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**PRESIDENT'S MALARIA INITIATIVE**

**MALARIA OPERATIONAL PLAN (MOP)**

**MALI**

**Fiscal Year 2012**

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## ACRONYMS AND ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
ASACO	<i>Association de Santé Communautaire</i> (Community Health Association)
AS-AQ	Artesunate-amodiaquine
ASC	<i>Agent de Santé Communautaire</i> (Community Health Worker)
BCC/IEC	Behavior change communication/information education communication
CCM	Community case management
CDC	Centers for Disease Control and Prevention
CNIECS	National Center for Information and Communication in Health
CSCOM	<i>Centre de Santé Communautaire</i> (Community Health Center)
CSHGP	Child Survival and Health Grants Program
CSREF	<i>Centre de Santé de Référence</i> (Reference/District Health Center)
DHS	Demographic and Health Survey
DHPS	<i>Division d'Hygiène Publique et Salubrité</i> (Division of Public Hygiene and Safety)
DNS	Direction Nationale de la Santé (National Health Directorate)
DPLM	<i>Division Prévention et Lutte Contre la Maladie</i> (Division of Prevention and Disease Control)
DPM	Directorate of Drugs and Pharmacies
DSR	<i>Division Santé Reproductive</i> (Reproductive Health Division)
EPI	Expanded Program for Immunization
ESR	Epidemic surveillance and response
FANC	focused antenatal care
FBO	Faith-based organization
FENASCOM	<i>Fédération Nationale des Associations de Santé Communautaire</i> (National Federation of Community Health Associations)
FSN	Foreign service national
Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GOM	Government of Mali
HIV/AIDS	Human immunodeficiency virus/Acquired immune deficiency syndrome
HIPC	Highly-Indebted Poor Countries
iCCM	Integrated community case management
IDSR	Integrated Disease Surveillance and Response
IMCI	Integrated Management of Childhood Illness
INRS	<i>Institut National de Recherche en Santé Publique</i> (National Institute of Public Health Research)
IPTp	Intermittent preventive treatment of pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated bed net
IVM	Integrated vector management

LNS	<i>Laboratoire National de Santé</i> (National Health Laboratory)
LLIN	Long-lasting insecticide-treated bed net
MCH	Maternal and child health
MOH	Ministry of Health
MICS	Multiple Indicator Cluster Survey
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MRTC	Malaria Research and Training Center
NGO	Non-governmental organization
NIH	National Institutes of Health
NMCP	National Malaria Control Program
PCR	Polymerase chain reaction
PKC	Project Keneya Ciwara (bilateral implemented by CARE)
PLWHA	People living with HIV/AIDS
PMI	President's Malaria Initiative
PPM	<i>Pharmacie Populaire du Mali</i> (People's Pharmacy of Mali)
PRODESS	National Health and Social Development Program
PSI	Population Services International
PTF	Technical and Financial Partners' Forum
PVO	Private voluntary organization
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
RTI	Research Triangle Institute
SLIS	<i>Système Local d'Information Sanitaire</i> (Health Management Information System)
SP	Sulfadoxine-pyrimethamine
SPS	Strengthening Pharmaceutical Systems
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 comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through the GHI, the United States will help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns, and children.

The President's Malaria Initiative (PMI) is a core component of the GHI, along with family planning, maternal and child health, nutrition, HIV/AIDS, and tuberculosis. The PMI was launched in June 2005 as a 5-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, funding for PMI has now been extended through FY2014. The goal of PMI is now to reduce malaria related mortality by 70% in the original 15 countries by the end of 2015. Programming of PMI activities follows the core principles of GHI: encouraging country ownership and investing in country-led plans and health systems; increasing impact and efficiency through strategic coordination and programmatic integration; strengthening and leveraging key partnerships, multilateral organizations, and private contributions; implementing a woman-and girl-centered approach; improving monitoring and evaluation; and promoting research and innovation.

The President's Malaria Initiative (PMI) began supporting activities in Mali in 2007 in close collaboration with the National Malaria Control Program (NMCP) as well as international and national partners. Malaria is the primary cause of morbidity and mortality in Mali, particularly for children less than five years old. The disease is endemic to the central and southern regions (where over 90% of Mali's population lives), and considered epidemic in the north. In 2010, the national health information system (*Système Local d'Information Sanitaire* or SLIS), reported 2.1 million clinical cases of malaria in health facilities (528,962 severe and 1,627,618 uncomplicated), accounting for 44.6% of all medical consultations, however less than 50% of these cases were confirmed by either microscopy or RDTs. Malaria also accounts for 51% of all outpatient visits for children less than five years of age.

Since the last Demographic and Health Survey (DHS) was conducted in 2006, Mali has demonstrated significant progress in scaling up malaria control interventions, especially in vector control. Data from a nationwide malaria survey conducted in September-October 2010 demonstrated achievement of some of Africa's highest rates of ITN ownership and use. Household ownership of at least one ITN increased from 50% in 2006 to 85% in 2010, and 70% of children under age five years had slept under an ITN the night before the survey in 2010 compared with 27% in 2006. However, prompt case management with an ACT remained low at 8%. In addition, parasite prevalence in 2010 appeared high at 38% by microscopy though no national-level baseline data is available for comparison.

Mali is the recipient of a \$26 million five-year Global Fund Round 6 malaria grant to support procurement of LLINs and artemisinin-based combination therapy (ACTs) and has been approved for Phase 2 funding. However, the Round 6 grant was suspended in 2010 because of misappropriation of funds. As a result, PMI has procured emergency stocks of ACTs to ensure sufficient quantities are available in-country. Mali's Round 10 Global Fund malaria proposal

was recommended for funding; pre-disbursement assessment and negotiations with Population Services International (PSI), the new Principal Recipient, are ongoing. The proposal focuses on nationwide implementation of integrated community case management (iCCM) and a 2014 universal LLIN campaign.

In 2007, the Government of Mali (GOM) raised the profile of the NMCP within the MOH by elevating it to the Directorate level. While GOM increased its investment in malaria control from about \$1 million annually in FY2007, \$6.7 million in FY2008, and \$9 million in FY2009; this support has decreased in FY2010 to approximately \$4 million and \$3 million in FY2011.

The FY2012 Malaria Operational Plan for Mali 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, pregnant women and children under five remain the focus of PMI efforts since they are the most vulnerable to malaria infection. The activities that PMI is proposing to support with FY2012 funding align with the 2012 – 2016 National Malaria Control Strategy and Plan (currently being finalized), complement the activities in the country's Global Fund Round 6 and proposed Round 10 grants, and build on investments made by PMI and other partners to improve and expand malaria-related services.

To achieve PMI's goals and targets in Mali, the following major activities will be supported with FY2012 funding:

**Insecticide-treated nets (ITNs):** The Malaria Strategic Plan promotes universal long-lasting ITN (LLIN) coverage by 2014 for all age groups (defined as one LLIN for every two people). The MOH supports the provision of free LLINs distributed to target populations through two main delivery channels: mass distribution to households as part of universal coverage campaigns and routine distribution for antenatal care (ANC) and Expanded Program for Immunizations (EPI) clinics targeting women and infants. The NMCP has made significant progress recently toward achieving its initial goal of 80% use of LLINs among children less than five years of age and pregnant women. According to a 2010 malaria survey conducted during the peak transmission season, 85% of households owned an ITN and 93% of households owned at least one mosquito net. With funding provided in FY2009, 2010 and 2011, PMI procured over 3.6 million LLINs as part of a significant net contribution to a nationwide phased universal coverage campaign in 2011. The PMI continued to support capacity building of the MOH and partners to coordinate donor inputs, track LLINs, and manage logistics and distribution systems. PMI supported the mass distribution campaign coordination activities, as well as targeted communications promoting consistent and correct LLIN use.

In Year 5, the PMI will procure 1,300,000 nets to fill the gap for routine LLIN delivery. The PMI will also continue to strengthen LLIN distribution systems at the national, district and community levels to prevent stock-outs, and will increase information, education, communication / behavior change communication (IEC/BCC) activities at national and community levels to promote correct and consistent net use, especially among the most vulnerable groups.

**Indoor residual spraying (IRS):** The PMI supports the NMCP's strategy to reduce malaria transmission through targeted IRS and entomological monitoring in select high-risk areas. Since

2008, PMI has supported three IRS campaigns in the districts of Bla and Koulikoro, adding a third district (Baraoueli) in 2011. Support in 2010 included initial and refresher training of 549 supervisors and spray operators and 772 community health volunteers (*relais*), the purchase of all commodities and personal protective equipment, and communication, supervision, monitoring and environmental compliance activities. During the 2010 IRS campaign, a total of 127,273 houses were sprayed, protecting about 440,815 residents, with an acceptance rate of 97%. With FY2012 funding, PMI will continue to support IRS in all three districts, covering 180,000 households. PMI will also continue strengthening the MOH's capacity to plan and supervise IRS activities within the context of its new integrated vector management strategy. This includes training for the new NMCP entomologist in conducting entomological monitoring related to IRS and insecticide monitoring, insecticide resistance testing, and implementation of the entomological monitoring plan.

**Intermittent preventive treatment in pregnant women (IPTp):** The 2006 DHS showed that only 4% received the recommended two doses of sulphadoxine pyrimethamine (SP) at ANC visits during their pregnancy, despite high ANC attendance rates by pregnant women of 72% for at least one visit and 63% for two or more visits. IPTp coverage rates were not measured in subsequent national household surveys. In 2009, PMI procured one million SP treatments for IPTp and in 2010 trained 1,173 health care providers in malaria in pregnancy (MIP) as part of focused antenatal care. Communications strategies on MIP have targeted religious leaders, traditional leaders, grandmothers, and women in positions of authority, women of childbearing age, and men.

With FY2012 funding, PMI will procure enough SP for half of the annual need of 700,000 pregnant women, complementing other donor support, along with supplies for direct observed therapy including providing cups and drinking water for IPTp administration at all health facilities. PMI will also help update MIP supervision and training materials, and assist in the roll out of new malaria in pregnancy treatment guidelines. Through training of health providers and strengthening of the commodity system, PMI will continue to improve MIP and increase IPTp rates. PMI will also continue to support engagement and mobilization of pregnant women and the promotion of MIP/IPTp in the community through religious/traditional leaders, midwives, and coordinated and harmonized IEC/BCC activities.

**Case management:** Poor geographic and economic access to care is a major challenge for malaria diagnosis and treatment in Mali. Malaria diagnosis in most public-sector health facilities is based on clinical criteria, with fewer than 10% of suspected cases of malaria having laboratory confirmation. In 2008 and 2009, PMI supported the NMCP to pilot a strategy of community case management of fever (CCM) with malaria treatment through *relais* in three districts of Sikasso Region in 2010 the scale-up of integrated CCM in five districts by training and deploying Community Health Workers (*Agents de Sante Communautaire [ASCs]*), procuring ACTs for community-based ACT distribution and ensuring sufficient supplies of ACTs for children less than five years of age in health facilities. PMI also procured drugs for the management of severe malaria, as well as supported in-service training and supportive supervision of health workers and ASCs. In 2009, PMI and other partners supported an MOH-organized national forum to build consensus around essential care services that will be offered at the community level.

In 2010, due to advocacy efforts from PMI and other partners, the MOH adopted significant policy changes including a community case management policy, updated severe malaria treatment and pre-referral guidelines, and removed consultation fees for children under five that pose financial barriers to health care. The national integrated CCM package will improve access to care by allowing ASCs to provide health services to the community level including treatment for uncomplicated malaria with ACTs after confirmation by rapid diagnostic test (RDT), acute respiratory infections with antibiotics, diarrhea with oral rehydration solution, and micronutrient supplementation (Vitamin A). PMI continued its support of iCCM in 2011 in five districts of Sikasso Region with plans to scale up to the entire region.

With FY2012 funding, PMI will continue to support and strengthen efforts to ensure prompt and effective case management of malaria at health facilities and support the scale-up of a new iCCM policy nationwide. At the health facility level, PMI will concentrate on strengthening capacity in laboratory diagnostics (including quality assurance and quality control), supply chain management, and BCC. 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 ACT at health facilities and in communities.

