacity within NMCP by:

- *Strengthening commodity supply chain management for drugs and other commodities at the central level:* Continue support to the Malaria Unit for reinforcing supply chain systems by supporting a logistics officer at the Malaria Unit. 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. (included in case management section)
- *IVM Advisor:* Provide a second (final) year of 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. This will be a senior level international specialist working across ministries (Health, Agriculture, Environment, etc) to coordinate strategy development. The IVM Advisor position would be phased-out after 18-24 months, once the strategy has been validated and essential capacity strengthened in the respective Ministries. (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 for the second 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. He or she will have skills in data analysis and could be a recent graduate from the school of public health. (Salary support will be limited to two years, at which point NMCP will decide whether or not to continue the position under other funding. (included in LLIN section)

HEALTH SYSTEMS STRENGTHENING

The MOH in Rwanda has made a strong commitment to improve the health of its population through a wide range of health systems strengthening interventions. Rwanda subscribes to the WHO framework for health systems strengthening which focuses on six building blocks for a well functioning health system. These building blocks, human resources, medicine, vaccine and technology, health finance, governance, health information and service delivery have been identified as priorities in two seminal GOR policy documents: the multi-sectoral Economic Development and Poverty Reduction Strategy and the Health Sector Strategic Plan II. The National Malaria Strategic plan is aligned with EDPRS and HSSP II and includes health system strengthening as one of its support strategies. PMI contributes to these efforts by supporting human resource needs at the Malaria Unit, contributing to the strengthening of HMIS, the NRL, supply chain and pharmaceutical management (pharmacovigilance), and the integration of service delivery within other programs, such as MCH and EPI.

COMMUNICATION AND COORDINATION WITH OTHER PARTNERS

Malaria Steering Committee: The PMI Steering Committee, a multi-sectoral group for coordinating and reviewing PMI activities, was established at the request of the Government of Rwanda in 2007. Chaired by the Permanent Secretary, it met again in May 2010 to review achievements by year (review of MOPs) and focus on overall malaria control challenges and future strategies. The committee agreed to change the PMI Steering Committee for an overall Malaria Steering Committee and established three working groups, case management, prevention and M&E. The working groups will meet monthly and the Malaria Steering Committee will meet on a quarterly basis.

PMI Partners' Meeting: The PMI and the NMCP have organized 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.

Country Coordinating Mechanism (CCM) for the Global Fund: The Country Coordinating Mechanism for the Global Fund continues to meet every month. The PMI 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.

MCH and the partners in MIP: The Maternal Child Health Unit provides support to the NMCP, and all the partners involved in malaria in pregnancy. These partners have proposed quarterly thematic group meetings and stressed the importance of increased involvement of the NMCP and MCH in these meetings.

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 Global Health Initiative (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. Rwanda was named a GHI Plus country in June 2010. GHI Plus countries will receive additional technical and management resources to build upon existing public health programs, improve program performance, and work in close collaboration with partner governments, across U.S. Government agencies, and with global partners. Although the strategic framework for GHI in Rwanda is still under development, examples of application of GHI principles in on-going and planned initiatives supported by PMI are incorporated under specific intervention areas of the MOP and include:

- *Implementing a woman- and girl-centered approach:* PMI will accelerate its support of communications strategies to encourage the adoption of preventive behaviors and appropriate treatment among pregnant women and young children. This includes promoting early ANC attendance (including supporting LLIN distribution at ANC clinics to pregnant women) and support surveillance and effective treatment of malaria in pregnancy. Midwives and female community health workers have been targeted for training on malaria in pregnancy. PMI support of expansion of community case management will also increase access and quality of care for women and girls in the community. In addition, 50% of the nearly 60,000 trained and functioning CHWs nationwide implementing CCM are women.
- *Increasing impact and efficiency through strategic coordination and integration:* For the past several years, the Rwandan government has consistently promoted integrated service delivery, including integration of malaria control with MCH

and community-based services. PMI supports 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 trained CHWs and health facility staff. PMI supports the analysis of critical malaria data collected at the facility level through Rwanda's national Health Management Information System, which is substantially supported by PEPFAR. In FY 2011, PMI will continue to coordinate with PEPFAR's laboratory activities building upon integrated training and supervision and to include malaria diagnostics as part of lab accreditation