**Epidemic surveillance and response (ESR):** Mali's ESR system features weekly disease reporting procedures from 13 districts in the epidemic prone Northern region. While gradually improving in recent years, data analysis capacity and epidemic response plans need reinforcement. To ensure accurate malaria case reporting, laboratory confirmation is also required as malaria cases are diagnosed presumptively. In 2008 and 2009, PMI procured ACTs and IRS supplies to be stored in two of the regions as contingency in the event of an epidemic. With FY2012 funding, PMI will strengthen epidemic surveillance and response capacity in the epidemic-prone areas by providing training to health care providers on microscopy or RDT use, case reporting, data analysis and monitoring, and case management. Periodic supervisory visits will verify that RDTs are performing adequately, data are being reported in a timely fashion, and case management is appropriate in health facilities.

**Capacity Building and Health System Strengthening:** The MOH reports a critical shortage of staff at all levels of the public health system, especially for service provision below the national level. The shortage of staff, in terms of their numbers, geographic distribution and level of training, affects the quality of service at all levels. Entomological capacity is fairly strong both within the MOH and at research institutes. The quality, completeness and frequency of malaria-specific supervision are starting to improve thanks to joint efforts of PMI implementing partners and MOH divisions involved in malaria control. However, supervision below the district level at community health centers remains more limited.

Since its first year, PMI has contributed substantially to building capacity of the NMCP and other GOM entities through direct funding of specific activities. This support has allowed GOM partners to improve training, supervision, quality assurance and quality control for diagnostics, to oversee implementation of BCC activities related to malaria, and to improve partner coordination. To help the NMCP reach its coverage targets for key malaria interventions, PMI in FY2012 will continue collaboration with other partners to support NMCP structure and staff, specifically to increase capacity at all levels to plan, implement, supervise, forecast commodity needs; improve distribution systems; coordinate with partners; and monitor and evaluate malaria

prevention and control activities. In addition, PMI will continue training and mentoring NMCP staff to increase their skills in data analysis, interpretation and reporting of findings both from routine supervision and other data sources such as large household and health facility surveys.

**Monitoring and Evaluation (M&E):** The NMCP, with support from PMI and other partners, has developed a comprehensive national malaria M&E plan, including capacity building, improvement of data collection, and provision of equipment to collect and analyze data. This plan will be reviewed this year as part of the review of the National Strategic Plan for 2012-2016. The quality of routine data collection, analysis and reporting through the health information system known as *Système local d'information sanitaire* (SLIS) is variable and feedback is not delivered in a timely manner for program management. At present, population-based surveys provide the most accurate data on malaria in Mali, and have recently shown tremendous progress especially for ITN ownership and use. PMI supported a national anemia and parasitemia survey during the peak transmission season in 2010, which found an estimated 38% of children 6-59 months of age were parasitemic and 85% were anemic (hemoglobin<11g/dL).

In FY2012, PMI will support preparations for a national malaria indicator survey (MIS) to provide follow-up data on key malaria indicators along with anemia and parasitemia. Efforts will continue to strengthen the SLIS through training and supervision, and will incorporate a data quality assessment of the SLIS to identify areas for improvement. PMI will also support entomological monitoring at ten sites to monitor pyrethroid resistance and examine alternative insecticides for use in IRS.

The proposed FY2012 PMI budget for Mali is \$25.5 million. Of this amount, 38% will support procurement and distribution of LLINs, 21% IRS, 4% malaria in pregnancy, 26% improved malaria case management and strengthened malaria laboratory diagnosis, 6% monitoring and evaluation and strengthening the epidemic surveillance and response, and 5% staffing and administration.

## **GLOBAL HEALTH INITIATIVE AND THE PRESIDENT'S MALARIA INITIATIVE**

Malaria prevention and control is a major foreign assistance objective of the US Government. In 2009, President 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. The GHI is a global commitment to invest in healthy and productive lives, building upon and expanding the USG's successes in addressing specific diseases and issues.

The President's Malaria Initiative (PMI) is a core component of the GHI, along with HIV/AIDS, and Tuberculosis. The PMI was launched in June 2005 as a five-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria related mortality 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 2014 and, as part of the GHI, the goal of the PMI has been adjusted to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. This will be achieved by continuing to scale up coverage of the most vulnerable groups –children under five years of age and pregnant women- with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide treated nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS).

Mali was selected to become a PMI focus country in December 2006. Large scale implementation of ACTs and IPTp began in Mali in 2008 and has progressed rapidly with support from PMI and other partners. ACTs and SP for IPTp are now available and being used in all public health facilities nationwide. More than 1.8 million long lasting ITNs have been distributed to pregnant women and children under five in the last three years, and over 3.6 million long lasting ITNs are being distributed during the 2011 campaign to achieve universal coverage.

This FY2012 MOP presents a detailed implementation plan for Year 5 of the PMI implementation in Mali, based on the PMI Multi-Year Strategy and Plan and the NMCP's 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 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 to fight AIDS, Tuberculosis, and Malaria (Global Fund) malaria grants. This document briefly reviews the current status of malaria control policies and interventions in Mali, 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 FY2012 activities.

## **BACKGROUND**

In 2012, the population of Mali will be approximately 16.3 million (from the 2009 General Census using 3% growth per year), with more than 47% less than 15 years of age. Approximately 64% of Malians live in poverty; i.e. on less than US\$1 a day. In 2005, the estimated annual gross national income per capita was just \$500 (World Bank 2007), making Mali one of the world's poorest countries.

## Administrative and health infrastructure in Mali

Mali is divided into eight administrative regions (Kayes, Koulikoro, Sikasso, Ségou, Mopti, Gao, Tombouctou and Kidal) plus the capital Bamako. The regions are subdivided into 49 administrative “*cercles*” comprised of 54 health districts while Bamako is divided into six administrative communes that correspond to six health districts, making up a total of 60 health districts in the country. Governance is decentralized into 703 communes, each one administered by an elected local council headed by a mayor. The organization of the health system is based upon the principles of decentralization of health services and community participation to: a) extend health service coverage, and b) ensure access to essential and effective medicines.

The health system is composed of three levels:

- The central-level with five national reference hospitals plus the maternal and child hospital that serve as the highest reference level;
- The intermediate level with six regional hospitals for patients requiring a higher level of care;
- The local level with:
  - Fifty-nine referral health centers (*Centre de Santé de Référence* [CSREF]) constituting the district reference level;
  - A total of 1050 community health centers (*Centre de Santé Communautaire* [CSCOM]) in 2010 as well as parastatal, faith-based, military and other private health centers, constituting the community health services level. The CSCOMs are established and managed by community health associations (*Association de Santé Communautaire* [ASACOs]).

The MOH has a critical staff shortage at all levels of the public health system, especially for service provision below the national-level. In addition, health workers are not distributed proportionally to population throughout the country. In 2009, the ratio of doctors to the population varied from 1/3,637 in sparsely populated Kidal to 1/22,045 in Mopti Region, compared with the WHO standard of 1/10,000. Regional directors oversee health teams that implement integrated health interventions; currently all regional teams have malaria focal persons. The district health center (CSREF) is the first referral structure for CSCOMs; the district health team is headed by a medical chief responsible for technical supervision of CSCOMs. Community health associations (ASACO) manage CSCOM staff and operations, collect proceeds from drug sales, consultation and user fees, and pay salaries and other expenses. As is the case at the central-level, distribution of staff is uneven. In 2009, the percentage of CSCOMs headed by a certified head nurse was close to WHO norms ranging from 100% in five regions to 95% in Kayes. The number of staff employed frequently depends on the level of community resources to pay them.

In 2010, Mali approved an integrated Community Case Management (iCCM) package offered by Community Health Workers [*Agents de Santé Communautaire* [ASCs]) to provide health services to the community level. The ASCs provide free treatment for uncomplicated malaria, acute respiratory infections (ARI) with antibiotics, diarrhea with oral rehydration solution (ORS) and

micronutrient supplementation. The ASC will also provide primary care to the newborn and family planning for eligible families. Based on the national CCM directive, the CCM package and ASC model will be introduced in villages located 5 km or more from a health facility and will cover 2-3 villages in a radius of 3 km with a catchment area of approximately 1,500 people. This iCCM approach and ASC efforts will be supported by an additional cadre of community health volunteer, the *relais*, whose role is to carry out BCC/IEC and health education to promote key health messages to complement iCCM activities. Support for the GOM scale up plan for nationwide implementation of the iCCM package including supervision, commodity management, RDT confirmation and QA/QC were incorporated into the successful Global Fund Round 10 grant.

### **Health financing through cost recovery**

Mali has a strong cost recovery system in place that is based on the “Bamako Initiative.” At the district-level, communities can establish CSCOMs based on the following criteria: the establishment of an ASACO; raising a minimum of 10% of the cost of construction or renovation of the health facility; and the hiring and support of health personnel. All CSCOMs are required to deliver the national minimum package of services: antenatal care, immunizations, and curative services. Once authorized by the District Medical Officer, the MOH provides an initial stock of medicines, consumables and equipment. In principle, communes are expected to allocate 15% of their budget for social services including water, education, and health.

CSCOMs have three forms of revenue generation that are managed by the ASACO: membership fees, the sale of essential drugs, and fees for services. Service fees vary by health area and are set by the ASACO after consultation with the population. Membership fees allow for reduced service charges at some CSCOMs. Funds derived from the sale of medications are kept in a separate account to prevent providers from overprescribing to generate revenue and to prevent de-capitalization of pharmacy stock. The ASACO management committee purchases replacement drugs for the CSCOM through the national pharmacy system or from the private sector based on availability. Selected drugs (e.g. antimalarials for children less than five and pregnant women, vitamin A, oral rehydration solution) are provided free by the government or donors. The CSCOMs must finance the transportation of their drugs from CSREFs. However, due to small profit margins and the loss of or use of revenues for non-pharmaceutical purposes, CSCOM drug stores often become de-capitalized. An assessment of the financial barriers to treatment for children under five was conducted in 2010 and although the majority of respondents favored free malaria treatment for children and the poor, people were worried about the sustainability of the health recovery system and problems with misuse.

### **National financial planning for malaria and health/social development**

The NMCP receives annual budget support from National Health Sector Wide Approach or PRODESS (*Le Programme de développement sanitaire et social*). The PRODESS Evaluation Committee (*Comité de Suivi*) manages and approves the annual operating budget plan. Several partners (including the governments of the Netherlands, Sweden and Canada) provide direct budget support on an annual basis. Other donors including the USG, target their funding to sub-sectors and specific programs. The Government of Mali (GOM) contributes mostly to salaries, office space and other operating costs in the PRODESS annual budget. The GOM also uses

Highly Indebted Poor Countries (HIPC) program funds to pay some MOH salaries, especially in CSCOMs.

The GOM-approved FY2010 Operating Plan for the PRODESS includes budget line items totaling about \$4 million for activities to be conducted by the NMCP. GOM funding for NMCP activities increased substantially in FY2008 to \$6.7 million and in FY2009 to over \$9 million, following the government's procurement of malaria commodities and equipment. However, in 2010 and 2011, GOM funding for malaria decreased to just \$4 million and \$3 million respectively.

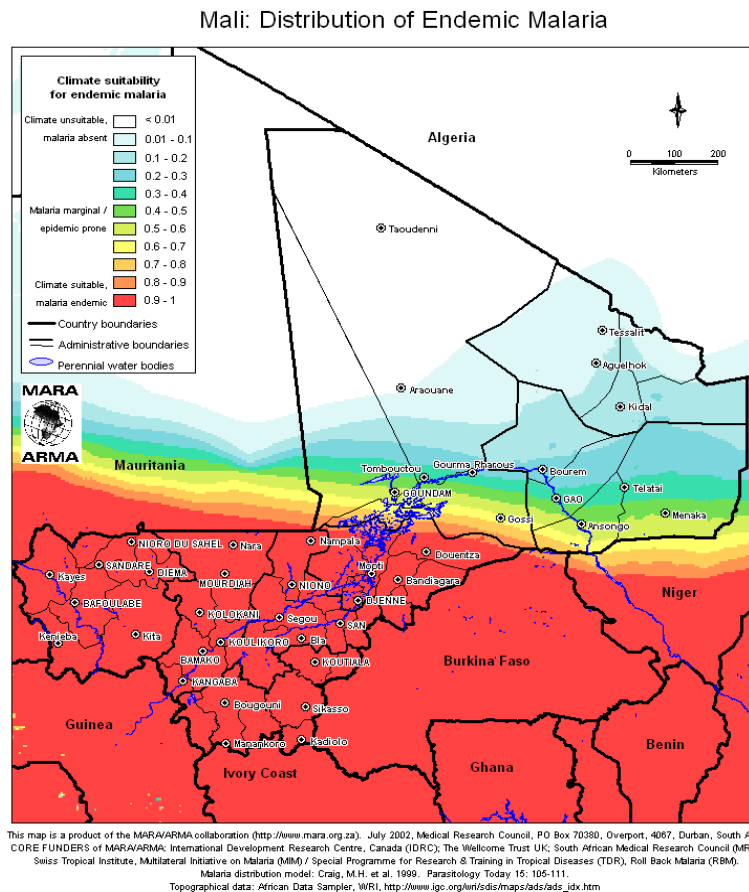
## **MALARIA SITUATION IN MALI**

Malaria is the primary cause of morbidity and mortality in Mali, particularly for children less than five years old. In 2010, the national health information system (*Système Local d'Information Sanitaire* or SLIS), reported 2.1 million clinical cases of malaria in health facilities (528,962 severe and 1,627,618 uncomplicated), accounting for 44% of all outpatient visits (all ages), however only 10% of these cases were confirmed by either microscopy or RDTs. Malaria also accounts for 51% of all outpatient visits for children less than five years of age. A total of 3,006 fatal cases representing 60.6% of all reported deaths were attributed to malaria and of these 64% were children under five (3,176 out of 4,960). However, with the lack of laboratory confirmation, the SLIS data should be viewed with caution.

*Plasmodium falciparum* accounts for 85-90% of malaria infections while *P. malariae* (10-14%) and *P. ovale* (1%) make up the remaining infections. A 2004 study conducted by the Malaria Research and Training Center (MRTC) in Menaka, an epidemic-prone region in the north indicated a prevalence of *P. vivax* of 8% which was confirmed by polymerase chain reaction (PCR).

Malaria is endemic to the central and southern regions (where about 90% of Mali's population lives), and considered epidemic in the north based upon viability of *Anopheles* species in the desert climate. Malaria transmission varies in the five geo-climatic zones. It occurs year-round in the Sudano-Guinean zone in the south, with a seasonal peak between June and November. The transmission season is shorter in the northern Sahelian Zone, lasting approximately three to four months (July/August to October). Malaria transmission is endemic in the Niger River Delta and areas around dams with rice cultivation, and is endemic with low transmission in urban areas including Bamako and Mopti. Epidemics occur in the north (Tombouctou, Gao, and Kidal Regions) and in northern districts of Kayes, Koulikoro, Segou and Mopti Regions, however, the last identified epidemic was in September 2003 in Tombouctou.

**Distribution of endemic malaria and climate suitability for endemic malaria (Source: MARA/ARMA, July 2002)**



Key partners of the NMCP include the Global Fund, the WHO, UNICEF, the World Bank, the Dutch Cooperation and USG. Non-governmental organizations (NGOs) and private voluntary organizations (PVOs) partners include *Groupe Pivot Santé*, *Fédération Nationale des Associations de Santé Communautaire (FENASCOM)*, *Médecins Sans Frontières*, and Plan International. The National Institutes of Health (NIH) supports the Malaria Research and Training Center (MRTC) within the Faculty of Medicine, Pharmacy and Odontostomatology of the University of Bamako.

Mali's Global Fund Round 6 Phase 2 grant for malaria and other Global Fund TB grant were suspended based on the Global Fund Inspector General's identification of misuse of approximately US \$5.3 million from the tuberculosis and malaria grants. The GOM has been responsive to Global Fund IG concerns and has taken steps to rectify the situation by replacing the Minister of Health and repaying \$300,000 to the Global Fund which was the original estimation of misappropriated funds. The status of procurements of life-saving commodities (ACTs and LLINs) budgeted under the Round 6 Phase 2 grant are unclear during this current suspension phase. Mali's Round 10 proposal was recommended for funding by the GFATM technical review panel. The Round 10 proposal includes funding for community case management and LLIN needs including a universal coverage campaign planned for 2014.

USAID Mali provides direct funding to the MOH which includes PMI funding to support the NMCP and its priority activities. USAID Mali maintains a team of two accountants and an auditor at the MOH overseeing all USG funding and ensuring that all USG requirements are adhered to and applied. USG funds are dispersed in small increments following USG's review of the MOH work plans and justifications. These funds are audited annually and the results shared with USAID's Regional Office of Inspector General in Dakar. The audits have revealed no misappropriation of USG funds.

## **NATIONAL MALARIA CONTROL PLAN AND STRATEGY**

The MOH guides and coordinates all malaria control activities. The NMCP was established in 1993 under the oversight of the Disease Control Division of the National Health Directorate (DNS). In July 2007, the GOM elevated the NMCP to a Directorate level in the MOH organizational structure. The NMCP Director supervises four technical divisions and one administrative and finance division, and reports directly to the Secretary General of the Ministry of Health. Due to its new higher profile in the MOH, the NMCP can now participate in and influence decision making about malaria control more effectively, including development of MOH work plans and budgets.

In 2010, the MOH began revising the National Malaria Strategic Plan to include new recommendations from WHO and RBM in malaria treatment and control as follows:

- Updated the malaria case definition to include biological confirmation using microscopy or RDTs;
- Adopted artemether – lumefantrine (AL) as the first line drug for the treatment of uncomplicated malaria;
- Introduced intramuscular artemether and rectal artesunate for pre-referral treatment of severe malaria;
- Updated guidelines concerning malaria in pregnancy to allow treatment of uncomplicated malaria in pregnant women with ACTs in the second and third trimesters of pregnancy or oral quinine in the first trimester of pregnancy;
- Implemented direct observation of SP administration during ANC visits ;
- Adopted community case management of malaria by community health workers using RDTs and ACTs, and
- Defined universal coverage target for LLIN distribution as one net for every two persons in a household.

The NMCP establishes strategies for all malaria interventions, coordinates research, proposes policies, norms and guidelines, and coordinates partner work plans. The NMCP also supports decentralized regional and district health teams through training and supervision.

The National Malaria Strategic Plan was extended (2012 – 2016) for Global Fund application purpose and aims to achieve the following ambitious goals:

- Reduce malaria mortality by at least 50% in 2010 and by 75% in 2015 as compared to year 2000 levels;
- Reduce malaria case-fatality rates reported in health facilities by at least 50% in 2010 and by 80% in 2015, as compared to year 2005 levels;
- Reduce malaria morbidity by at least 50% in 2010 and by 75% in 2015 as compared to year 2000 levels.

To achieve these objectives, the NMCP has defined four major malaria control and prevention strategies: 1) improved case management, 2) IPTp, 3) vector control through the distribution and use of LLINs, elimination of mosquito breeding sites using larvicides, and targeted IRS, and 4) malaria epidemic preparedness and response. Three cross-cutting approaches support these major strategies: community mobilization and behavior change communication (BCC), operational research, and monitoring and evaluation.

The 2007 – 2011 National Malaria Strategic Plan will be reviewed and a new five-year plan (2012-2016) will be finalized before the end of December 2011.

## **CURRENT STATUS OF MALARIA INDICATORS**

A Demographic and Health Survey (DHS) was conducted in Mali in 2006 and a 2011 DHS is in the planning stages at present. The 2006 DHS was conducted from May to December, which includes the peak period for malaria transmission (August-November). The results showed relatively high household ownership of any type of net (50%), but low use of ITNs by high-risk groups (pregnant women – 29% and children – 27%). Prompt case management in children less than five years of age with fever was also very low, as was use of sulfadoxine-pyrimethamine (SP) for IPTp (4%).

A UNICEF multiple indicator cluster survey (MICS) was conducted from December 2009 – July 2010 during the dry season and non-peak malaria transmission. The survey includes a module on selected malaria indicators and measures anemia prevalence in children 6-59 months of age. Results showed high net ownership (77%) and increasing use compared to the 2006 DHS with 54% use among children under five and 55% use among pregnant women. Anemia was also noted to be a persistent and pervasive problem in Mali among children under five. The MICS reported 72% of children 6-59 months of age were anemic (<11g/dL) compared to 81% from the 2006 DHS and 4% of children 6-59 months of age had severe anemia in the MICS (<7 g/dL) compared to 10% in the 2006 DHS.

A national anemia and parasitemia survey was conducted during the peak transmission season (September/October) in 2010. Results show a national estimate of malaria parasitemia prevalence of 38% for microscopy and 43% for rapid diagnostic tests (RDTs) which will be used as a baseline to measure future progress as none existed before the survey. Parasite prevalence ranged from 2% in Bamako which reports about 12% of the annual malaria cases in children under five in the SLIS 2010 to 59% in Sikasso which reports 24%. The North including Tombouctou, Gao, and Kidal which is traditionally considered as an epidemic-prone zone, showed a surprising high parasite prevalence of 17%; however this estimate was based a very small sample size. Mali's problem with anemia in children under five was shown in the 2010 A&P with any anemia (<11g/dL) reported at 85% and severe anemia (<7g/dL) reported at 12%.

<b>Malaria Indicator</b>	<b>DHS 2006</b>	<b>MICS 2010</b>	<b>A&amp;P 2010</b>
Proportion of households with at least one ITN	50%	77%	85%
Proportion of children less than five years old who slept under an ITN the previous night	27%	54%	70%
Proportion of pregnant women who slept under an ITN the previous night	29%	55%	63%**
Proportion of children less than five years old with fever in the last two weeks who received treatment with ACTs within 24 hours of onset of fever	N/A*	N/A	8%
Proportion of women who received two or more doses of IPTp during their last pregnancy in the last 2 years	4%	N/A	N/A
Parasite prevalence (microscopy/RDT)			38%/43%
Any anemia (<11g/dL)	81%	72%	85%
Severe anemia (<7g/dL)	10%	4%	12%

\*ACT adopted as the first line treatment in 2006 and became available in 2007

\*\*The A & P survey included all women of child-bearing age, not just pregnant women.

Note: DHS and MICS surveys cannot be considered peak malaria transmission season surveys as data collection spanned 6-9 months. The A & P survey was conducted during the peak malaria transmission period (September – October)

## **GOAL AND TARGETS OF THE PRESIDENT’S MALARIA INITIATIVE**

The goal of PMI is to reduce malaria-associated mortality by 70% in the original 15 PMI countries compared to pre-Initiative levels. By the end of 2012, PMI will assist Mali to achieve the following targets in populations at risk for malaria:

- Over 90% of households with a pregnant woman and/or child less than five years old will own at least one ITN;
- 85% of children less than five will have slept under an ITN the previous night;
- 85% of pregnant women will have slept under an ITN the previous night;
- 85% of houses in geographic areas targeted for IRS will have been sprayed;
- 85% of pregnant women and children less than five will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the last 6 months;
- 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and

- 85% of children less than five with suspected malaria will have received treatment with an ACT in accordance with national malaria treatment policies within 24 hours of onset of their symptoms.

### **Expected Results – Year Five**

#### Prevention:

PMI will procure approximately 1.3 million LLINs and support distribution of free LLINs to pregnant women and infants in the public sector by ensuring nets are delivered to the CSCOM level for routine distribution during antenatal care (ANC) and immunization (EPI) services. This, together with other donors' contributions, is expected to result in more than 80% of households owning one or more LLIN;

- 180,000 houses with approximately 580,000 residents will be sprayed covering three contiguous districts;
- Approximately 780,000 treatments of sulfadoxine-pyrimethamine (SP) for IPTp will be procured which represents approximately one-half of SP needs for 2013. UNICEF and Global Fund will also procure SP to meet the remaining SP needs for 2013. PMI will also continue to support the procurement of cups and water containers to make sure that women take the SP under direct observation by health care providers.