- *Strengthening and leveraging key partnerships, multilateral organizations, and private contributions:* PMI will play a key facilitation role with the Global Fund, World Bank, WHO and other development partners to identify and resolve technical and funding gaps for the implementation of the Rwanda National Malaria Strategic Plan. The USG is collaborating with the GOR, UNICEF, and Global Fund to jointly fund the 2010 Rwanda Demographic and Health Survey, which collects essential health indicators relevant to malaria and maternal and child health programs.
- *Encouraging country ownership and investing in country-led plans:* PMI supports implementation of the National Malaria Control Strategy. Rwanda is renowned for its innovative leadership in health service delivery, and PMI has supported this ownership through joint planning, implementation and evaluation. The President of Rwanda speaks on malaria at international fora, and the Permanent Secretary of the MOH personally chairs the Malaria Steering Committee. The Malaria Unit chairs quarterly reviews of PMI implementing partners. This MOP reflects national policies as well the National Malaria Control Strategy 2008-12. Rwandan leadership has been more critical than donor funding in improving health indicators over the past five years and will be a crucial factor in sustaining health sector inputs and outcomes over the longer term.
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- *Improving monitoring and evaluation:* PMI is an active member of the NMCP M&E working group and has supported capacity-building and links with the Health Management Information System. As described in detail in the M&E section, PMI supports malaria surveillance, entomological monitoring, and community information systems, as well as incorporation of programmatic data into routine decision making.
- *Promoting research and innovation:* PMI supports operations research targeted on key program elements, including LLIN durability, malaria in pregnancy, and use of Rapid Diagnostic Tests (RDTs). PMI also supports innovative approaches to community case management, transitioning to district responsibility for indoor residual spraying, cell-phone based reporting systems, and integrated vector management.

STAFFING AND ADMINISTRATION

Three malaria specialists have been hired to oversee PMI in Rwanda, within the context of an integrated strategic objective team. This team includes two international specialists and one Rwandan physician. All three 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 three specialists develop and implement PMI strategies and work plans, coordinate with national authorities, manage collaborating agencies, and supervise 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.

ANNEX 1

Table 1

**President's Malaria Initiative - Rwanda
Planned Obligations for FY11 (\$000)**

Proposed Activity	Mechanism	Budget (x\$1,000)	Geographic Area	Description of Activity
PREVENTION ACTIVITIES				
LLINs				
Procure and distribute 500,500 LLINs	DELIVER (5,000) PSI Behavior Change Social Marketing (200)	5,200	National	Procure 500,500 LLINs for routine distribution channels targeting pregnant women and children under 5 and potentially other vulnerable groups in orphanages, boarding schools and hospital wards. Provide support to strengthen quantification/forecasting and distribution system to attain universal coverage. Includes replacement LLINs for those removed from households for longevity monitoring

Proposed Activity	Mechanism	Budget (x\$1,000)	Geographic Area	Description of Activity
Monitoring of LLIN durability and longevity	TBD	75	National	Provide technical assistance and support to the NMCP to monitor the durability and longevity of LLINs to help inform programmatic decisions for replacement and maintenance of effective nets
IRS				
Semi-annual IRS implementation	IRS2 IQC	6,600	Targeted sectors	Procurement of insecticides and other IRS supplies/equipment; training and other operational costs for IRS activities for approximately 165,000 households twice per year.
Entomological M&E	IVM (200) CDC (25)	225	IRS districts	Provide continued support for central planning for entomological monitoring and district implementation; provide ongoing support for the insectary operations, vector resistance monitoring and ELISA lab and PCR testing. Support for field technicians to conduct monthly mosquito collection and testing, procurement of supplies and equipment needed for additional entomologic monitoring including insecticide resistance testing and LLIN longevity testing
Support for IVM advisor at NMCP	IVM	125	National	Provide technical assistance through IVM advisor seconded to the Malaria Unit/TRAC-PLUS to support the development, implementation and evaluation of the National IVM Strategy
Environmental compliance	TBD	30	IRS districts	External monitoring of the environmental compliance of the IRS operations, including disposal of sachets and other contaminated materials and overall waste management/incineration plans
Malaria in Pregnancy				
Integration of MIP into MCH services	USAID- Family Health Project	400	National	Support MCH and NMCP collaboration and integration of MIP activities into MCH services at

Proposed Activity	Mechanism	Budget (x\$1,000)	Geographic Area	Description of Activity
	(FHP)			both health facilities and community levels including supervision, technical assistance for policy revision, implementation and training
Behavior Change and Communication				
National Integrated BCC/IEC	PSI BSCM	200	National	Support national level BCC/IEC activities (mass media approaches and national campaigns) as outlined in the integrated BCC strategy
Community mobilization and health communications for IRS implementation, LLIN use and case management	USAID-FHP	400	Targeted districts	Promote community mobilization and sensitization for IRS, LLIN use and prompt treatment of fevers through CHWs , local leaders and RPOs
SUBTOTAL: Preventive		13,255		
CASE MANAGEMENT				
Diagnosis				
Laboratory diagnostic commodities	DELIVER	250	National	Procure lab equipment and supplies for malaria diagnostics, including slides, Giemsa stain, as needed and 50 replacement microscopes to support malaria diagnostics and laboratory confirmation at district health facilities and the NRL
Strengthen malaria laboratory diagnostics	Implementing letter to National Reference Laboratory	200	National	Support training, supervision, transportation for strengthening malaria diagnostic capacity and QA/QC throughout the health system
Community and Private Sector Treatment				
Community case management implementation	USAID-FHP	1,670	10 districts	Support continued implementation and nationwide scale-up of community case management of fever (CCM) within integrated community health

Proposed Activity	Mechanism	Budget (x\$1,000)	Geographic Area	Description of Activity
				package in 10 districts.
Procure 500,000 RDTs for CCM and private sector	DELIVER	500	National	Procure 500,000 RDTs (400,000 for CCM and 100,000 for the private sector) as a contribution to the overall estimated needs of 1.2 million RDTs for nationwide scale-up of CCM
Procurement of ACTs for private sector	DELIVER	100	Targeted districts	Procure ACTs for private sector treatment of adults in the urban areas of Rwanda
Strengthen private sector treatment	PSI BCSM	175	Over 200 private sector pharmacies and outlets nationwide	Strengthen private sector capacity to diagnose and appropriately treat children and adults for malaria with ACTs including the introduction of RDTs; support the timely distribution of ACTs to private sector outlets nationwide.
Repackaging of ACTs	PSI BCSM	100	National	Printing and re-packaging ACTs for CCM and private sector
Drug Supply and Pharmaceutical Management				
Strengthen commodity supply chain	DELIVER	150	National and district levels	Continue support to strengthen supply chain management using previously developed tools and software; collaborating with CAMERWA and districts to track drugs at district pharmacies and health centers. Support one commodities manager staff at the Malaria Unit
Pharmacovigilance	SPS	100	National	Collaborate with PEPFAR and Global Fund to support the implementation of the pharmacovigilance system including training, development and distribution of job aids and integration in community and private sector case management
Drug quality	USP DQI	100	National	Provide continued support for the national quality control and quality assurance strategy including coordination of drug testing; procurement of necessary reagents for the quality testing of antimalarials

Proposed Activity	Mechanism	Budget (x\$1,000)	Geographic Area	Description of Activity
Monitoring of drug efficacy	TBD	200		Provide support to ongoing in vivo ACT drug efficacy monitoring occurring in Rwanda
SUBTOTAL: Case Management		3,545		
MONITORING & EVALUATION ACTIVITIES				
Strengthen national and district level M&E	Integrated health systems strengthening project (IHSSP)	200	National	Support MOH systems strengthening in M&E, focusing on the link between community and facility-based reporting systems; strengthen capacity to facilitate analysis and data-for decision making at district and facility levels
Support for IDSR	IHSSP	150	Sentinel sites	Support IDSR system by contributing to training and supervision to ensure timely, complete, and accurate malaria case reporting.
Support for 2012 MIS/interim DHS	MACRO	150	National	Contribute to other USG and GOR funding to support a malaria indicator survey or include a malaria module in an interim DHS
PMI impact evaluation support	TBD	100	National	Support data collection, analysis, and dissemination of the meta-analyses for the post impact assessment.
M&E and reporting unit in Mission	MEMS	100	n/a	Contribution to USAID Mission M&E requirements and responsibilities as they relate to PMI
SUBTOTAL: M&E		700		
STAFFING & ADMINISTRATION				
PMI staff (USAID and CDC) and associated administrative expenses	USAID (1,000) CDC IAA (500)	1,500		Support for USAID & CDC Malaria Advisors, Malaria Program Specialist and support staff within USAID Mission plus associated administrative costs.
SUBTOTAL: Mgmt. and		1,500		

Proposed Activity	Mechanism	Budget (x\$1,000)	Geographic Area	Description of Activity
Admin.				
GRAND TOTAL		19,000,000		