#### Treatment

- PMI will procure approximately 1 million RDTs towards the estimated annual need of 1.8 million RDTs throughout the country. A one-year supply of laboratory consumables will be purchased to reinforce diagnostic capacity at all 59 district referral centers, including referral hospitals.
- PMI will procure 500,000 AL treatments to fill gaps with Global Fund Round 10 ACT procurements as well as supporting scale up of ACT treatment within iCCM. PMI will also continue to procure pre-referral drugs for managing severe malaria, including injectable artemether, rectal artesunate, and oral quinine.
- PMI will support expansion of integrated community case management (iCCM) to 9 districts to cover the entire region of Sikasso.

### **INTERVENTIONS – LONG LASTING INSECTICIDE-TREATED NETS (LLINs)**

#### Background:

The MOH supports the provision of free LLINs distributed to target populations through two main delivery channels: mass distribution to households as part of universal coverage campaigns and routine distribution for antenatal care (ANC) and Expanded Program for Immunizations (EPI) clinics targeting women and infants. Since 2006, the MOH has provided LLINs for free to children less than five years of age in an integrated health campaign, to pregnant women at their first ANC visit, and to children less than one year of age with completed vaccination cards at EPI services. Mali defines universal coverage as one LLIN for every two persons. According to the new 2012-2016 Malaria Strategic Plan, the NMCP plans, in 2014, to replace the older nets distributed previously and target all susceptible populations in the context of universal LLIN coverage for all age groups in 2011. To maintain high annual coverage, the NMCP intends to

carry out mass distribution campaigns in 2011 and 2014 to achieve its universal coverage goals. The NMCP will also continue to support free LLINs as part of routine distribution channels for pregnant women and infants at ANC and EPI clinics.

Net ownership in Mali is high. According to the A&P survey conducted during the peak transmission season in October and November 2010, 85% of households owned an ITN and 93% of households owned at least one mosquito net. Among the respondents interviewed, 70% of children under five slept under a net the previous night. Results from the 2010 MICS (carried out during the dry season or low transmission period) suggest similarly high coverage and use. A total of 77% of households owned at least one ITN, and 54% of children under five and 55% of pregnant women slept under a net the previous night. These findings suggest that Mali has maintained high net ownership since December 2007, when the Malian Government and its health partners distributed 2.8 million LLINs to children under five as part of an integrated child health campaign. A survey conducted by HealthBridge in August 2008, eight months after this campaign, found that 78% of children less than five and 74% of pregnant women slept under a treated net the previous night. The NMCP and partners have conducted BCC/IEC activities to reinforce correct behaviors and practices around net use. While Mali has generally high demand for LLINs, consistent year-round use among target groups remains below NMCP and PMI objectives, especially during the dry season when people are less likely to sleep under a net due to the heat.

### *Mass Campaigns*

In April 2011, Mali launched a rolling, phased universal coverage campaign to achieve 100% ownership and 80% use of LLINs in the general population, and to replace old nets distributed in 2006. The NMCP and partners opted for a phased approach to the universal coverage campaign, starting with one region, Sikasso, and proceeding to other highly-endemic malaria regions until sufficient resources were available to cover the entire country. Registration of households and their occupants and regional and district-level microplanning preceded actual campaign implementation. Households were provided with vouchers in advance and LLINs were then obtained at distribution sites on designated campaign days. Intensive communications and follow-up home visits by community workers helped ensure proper net hanging and encourage consistent and correct use. The following table illustrates the LLIN contributions and gap identified for the 2011 universal coverage campaign:

Sources of LLINs	Quantity	Distribution Time frame	Target
UNICEF	100,000	2011	Universal coverage (UC) campaign
Government of Mali	975,000	2011	UC campaign
Islamic Development Bank	1,650,000	2011	UC campaign
PMI FY 2009	570,000	2011	UC campaign
PMI FY 2010	1,540,000	2011	UC campaign
PMI FY 2011	1,500,000	2011	UC campaign
<b>Total LLINs available</b>	<b>6,335,000</b>		
<b>Total LLINs needed for campaign</b>	<b>8,666,667</b>	<b>1 net for every 2 people calculated as 15.6 million people / 1.8 ratio people per net (according to Global Fund recommendations)</b>	
<b>LLIN Gap</b>	<b>2,331,667</b>		

As of July 2011, two of nine regions have received LLINs. The MOH intends to reach the remaining regions before the end of the year. Of the 8.6 million nets needed for the 2011 universal coverage campaign, 6.3 million have been pledged and about half of the nets are available in country for distribution. With the current Global Fund negotiations pending, the LLINs available to support the campaign through the Global Fund Round 10 grant are still to be determined.

### *Routine Distribution*

The NMCP distributes free routine LLINs for pregnant women attending ANC clinics and infants fully immunized at EPI visits. With the rolling phased campaign underway, most LLINs available in-country were pledged to support the universal coverage campaign. However, through the Global Fund Round 6 grant, a total of 750,000 LLINs are planned in 2011 for routine distribution to pregnant women and infants only. The NMCP M&E Planning Division is responsible for forecasting net needs in collaboration with other MOH offices including the Directorate of Drugs and Pharmacies (DPM), the Division of Reproductive Health (DSR), and the EPI Section with input from the regions and districts. The Global Fund supports procurement, warehousing, and distribution of the MOH nets to the district CSREF-level and further to the CSCOM-level. In the past, the NMCP experienced additional challenges when GOM and donor nets were distributed to regional or district levels without the necessary resources to ensure delivery to the health facilities. However, malaria partners have carried out quarterly LLIN inventories at CSCOMs, replacing or shifting stocks as needed, to ensure sufficient quantities were available for routine services. As a result, the 2010 SLIS reported that free LLINs were distributed to 68% of pregnant women attending ANC clinics and 84% of infants aged 0 – 11 months at EPI services.

### *Insecticide Resistance Issues*

With the significant investment Mali has made in LLINs and the increasing levels of pyrethroid resistance noted in many parts of the country, it is essential to assess alternative LLIN products should pyrethroid resistance limit the protective efficacy of LLINs. Despite the exceptionally high LLIN coverage attained in Mali, parasite prevalence in children under five remains high at 38% by microscopy or 43% by RDT, and 85% of children are anemic. The NMCP is increasingly concerned that insecticide resistance may be limiting the effectiveness of their control efforts. Because of these concerns, the NMCP supports efforts to test other LLIN options for managing pyrethroid resistance in *An. gambiae*. Currently there is only one combination LLIN product commercially available but other LLIN manufacturers are developing products that might be available over the next year. NMCP would like to determine if a combination LLIN offers greater personal protection against malaria than a traditional LLIN in an area with emerging pyrethroid resistance. The results will help inform the choice of LLIN product used in the 2014 universal LLIN campaign funded by Mali's Global Fund Round 10 grant.

2013 LLIN Needs/Gap Analysis

The table below summarizes the calculation of the estimated LLIN gap in 2013 to maintain universal coverage targets based on the following assumptions:

<b>Coverage goal for 2013 to ensure 1 net for every 2 people</b>	<b>Universal Coverage</b>
At-risk population (2010 estimates)	15,400,000
Expected population growth	3.00%
Average number of persons per net	1.8
<i>Distributed LLINs</i>	
Distributed LLINs in 2010	0
Distributed LLINs in 2011 (universal coverage)	6,335,000
Additional pledged to be distributed in 2011	0
<i>Pledged LLINs</i>	
Pledged LLINs in 2012	0
Pledged LLINs in 2013	0
Pledged LLINs in 2014	0
<i>Calculations for 2013</i>	
Population at-risk in 2013	16,827,996
Total number of LLINs needed	9,348,887
Viable nets from previous years (durability @ 3 years)*	6,335,000
Nets in-country (previous years plus pledged)	6,335,000
<b>LLIN gap (total nets needed minus nets in-country)</b>	<b>3,013,887</b>

\*The 750,000 Global Fund Round 6 LLINs available in 2011 are for routine distribution only and therefore not factored into the calculations for universal coverage campaign needs and maintaining universal coverage targets.

In addition, the following table summarizes the estimated 2013 LLIN gaps/needs for routine distribution:

<b>Country data and assumptions</b>	<b>ANC/EPI Routine Distribution</b>
Population at-risk in 2013 (routine system)*	1,632,315
Total number of nets needed (routine system)	1,632,315
Pledged LLINs in 2013 (via routine distribution) includes PMI FY 2012 proposed nets	1,300,000
<b>LLIN gap</b>	<b>332,315</b>

\* 5% or 841,399 of the total 2013 population is pregnant women; 4.7% or 790,916 of the total 2013 population is infants (children <1 year).

### Progress during the last 12 months

The PMI contributed 3.61 million LLINs with FY 2009, 2010 and 2011 funding to the 2011 universal coverage campaign. Because of the timing of the campaign launch and phased implementation strategy, PMI was able to plan and procure LLINs in advance in order to contribute to the universal coverage campaign. The PMI also supported an assessment of the first stages of the LLIN campaign in Sikasso to validate initial strategies, and further improve campaign distribution methods in subsequent phases.

With substantial numbers of LLINs distributed to households, the PMI promoted BCC messages focused on awareness of malaria transmission and increasing year-round net use. PMI supported these messages through delivery channels that included interpersonal BCC messages provided by relais and community health workers at the household level and mass media through regional and community radio spots and television broadcasts at the national level. LLIN ownership and use will be measured with the 2011 DHS (data collected in October and November) although it is understood that not all regions will have been reached by the campaign by then.

The PMI also supported the NMCP to strengthen supervision, forecasting, planning and coordination of net distribution. This included assisting in the micro planning for the rolling phased-mass campaign in 2011 and LLIN distribution support from Bamako directly to the peripheral health facilities to ensure availability of free nets at the CSCOM level.

### Proposed activities, with FY2012 funding, : (\$10,083,000)

PMI will contribute 1.3 million LLINs to reduce the projected 2013 gap of over two million nets needed to maintain universal coverage and will provide nets for free through routine distribution channels at ANC and EPI services targeted at pregnant women and children less than one year of age. PMI also plans to support BCC efforts for LLIN use. While reported net usage is high during the high transmission season, efforts are needed to maintain high usage during the low transmission season. Identifying the remaining barriers to correct hanging, use and maintenance of nets and promoting year-round use is extremely important to help meet NMCP and PMI goals. PMI will also continue to strengthen the capacity of the MOH and partners to coordinate donor inputs, track LLINs, and manage logistics and distribution systems from central to peripheral health facility levels.

The following PMI Year 5 activities are planned for Mali:

**LLIN procurement:** PMI will procure approximately 1.3 million LLINs for free distribution through routine delivery channels (EPI and ANC clinics) as well as contribute to closing the LLIN gap to maintain universal coverage targets in 2013. PMI will continue to strengthen the capacity of the NMCP in supervision, forecasting, planning and coordination of net distribution. PMI will work closely with NMCP and other partners to leverage additional support and funding for LLINs to meet the remaining gaps. (\$8,100,000)

**Distribution of LLINs:** PMI will support distribution of free LLINs to pregnant women and infants in the public sector by ensuring nets are delivered to the CSCOM level for routine

distribution during ANC and EPI services. PMI will continue to help CSCOMs improve their distribution and reporting systems and ensure proper labeling of public sector LLINs. PMI will also support the NMCP in planning and monitoring of routine distribution through EPI and ANC. (\$1,350,000)

**LLIN procurement for dual-insecticide treated nets and LLINs for operational research project:** PMI will procure dual insecticide treated nets and traditional LLINs for an operational research project exploring the impact of dual-insecticide treated nets on malaria transmission and parasite prevalence. (\$143,000)

**LLIN supply management, tracking and forecasting:** PMI will continue to strengthen the capacity of the NMCP and other key implementing partners involved with LLIN logistics from central- to district-levels. PMI will fund technical assistance to strengthen commodity management to adequately forecast, plan and track distribution of LLINs and carry out semi-annual inventory controls of LLIN stocks. This includes advising on transportation and other inputs needed to ensure adequate stocks are available for routine distribution. Funding will support improved monthly stock distribution and reporting as well as inventory and supervisory checklists. A portion of the funds will also be used to support an annual end-use verification exercise for LLINs at health facilities. (\$140,000)

**BCC/IEC:** BCC/IEC coordination among PMI and NMCP partners at the national and community levels is even more critical in Year 5 to ensure correct and consistent use of nets, uniformity of messages from various interventions, regular monitoring, and subsequent reorientation as needed. Support for BCC/IEC activities will reinforce the correct use of bed nets throughout the year. PMI will support innovative ways to combine tracking of LLINs with targeted BCC messages, emphasizing the necessity to continue sleeping under LLINs during the dry seasons, associated with low transmission season. PMI will identify multi-channel strategies to design, develop and communicate this information, including door-to-door message dissemination by *relais* in their communities. (\$350,000)

## **INTERVENTIONS– INDOOR RESIDUAL SPRAYING (IRS)**

### Background:

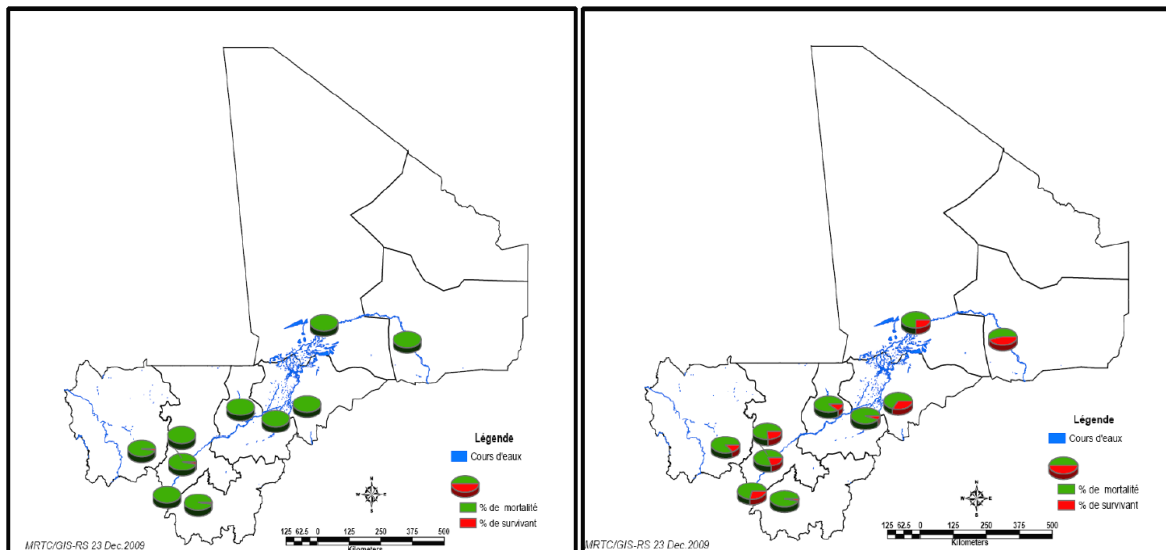
The NMCP's Strategic Plan envisions an integrated vector control program that includes LLINs, IRS, destruction of larval habitats, larviciding, and environmental management in urban zones. Regional climatic zones in Mali range from desert in the north with less than one month of rainfall, to the Sudano-Guinean Zone in the far south with six to seven months of rainfall. IRS is most effective in areas of the country where malaria transmission is perennial and occurs in seasonal peaks that vary in duration from three to six months. This excludes the three northernmost regions and the northernmost districts within the Kayes, Koulikoro, Segou and Mopti regions that are considered zones of sporadic or epidemic risk for malaria transmission. IRS is also not ideal for rice-growing areas and zones of irrigation around the Niger River Delta where transmission is holoendemic, or in the urban areas of Bamako and Mopti, where much lower transmission occurs.

Private mining companies conduct IRS regularly in the gold mining areas of Sadioloa, Yatela, Loulou, Morila and Kalana, but it is limited to the mines and surrounding villages rather than to the entire district. No Global Fund-supported or other private sector IRS activities are currently underway. In support of the NMCP's strategic plan to scale up IRS, PMI has supported spraying in three contiguous districts to act as the nucleus for future IRS districts.

In 2010 the MOH expressed interest in costing an IRS strategy that covers the entire country. The PMI supports the development of this approach, which will be integrated into the National Integrated Vector Management (IVM) Strategy and assisted with PMI financial support.

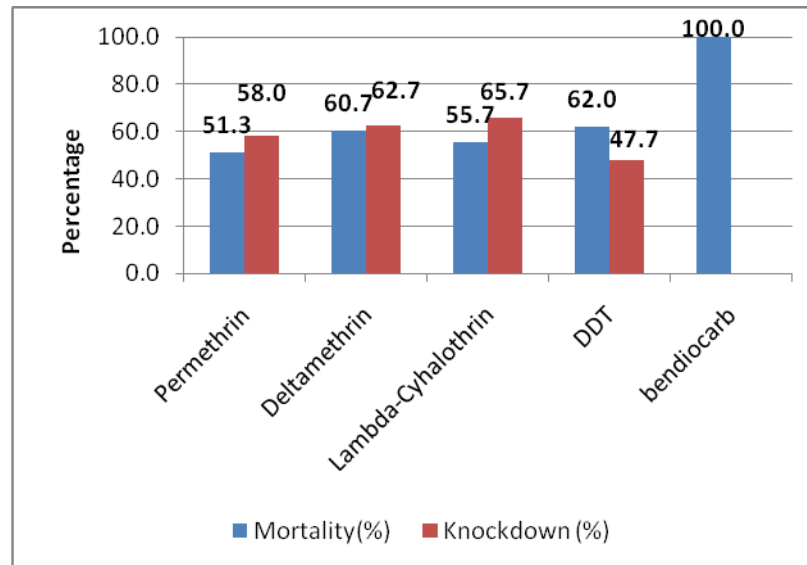
A list of WHO-approved insecticides for IRS includes several insecticides in four classes that offer good options for pesticide rotation strategies designed to limit the development of resistance in mosquito populations. Based upon the Malaria Research and Training Center's (MRTC) insecticide resistance tests conducted using *Anopheles gambiae* collected in Bla and Koulikoro during 2007, the NMCP and its in-country implementing partners chose the pyrethroid insecticide, lambda-cyhalothrin (30 mg/m<sup>2</sup>), as the insecticide of choice for 2008 and 2009. Deltamethrin, another pyrethroid insecticide, was chosen for the 2010 spray round based upon previous susceptibility data and additional tests conducted in 2009. In addition to the three IRS districts monitored, entomological monitoring at sentinel sites jointly-funded by PMI and the Gates Foundation, have shown a growing resistance of *Anopheles* mosquito vectors to pyrethroid insecticides. The figures below from 2009 show the susceptibility status of *An. gambiae* to the pyrethroid insecticide lambda-cyhalothrin (right) and to the carbamate bendiocarb (left), indicating rapid pyrethroid resistance developing throughout the country (in red) whereas bendiocarb is still effective. The organophosphate insecticide fenitrothion was also effective and represents another insecticide class for consideration in IRS programs.

**Insecticide resistance status of *An. gambiae* to bendiocarb [carbamate class (left) and lambda-cyhalothrin [pyrethroid class] ] (right) at ten sentinel sites throughout Mali using the WHO susceptibility assay (% mortality = green; % survival = red).**



Susceptibility assay results from Baraoueli, the third IRS district to be sprayed for the first time in 2011, likewise show pyrethroid resistance and carbamate susceptibility (below).

**Percent mortality and knockdown of *An. gambiae* from Baraoueli when exposed to insecticides in three classes using the WHO assay.**



As a consequence of reviewing these results, the NMCP in collaboration with the Ministry of Agriculture and Sahelian Committee of Pesticides decided to rotate the IRS insecticide class used in 2011 as part of the national IVM strategy for managing insecticide resistance. In this way the effectiveness of pyrethroids used within IRS programs and those used in LLINs may be preserved.

A carbamate insecticide (i.e., bendiocarb) was therefore selected for the 2011 IRS spray round because of its proven efficacy in killing wild *Anopheles* mosquitoes. However, recent data on current carbamate formulations in a similar setting in Burkina Faso indicate a reduced duration of effectiveness of three to four months. Therefore, to maximize the effectiveness of the carbamate during the malaria transmission season, the 2011 spray round started one month later, in July, to provide the most effective insecticide and greatest protection during the most intense malaria transmission period (September - November).

Progress during last 12 months:

In 2008, PMI funds supported Mali’s first large-scale IRS campaign in the districts (*cercles*) of Bla and Koulikoro, with continuing support of both districts in 2009 and 2010. PMI added a third district (Baraoueli) in 2011. Entomological baseline data were collected in Baraoueli in preparation for the 2011 IRS operations. PMI supported the training of spray trainers, supervisors and operators, the purchase of commodities and protective equipment, and communication, supervision, monitoring, and environmental compliance activities. Activities to promote IRS and mobilize the population around IRS have been carried out each year. About 549 supervisors and spray operators were trained for IRS operations and 772 *relais* received BCC/IEC training and materials to conduct informational group meetings and door-to-door mobilization. In 2010, spray activities were conducted May to June in Bla and Koulikoro, resulting in 97% household coverage, which included 127,273 houses sprayed and over 440,815

residents protected. The IRS campaign for 2011 was conducted June-July and included Baraoueli for an additional 73,315 houses targeted (coverage estimates are not yet available).

Entomologic monitoring of the IRS program continued to determine the quality and duration of insecticidal activity on walls during the malaria transmission season. Monitoring in Bla and Koulikoro districts began shortly after the spray round was completed in July 2010 and included WHO cone bioassays, pyrethroid spray catches and indoor and outdoor human landing catches. Extensive laboratory analyses have been performed on collected specimens to determine important entomological parameters.

For the 2010 spray round, initial results of wall bioassays indicated sub-optimal insecticide activity on walls in one of six villages monitored, with decreased activity due to insecticide decay after only three months in three of the six villages monitored. Such results highlight the importance of early testing of IRS-sprayed houses to inform IRS implementing partners when spray operations need corrective action. The PMI, NMCP, and MRTC are working with the IRS implementing partner to ensure the quality of spraying in this specific village.

Results of entomologic monitoring in the IRS districts reveal that *Anopheles gambiae s.s.* predominates over *An. arabiensis* throughout Mali. Within *An. gambiae s.s.* the M molecular type occurs at greater frequency than the S type. This is good news since the M type is much less likely to carry the knockdown resistance (kdr) gene responsible for the kdr insecticide resistance mechanism which confers resistance to pyrethroids, carbamates, and organophosphates. Overall, entomological monitoring of the *Anopheles* vector populations and their behaviors shows reduced indoor resting densities, lower biting rates and lower EIRs, indicating that IRS and LLIN insecticides negatively impact the vectors. Biting rates inside and outside houses reveal a significant proportion (46%) of *Anopheles gambiae* biting outdoors. It is not clear if the lower densities indoors are due to increased mosquito mortality from IRS effects and LLIN use or whether insecticide excito-repellency is causing mosquitoes to leave the house (before or after feeding) to rest outdoors or in non-sprayed rooms.

### **Operational Research Results**

The NMCP desires an integrated vector control program and PMI has responded by supporting two operational research projects to inform additional vector control interventions. At the NMCP's request, PMI supported a two-year larviciding project in a small subset of houses in Koulikoro District to determine if there is an added benefit to larviciding water sources surrounding sprayed houses. Field activities in 2009 included three treated villages and three untreated villages and concluded in 2010 using two treated and two untreated villages in Koulikoro district. Most breeding sites identified and monitored were burrow pits (51%), and natural depressions such as ponds (30%) and tire tracks (19%). The results indicated highly significant reductions in larval breeding activity in all test villages after treatment compared to untreated villages. However, entomological parameters of adult *Anopheles* mosquitoes collected in 2009 varied widely by location, and therefore did not show statistically significant reductions in adult mosquito densities, biting rates, infection rates, or EIRs in treated compared to untreated villages.

Results from 2010 however were very different. Excellent larval control was again achieved, but this time there were accompanying reductions in resting densities, biting rates, sporozoite rates

and EIRs, particularly early and during the peak of the transmission season. Toward the end of the malaria season mosquito numbers increased, likely due to missed breeding sites, immigration from non-treated areas and waning IRS insecticide activity on walls.

A second PMI-supported operational research project targeted *An. gambiae s.l.* breeding in water-filled depressions along the Niger River during the dry season. Although *An. gambiae* is found year-round in the hamlets along the Niger River, it disappears during the dry season in larger villages a few kilometers inland. The “river” anophelines may be the primary source for the mosquito population that increases and migrates inland after the rains begin. This operational research examined the effects of dry season IRS in three treated hamlets and three untreated villages along the Niger River, with entomological monitoring throughout the rainy season from June to December 2010. Results from 2009 showed some reductions in *Anopheles* densities per house in two of the three IRS river hamlets (Dangassa-Somonosso and Bozokin) but little difference in a third (Fourda). Similarly, *Anopheles* biting rates were reduced in Dangassa-Somonosso but not in the other two IRS river hamlets. No reductions in *Anopheles* densities or biting rates were seen in inland villages.

Results in 2010 were more positive but also mixed. IRS-treated hamlets showed significant reductions in resting densities, biting rates and EIRs during the first three months. This result clearly demonstrates the effectiveness of IRS. After three months however, mosquito densities, biting rates and EIRs quickly returned to pre-intervention levels. Cone assays performed on sprayed walls showed that the pyrethroid (lambda-cyhalothrin) lasted only three to four months before activity fell well below 80% mortality thresholds; the different microclimates and interior household characteristics may explain results that diverge from the IRS districts where the pyrethroid remained active for six to eight months. In addition, resistance to pyrethroids was detected at high levels in the study area (only 50% and 56% mortality in WHO assays for permethrin and lambda-cyhalothrin, respectively). For this intervention to be successful, a longer-lasting insecticide in a different class (non-pyrethroid) will be needed.

**Proposed activities with FY2012 funding:** (\$5,484,000)

The NMCP and the MOH continue to advocate for the development of a National IVM strategy including a costed IRS strategy that covers the entire country.

**IRS:** PMI will continue to support IRS covering 180,000 households in Bla, Koulikoro and Baraoueli districts in 2012 by procuring insecticide and equipment and covering expenses for trainers, spray teams and storage facilities. Other support to be provided will include training at the regional, district, and community levels, and joint supervision with the NMCP and the Division of Public Hygiene and Health (*Division d'Hygiène Publique et Salubrité, or DHPS*). Communications materials will be provided to inform beneficiaries, raise public awareness, promote behavior change (including environmental management and sanitation) and promote cooperation with the DHPS spray teams. (\$5,100,000)

**Technical assistance for entomology:** A CDC entomologist will provide technical assistance on entomological monitoring activities to ensure quality control and the completion of operational research projects. (\$24,000)

**Entomological monitoring:** To measure the impact of IRS on mosquito populations, PMI will continue to support ongoing insecticide efficacy and longevity studies in selected villages within the three IRS districts immediately after spraying in 2012. PMI FY2010 funding already covers monitoring activities through November 2011. (\$200,000)

**Capacity building for the NMCP and DHPS in IRS planning and entomological monitoring:** PMI will strengthen national and local capacity for IRS by training the NMCP entomologist in conducting entomological monitoring related to IRS and insecticide resistance management activities. In addition, PMI will assist with the NMCP's IRS oversight committee to develop an IRS sustainability plan for the MOH. The support will cover periodic IRS committee meetings to ensure partner coordination and effective monitoring and evaluation. PMI will support IRS quarterly coordination meetings and assist with the design and production of IRS planning, implementation and monitoring tools. (\$60,000)

**IVM strategy development and implementation:** After developing a strategic IVM national plan for IRS, ITNs and insecticide resistance management in 2011, PMI will support the plan's implementation and coordination at the national level, plus a focus on the three IRS districts. (\$100,000)

## **INTERVENTIONS: MALARIA IN PREGNANCY**

### Background:

Mali's malaria in pregnancy (MIP) strategy applies WHO's three-pronged approach: providing two doses of intermittent preventive therapy for pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP), promoting the use of LLINs distributed free at the first ANC visit, and effective case management of suspected malarial illnesses. Utilization of ANC services by pregnant women is relatively high; according to the 2006 DHS; 72% of pregnant women made at least one ANC visit and 63% made two visits or more. However, ANC attendance usually occurs late with only 30% of pregnant women attending before the end of their first trimester of pregnancy. IPTp use is low as the 2006 DHS showed that only 4% received the recommended two doses of SP at ANC visits. The 2010 SLIS showed 62% of pregnant women attending one ANC visit obtained one dose and 40% received two doses of SP. IPTp coverage will be assessed in the 2011 DHS. The CNIECS (*Centre National d'Information Education et Communication pour la Santé*), which is tasked with creating IEC/BCC materials and strategies, is addressing barriers to increasing uptake of IPTp by improving providers' interpersonal communication skills and encouraging early ANC visits by pregnant women.

Another barrier to IPTp in Mali arises from pregnant women having to pay for antenatal care. In 2006, the MOH announced that IPTp would be provided free; however, some pregnant women continue to be charged for their SP as the policy has not been widely disseminated and has not been adopted within the Bamako Initiative cost recovery system. Women also report that they are still required to pay for all other medicines prescribed by clinicians and consultation fees remain prohibitively high. Advocacy for removal of consultation fees and adherence to the free SP policy has been ongoing at the central level.

Currently the amount of SP available in Mali, which included a PMI procurement of 1 million SP treatments in 2009, is enough to cover all pregnant women until 2012. Additional funding is available from PMI and other partners to continue SP procurement as needed in 2012 and 2013. However, a surplus of free SP at CSCOMs could encourage inappropriate use of SP as a first-line treatment of malaria when stock outs of ACTs occur, potentially resulting in SP shortages for IPTp. An end-use verification exercise is planned to identify ways to respond to this problem.

SP is given to pregnant women under direct observed therapy (DOT) during ANC visits. SP is packaged and distributed in either a container of 1,000 tablets or in blister packs of 3 tablets (one treatment). NMCP encourages use of SP from the container since the blister packs have been sold for treatment which is against MOH policy. As of December 2010, an end-user verification exercise showed stock outs of the SP container at most of the delivery points, while 19-months of blister packs were available. PMI is working with the NMCP and the *Pharmacie Populaire du Mali* [PPM] (People's Pharmacy of Mali) to use the existing SP stocks and switch to the containers to prevent incorrect treatment and promote IPTp use.

Integration and coordination between the NMCP and the MOH's Reproductive Health Unit (RH) is critical in ensuring effective MIP programs and high IPTp coverage. Since 2006, the RH and the NMCP have developed a revised in-service training module for focused antenatal care (FANC) that included MIP and IPTp. The PMI has supported the RH, NMCP, and Midwives Association to expand use of this focused antenatal care (FANC) in-service training module, which includes the diagnosis and treatment of malaria, IPTp and malaria in pregnancy and use of LLINs, as well as increased supportive supervision of IPTp through facility and community outreach activities.

PMI implementing partners have helped produce technical guides for providers, IEC outreach materials for *relais*, and radio and TV campaigns on IPTp. Other PMI-supported partners have promoted the provision of free LLINs to pregnant women at their first ANC visit; in practice, LLINs are often not given until the third or fourth ANC visit. The partners have trained *relais* to promote key MIP messages, including the importance of IPTp and the availability of free SP and LLINs at ANC clinics.

Health facilities collect and report information quarterly through the national SLIS on the number of ANC visits (including early ANC visits), postnatal consultations, SP doses administered, and assisted deliveries by a skilled birth attendant. In 2007, the MOH released revised ANC visit cards that included IPTp and LLIN information.

#### Progress during last 12 months:

In 2006 the MOH issued directives ensuring free provision of SP for IPTp. In April 2010, this policy was reinforced and treatment guidelines were updated to include oral quinine for the treatment of malaria in pregnant women in the first trimester, and ACTs for treatment in the second and third trimesters. PMI has supported in-service training and supervision to facilitate the implementation of these new guidelines. In 2010, to promote the use of updated FANC training materials, PMI supported training of 1,173 health providers in the FANC in-service training module and expansion of this training along with supportive supervision among facility staff at the CSREF and CSCOM levels.

PMI continued to support national-level policy dialogue and consensus building that included targeting religious and traditional leaders as well as elected officials to help advocate for the importance of malaria prevention during pregnancy. In response to late or missed ANC visits, PMI works with influential religious leaders to include messages from the Koran and Bible in their public addresses that emphasize the importance of ANC, risk of malaria in pregnancy, and overcoming cultural barriers to taking IPTp. These teachings also educate and promote dialogue among couples about malaria in pregnancy and encourage husbands to accompany their wives on these visits, a common practice in other Muslim countries.

PMI also supported a multi-channel IEC/BCC strategy targeting pregnant women, women of child bearing age, and men, focusing on knowledge and perceptions related to malaria in pregnancy, women's awareness of risks of malaria during pregnancy, early and frequent ANC attendance at the CSCOMs, early use of IPTp in the second trimester, completion of the recommended two treatments courses of IPTp, provision of a free LLIN at first ANC, and increasing demand for proper treatment of malaria in pregnancy. PMI supported training health providers on interpersonal communication, an area cited by the MOH's CNIECS as a challenge. PMI also continued to support refresher training for *relais*, with a focus on men and key decision-makers in households. Malaria BCC/IEC activities were linked with HIV/AIDS messaging where appropriate.

Proposed activities with FY2012 funding: (\$710,000)

The projected annual need for SP in 2013 to maintain the NMCP objective of 80% coverage is about 1.56 million treatments, based on 5% of the population being pregnant women (780,000) and each woman receiving two doses. Global Fund Round 6 Phase 2 includes 2.4 million SP treatments for IPTp over the next three years (approximately 800,000 treatments per year). Therefore, in 2013, there will be a gap of approximately 760,000 treatments. PMI and UNICEF will procure SP to fill this gap. PMI will also support early and frequent attendance at ANCs, and work with the MOH and other donors to ensure SP is used correctly and provided free to pregnant women for IPTp. Through training of health providers in FANC and strengthening of the commodity system, PMI will continue to improve MIP services and increase IPTp rates. PMI will also support engagement and mobilization of pregnant women and the promotion of MIP services at the community level through religious/traditional leaders, midwives, and coordinated and harmonized IEC/BCC activities.

**SP Procurement:** PMI will procure enough SP for half of the annual need of 780,000 pregnant women in 2013 including handling and distribution costs, with the assumption that UNICEF will fund the remainder. PMI will also provide supplies for direct observed therapy, including cups and water containers. (\$30,000)

**Facility-level service provider training and supervision:** PMI will continue to update supervision and training materials as necessary and assist in implementing the malaria in pregnancy guidelines. PMI will work to ensure that every cadre of health provider is providing appropriate services at ANC visits. PMI will work with partners, including the MOH Reproductive Health Division and the Midwives Association, to expand use of the new in-service FANC training module and increase supportive supervision during IPTp implementation nationally through facility and community outreach activities. The NMCP's 2010 – 2014 master training plan targets 1,930 service providers for training and to date 1,173 (61%) of them have

been trained. As part of its overall M&E plan, PMI will continue to support training and supervision of health workers to complete the IPTp portion of the new MOH health facility reporting form, and to use this information locally to improve IPTp quality and coverage. (\$380,000)

**Policy support for ANC and IPTp:** Religious and traditional leaders will continue to be engaged to accelerate the uptake of the IPTp policy and help encourage pregnant women to seek ANC services early in their pregnancies. PMI will help ensure that the national leadership understands the importance of IPTp and encourages adherence to policies such as the provision of free SP to pregnant women. PMI will support a national consensus building workshop to help change provider behaviors to provide free SP to pregnant women. An assessment of these activities will also be conducted to monitor effectiveness of messages and evaluation of impact. (\$150,000)

**BCC/IEC for ANC and IPTp:** PMI will support a multi-channel strategy targeting pregnant women, women of child bearing age, and men, focusing on knowledge and perceptions related to malaria in pregnancy, women's awareness of risks of malaria during pregnancy, early and frequent ANC attendance at the CSCOMs, early use of IPTp in the second trimester, completion of the recommended two treatments courses of IPTp, ensuring that LLINs are given free to pregnant women at their first ANC visit, and demand creation for proper treatment of malaria in pregnancy. PMI will continue to link BCC/IEC activities with HIV/AIDS messaging where appropriate. (\$150,000)

## **INTERVENTIONS –CASE MANAGEMENT**

### Background:

**Diagnostics:** Mali has updated its case management policy to require that every malaria case should be laboratory confirmed before administering ACTs; where microscopy is not available, rapid diagnostic tests (RDTs) should be used to confirm the diagnosis. However, this policy has not been included in any official memorandum from the MOH and therefore remains largely ignored. Malaria diagnosis in most MOH facilities is based on clinical criteria and according to the 2009 SLIS, fewer than 10% of suspected cases of malaria are laboratory confirmed. This is due in part to the lack of laboratory supplies as well as the user fees patients are charged. Microscopic diagnosis is performed in four national, six regional and 59 district hospitals at a cost ranging between 300 and 2000 FCFA (\$0.75-\$5) per blood smear. In addition to the hospitals providing microscopy, some privately run CSCOMs staffed with physicians and/or lab technicians also perform malaria microscopy. RDTs are provided free of charge to children less than five years of age and pregnant women. The *Institut National de Recherche en Santé Publique* (INRSP) is responsible for quality control of all diagnostic services. The INRSP is currently field testing a comprehensive strategy for quality control of malaria microscopy and RDTs with technical assistance from PMI. The NMCP has recently updated its choice of malaria RDTs to include SD Bioline Malaria Ag Pf and Paracheck Pf. They have also requested a small quantity of pan species RDTs (SD Bioline Malaria Ag Pf/Pan) for use in the northern regions where up to 20% of malaria cases are *P. vivax* or mixed infections.

**Case management:** The MOH revised the national policy for the treatment of uncomplicated malaria to make artemether-lumefantrine (AL) the first-line drug in 2010. An initial stock of Co-Artesiane® (Dafra Pharma) was procured using Global Fund resources, given that it was on the Global Fund's list of approved medications; however this practice has stopped because it is not WHO prequalified. As per national directive, ACTs are free to children less than five years of age and pregnant women in the second and third trimesters. Two regimens are recommended for severe malaria: intravenous quinine or injectable artemether. PMI is supporting the use of pre-referral drugs, including injectable artemether and rectal artesunate, in two districts in Sikasso Region. This pilot deployment will be evaluated in 2011 to assess drug preferences among prescribers, use in pre-referral treatment, community acceptance of alternatives to quinine, and patient outcomes.

Poor geographic and economic access to care is a major challenge for malaria treatment in Mali. With approximately 1,050 CSCOMs in the country, about 88% of the population has geographic access to public health services according to WHO standards (living within 15 km of a first-line health facility). However, the 2006 DHS showed that only 31% of children less than five years of age with fever received any antimalarial, and only 15% were treated the same day or the day following symptom onset. Results of a 2010 survey showed improvement in care seeking for febrile children less than five years of age during the rainy season with 59% seeking care and 23% seeking care the day of or the day following symptom onset, but only 39% of children received an antimalarial and less than 8% received an ACT. Results of the 2009-2010 MICS showed similar results with 20% of children receiving an antimalarial the day of or the day following symptom onset (the type of antimalarial treatment received is not specified in the preliminary MICS report). Unfortunately, ACT stockouts were frequent in the 2010 rainy season, particularly free ACTs for children. PMI is addressing the issue of stockouts with the NCMP and MOH and working to ensure resolution of all reported health facility stockouts prior to the high transmission season.

**Quantification of ACT needs:** Quantification of ACT needs for 2007-2009 was based upon 2005 health facility usage data that suggested that approximately 29% of patients with fever seek treatment at public-sector health facilities. A new ACT quantification was completed for Round 10 Global Fund submission based upon the following assumptions: the incidence rate determined by 2009 reported cases, 90% of population in areas of endemic malaria transmission and 10% in areas of episodic transmission, health facility coverage (% of population within five kilometers of a health facility), 10% of patients testing negative and not receiving treatment, and a 5% buffer stock to avoid stockouts at health facilities.

All Global Fund grants to Mali were suspended in 2010 based on the misuse of funds. The Global Fund is negotiating with the GOM in regards to the investigation and a new principal recipient is being negotiated. However, the disbursement of Round 6 Phase 2 for life saving ACTs and RDTs remains uncertain. The Global Fund is working with partners to procure LLINs for routine distribution and to ensure adequate stocks of ACT until investigations are completed and the Round 10 grant can be awarded to a new principal recipient. The Round 10 grant requests the following quantities; however, until the award is signed PMI may need to respond to PNLP requests for assistance to maintain ACT stocks and award negotiations may increase or decrease the quantity of ACTs procured by the Global Fund.

Age Group	ACT estimated need for 2012 for health facilities	Planned ACTs from Global Fund for 2012	Gap in treatment courses for 2012	ACT estimated need for 2013 for health facilities	Planned ACTs from Global Fund 2013	Gap in treatment courses for 2013
0-3 years	377,936	357,150	20,786	358,361	338,651	19,710
3-5 years	253,126	239,204	13,922	240,015	226,814	13,201
6-14 years	372,328	351,850	20,478	353,043	333,625	19,418
≥15 years	688,606	650,733	37,873	652,939	617,027	35,912
Totals	1,691,996	1,598,937	93,059	1,604,358	1,516,117	88,241

Global Fund financing may provide enough ACTs to cover expected needs at MOH facilities, but these projections are based upon the number of cases presenting to health facilities, which is less than 50% of all malaria cases. In order to attain 85% coverage of febrile children with ACTs, scaling up of community-based treatment will be essential. The ACT distribution system will also need to be supported to meet the increased demands of community-based distribution. The quantities of ACTs needed to support community-based treatment are difficult to project as they depend on the ability of implementing partners to recruit, train, equip, and deploy Community Health Workers (*Agents de Santé Communautaires* or ASCs) to villages more than five kilometers from an existing health facility.

**Community treatment of malaria:** To overcome barriers of access to health services, the MOH adopted an integrated community case management (iCCM) package in February 2010 that includes treatment for malaria, diarrhea, pneumonia, malnutrition, essential newborn care, and family planning. Trained ASCs treat children under five for free including malaria diagnosis with RDTs and treatment with ACTs. PMI is supporting the expansion of iCCM from five to all nine health districts of Sikasso Region. Through funding from Canadian CIDA, Population Services International (PSI) initiated community-based malaria treatment by *relais* in two additional regions in 2010. UNICEF has supported *relais* to deliver health messages and to encourage parents to bring ill children to health facilities, and planned in 2011 to support the implementation of iCCM with trained ASCs in one other region of Mali.

**Supply chain management:** The *Pharmacie Populaire du Mali* manages medicines for Mali's primary health care system. The PPM procures drugs through international tender from qualified suppliers and distributes them to the nine administrative regions. The PPM has no capacity to ensure reliable transportation of commodities to the community health centers or community. Community health center staff pull health commodities from the district pharmacies and community health workers obtain their health commodities from the community health centers. The district pharmacies purchase drugs from regional depots based upon monthly orders from

health facilities (CSREFs and CSCOMs) and the average number of drugs expected to be distributed within the district's catchment area. If a drug is unavailable in the regional PPM stores, private pharmaceutical warehouses can fill orders. There are significant problems with drug storage at district pharmaceutical depots related to storage capacity, humidity, security and drug classification in warehouses. While CSCOMs must collect all required drugs from the district pharmaceutical depots, there is no central funding to support the transportation and logistics.

**Regulation and drug quality:** Several Ministerial decrees provide guidelines for the management of pharmaceuticals in Mali. These include the formation of a national committee to oversee pharmacy retailers responsible for quality control, inspection, licensure and ensuring a basic package of pharmaceutical products. The National Essential Drug List is reviewed bi-annually. Laws are in place to ensure quality control for imported drugs. The *Direction de la Pharmacie et du Médicament* (DPM) issues visas and import licenses only after the exporter meets certification and other requirements. The *Laboratoire National de la Santé* (LNS) samples drugs and verifies quality, and has regulatory authority to monitor pre- and post-market quality of drugs and other products (including insecticides and bednets).

**Pharmacovigilance:** Pharmacovigilance is a high priority of the NMCP and the MOH. Following training in Morocco, the Pharmacovigilance Department at the DPM has developed an action plan, adverse events notification form, and timetable. The plan has been implemented and trainings on adverse events notification and reporting have been conducted up to district level in all the regions except for Kidal region. Adverse events reporting forms have been distributed nationally at all public health facilities but pharmacovigilance reporting is not complete and requires strengthening through supervisory visits.

#### Progress during last 12 months:

Major achievements have occurred in the last 12 months including: development of a national iCCM policy for the treatment of malaria, diarrhea, pneumonia, malnutrition, essential newborn care, and family planning at the community level by trained ASC; improved training in diagnostics and initial implementation of a national quality assurance program for malaria diagnostics; and identification of sub-standard lots of injectable quinine by the PMI-supported minilab system used regionally by the LNS to assess drug quality.

The following issues remain to be solved for improved case management:

- Stockouts of ACTs at CSCOMs remains a major barrier to ensuring timely treatment of malaria at health facilities.
- National policy requiring diagnostic testing for malaria prior to treatment must be disseminated widely and reinforced during supervisory visits.
- Inclusion of dosing and administration information for IV artesunate in national treatment guidelines (currently listed as acceptable alternative)

Training manuals for malaria case management and laboratory diagnosis have been developed and officially adopted. A master training plan on malaria case management and laboratory

diagnosis (microscopy and RDTs) has been developed and training conducted out to the district level. Cascade training in case management at CSCOM level is completed in most of endemic regions with the support from PMI and is continuing in the rest of the country. This training will continue at the community level with the adoption of iCCM.

An on-going challenge in case management will be to support of high quality clinical and diagnostic services at all levels. PMI will support strengthening of formative supervision at all levels of the health systems. Though the MOH has officially adopted iCCM, mobilizing the resources to support implementation at large scale will remain a challenge in case management. Ensuring adequate stock of ACTs, RDTs, SP, and LLINs in all health facilities also remains a challenge.

The NMCP and MRTC initiated supervision of malaria case management practices starting with Bamako and transitioning to other regions. These visits include district reference centers (CSRefs) where the team provides TOT to district health leads to provide supervisory support in their specific district at lower levels in the long term. The team uses supervisory tools developed in collaboration with NMCP, PMI, MRTC and malaria partners which focuses on the proportion of suspected malaria cases tested, adherence to test results when prescribing ACTs, and improving care of patients with severe febrile disease. NMCP and partners expect that these additional supervisory visits will improve case management practices in Mali, especially in Bamako where malaria prevalence is very low.

The PMI has supported collaboration among the NMCP, INRSP, and MRTC to ensure quality training in RDTs and QA/QC after implementation. The NMCP is prioritizing the scale up of RDT use with a QA/QC plan in place. PMI supported refresher trainings on malaria case management for clinicians throughout Mali with an emphasis on laboratory confirmation before treating. PMI will continue to support the NMCP with conducting formative supervision visits to assess the use of the new first-line drug (AL) and newer drugs for severe malaria. INRSP works with the MRTC and the NMCP to conduct QA/QC of malaria diagnostics in health facilities with microscopy and RDTs. The INRSP does not have sufficient staff to accomplish this without additional support from MRTC. Also, in Mali, laboratory technicians may not be comfortable approaching clinicians about inappropriately treating patients who have a negative diagnosis (RDT or microscopy) with an ACT. The NMCP and MRTC staff assist with improving supervision of service providers and clinicians so that quality laboratory results are followed.

Pre-referral treatment for severe malaria (rectal artesunate or IM artemether) was introduced in two districts in 2009 and will be evaluated in 2011 prior to expanding nationwide. PMI trained 64 MOH staff in drug and laboratory quality control at the National Health Laboratory (LNS – *Laboratoire National de Santé*) and in appropriate use of WHO's Model System for Computer-assisted Drug Registration SIAMED software for drug registration and drug import verification. During that training session, a drug quality control plan and a pharmacovigilance plan were developed for nationwide implementation. The DPM, with support from PMI, provided training to health providers at all levels on the notification and reporting of adverse drug events with an emphasis on ACTs.

Proposed activities with FY2012 funding: (\$5,768,000)

PMI will contribute to filling annual needs/gaps in essential malaria commodities including ACTs, RDTs and severe malaria drugs. PMI will continue to support the improvement of malaria diagnosis by microscopy and RDTs through training and supervision as well as the implementation of a national system of quality control for microscopy and RDTs. PMI will also support the scale up of the national iCCM policy including training of ASC and continued support for the community *relais* to carry out BCC/IEC activities.

PMI will work with the MOH to ensure that essential life-saving drugs, including ACTs, are pushed through the system to CSCOMs. PMI has requested the PPM to push the most recent procurement of ACTs to the district depots. An additional public or private mechanism will be sought to continue distribution to CSCOMs as a one-time emergency measure in 2011. PMI will join with partners to ensure that medications, diagnostic kits, and other commodities donated to the MOH are distributed to CSCOMs by strengthening the distribution system and encouraging distribution of commodities at all levels of the health system. PMI will also work with the MOH to ensure appropriate coordination between the DPM and the PPM.

Specific activities to be funded in FY2012 include:

**Procurement of RDTs:** PMI will procure one million RDTs to cover the gap from the Global Fund Round 10 for CSCOMs nationwide and to supply ASCs as part of the national iCCM strategy implementation in Sikasso. (\$1,000,000)

**Procurement of laboratory equipment and consumables:** PMI will procure laboratory equipment and consumables to support microscopy testing in all 59 district hospitals and six regional hospitals. Laboratory consumables (slides, stain, etc.) will also be procured to support the INRSP's national reference laboratory and pre-service training. This amount translates to \$187/site/month for 12 months. (\$150,000)

**Quality assurance/quality control for diagnostics:** In addition to in-service training, PMI will support the NMCP and INRSP to finalize and implement a plan for quality assurance and quality control of microscopy and RDT diagnosis, including regular supervisory visits, systematic review of a predetermined percentage of positive and negative blood smears, and simultaneous use of both tests in a percentage of cases to monitor the quality of RDT diagnosis. The plan will also include QA/QC for the nationwide scale-up for RDT diagnosis. (\$150,000)

**Technical assistance on diagnostics:** A CDC laboratorian or medical epidemiologist will provide technical assistance to refine the quality assurance/quality control plan throughout the health system down to the community level, and recommend best practices for the plan's implementation. (\$12,000)

**Formative supervision of laboratory technicians and clinicians:** To ensure dissemination and implementation of the new policy on laboratory confirmation of malaria diagnosis, PMI will support supervision and on-site training of laboratory technicians and clinicians. The focus of

this training will be on microscopy, RDTs, quality of laboratory services and adherence to test results. (\$100,000)

**Supervision for malaria case management and use of RDTs:** After training health personnel at all levels in case management and diagnosis using rapid diagnostic tests, PMI will continue to support NMCP capacity to conduct quarterly supervisory visits in order to maintain and strengthen the quality of services at multiple levels of the health delivery system. This supervision will focus on health care providers and less on microscopy and quality of laboratory services. (\$450,000)

**Support pre-service training of providers in the Northern regions:** Support the Gao Nursing School to ensure quality pre-service training of nursing students and laboratory technicians in the Northern regions on malaria diagnosis, treatment, and prevention including IPTp. Support will include assessment and revision of the curriculum and teaching materials to ensure they reflect national guidelines, and testing and finalizing the materials. (\$50,000)

**iCCM implementation and scale up:** Support for iCCM implementation in all of Sikasso region's nine districts. This includes continued support to the malaria/fever component of the iCCM package, including original and refresher trainings at district levels, supportive supervision, training in appropriate RDT use, evaluating ASC performance with RDTs, monitoring and evaluations of activities, and provision of ASC materials and supplies. PMI will support ASCs to provide appropriate health communications and BCC messages to encourage understanding and adherence to current treatment algorithms. PMI will continue to support the NMCP 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. (\$1,000,000)

**Peace Corps volunteer to assist with iCCM:** A Peace Corps volunteer will be extended for a third year of service to help with implementation of iCCM in Sikasso Region. (\$20,000)

**Technical iCCM Coordinator:** PMI will support a technical advisor for a maximum of two years assigned to work in the MOH to ensure collaboration and harmonization of iCCM policies, monitoring and evaluation, training materials, supervision, financing, and logistics. This individual will play a critical role in ensuring the coordination needed to scale up iCCM implementation in Sikasso as well as informing further adaption of the national iCCM strategy in other regions. (\$100,000)

**Procurement of ACTs and severe malaria drugs:** PMI will procure 500,000 AL treatments to fill gaps with Global Fund Round 10 ACT procurements and other USAID health programs as well as supporting scale up of community-based ACT distribution. PMI will also continue to procure pre-referral drugs for managing severe malaria, including injectable artemether, rectal artesunate, and oral quinine. (\$1,250,000)

**BCC/IEC for case management:** PMI will continue to support the dissemination of IEC/BCC messages related to case management of malaria through mass media and interpersonal

communication and to harmonize malaria prevention and treatment messages. The strategy will promote care-seeking for febrile children and compliance with treatment regimens. PMI will also support training on treatment of malaria with ACTs at the facility and community levels, and training in ACT compliance monitoring by ASCs. The ASCs and *relais* will also educate care givers on signs of severe malaria that require referral. (\$320,000)

**Logistics strengthening:** PMI will continue to facilitate distribution of PMI-funded ACTs and provide technical assistance for pharmaceutical management, including forecasting and quantifying commodities needs, distribution at central, district, and community levels and improved coordination between the NMCP and PPM. Pharmaceutical and supply chain strengthening activities will also include end-use verification/monitoring of the availability of key antimalarial commodities at the facility and community levels. This will entail regular supervisory/monitoring visits to a random sample of health facilities, community health workers, and regional warehouses to detect and trigger further action on the following critical areas: ACT (or other drug) stockouts; expiration dates of ACTs at health facilities; leakage; anomalies in ACT use; and verifying assumptions on quantification and consumption. (\$500,000)

**Distribution of free commodities from district to CSCOM:** PMI will contract with a local public or private institution to ensure essential malaria drugs and other life-saving commodities are delivered to peripheral health facilities. (\$150,000)

**Drug quality control:** PMI will continue to support testing of ACTs, RDTs, SP, and other malarial drugs upon arrival in country (including drug donations that do not comply with national treatment policies) and post-market drug quality monitoring by the LNS with equipment and technical assistance. Technical assistance to the LNS will also examine quality of insecticides, LLINs, and RDTs. With PMI's support, the minilab drug quality assessment kits have already identified poor quality quinine in the field. Additional support in FY 2012 is needed for follow-up training of the staff in the field, training of the laboratory staff to conduct appropriate confirmatory testing, and equipping the National Reference Laboratory. Technical assistance is also needed to strengthen the drug quality control system at the National Reference Laboratory and funding covers the National Reference Laboratory's participation in two rounds of proficiency testing, laboratory training and an annual technical meeting. (\$290,000)

**Pharmacovigilance:** PMI will continue to support the implementation of a pharmacovigilance plan through the DPM. The pharmacovigilance plan addresses adverse events reporting for all malaria medications, including ACTs and newly introduced drugs for severe malaria (artemether and artesunate). The pharmacovigilance system in Mali is still in its early stages. Mali became a full member of the WHO Drug Monitoring Program in July 2011 marking Mali's on-going commitment to developing a highly functional pharmacovigilance system. PMI funding will contribute to strengthening the system through sensitization campaigns, training of health workers on reporting adverse effects, and subscription to Vigiflow to report to the WHO monitoring center in Uppsala, Sweden. (\$226,000)

## **EPIDEMIC SURVEILLANCE AND RESPONSE**

### Background:

An estimated 1.5 million people in the northern areas of Mali are considered at risk for malaria epidemics. This includes the 13 districts of the Tombouctou, Gao and Kidal Regions and the northernmost districts of Mopti, Segou and Koulikoro, and Kayes Regions. The periodicity of epidemics generally ranges from two to seven years with the most recent epidemic having occurred in 2003. The northern Sahelian region is subject to irregular rainfall amounts, and climatic conditions such as increased rainfall and temperatures appear to play a significant role in the occurrence of epidemics. However, there are no recent data in terms of parasitemia or laboratory-confirmed cases to provide insight into the epidemic nature of malaria in northern Mali. The 2010 Anemia and Parasitemia survey sampled 145 children in the 3 northern regions 17% of whom tested positive for malaria; however, this survey was not powered for regional estimates and this small sample size should be interpreted with caution.

Past NMCP strategic plans included the goal of implementing a system for surveillance, prevention, detection and response to malaria epidemics in the north of Mali; the NMCP is currently reviewing their strategic plan to elaborate a new plan for 2012-2016. Previously identified objectives were to detect 80% of the episodes in the two weeks following their appearance and to control 80% of episodes within two weeks of their detection. In the proposed budget for 2007-2011, \$1.75 million was suggested for epidemic control, but no budget for such activities was included in the National Plan for Accelerated Malaria Control nor in the Global Fund Round 10 budget.

The SLIS, managed by the Planning Unit within the DNS, compiles data on reported malaria cases every three months for the whole country and reports it annually; thus data are not collected frequently enough for timely epidemic detection and response. The WHO-supported Integrated Disease Surveillance and Response system (IDSR), implemented in 2003, collects weekly data on diseases with potential for epidemics. Suspected cases of malaria are reported weekly in this system and data are collected as follows: the CSCOMs report the previous week's data to the CSREFs where they are combined and reported to the Regional and then the National level to the DNS, DPLM and WHO. In the IDSR system, an epidemic is declared when the number of cases doubles from one week to the next and remains at that level or higher during the third week. In addition to case data, rainfall data are also collected in the northern regions as epidemic malaria has been associated with more than 200 mm of rainfall in the north.

### Progress during the last 12 months:

PMI has procured ACTs to be stored at the regional and district hospitals in Tombouctou and Gao. PMI also supported stock rotation of commodities and ACTs positioned in 2011 for epidemic surveillance and response in the North before they expire.

### Proposed activities (listed under M&E):

PMI will provide training to health care providers in epidemic prone areas on microscopy or RDT use, timely reporting, data quality and analysis, and case management. Periodic supervisory visits will verify that the RDTs are performing adequately, data are being reported in a timely fashion, and case management is appropriate in health facilities. This activity is separate from the laboratory diagnostic strengthening. The funding will not support epidemic response.

### **Strengthening epidemic surveillance and response:** (Costs included in the M&E section)

Current malaria prevalence and transmission dynamics in Mali's three northern regions and other epidemic-prone districts are unclear. PMI will strengthen the NMCP's capacity to conduct ESR in these areas including strengthened surveillance and discussions on appropriate epidemic responses. PMI will support the MOH to strengthen the WHO-supported weekly IDSR system, to make sure that only confirmed cases of malaria are reported through this system.

## **CAPACITY BUILDING AND HEALTH SYSTEMS STRENGTHENING**

### Background:

The MOH reports a critical staff shortage of staff at all levels of the public health system, especially for service provision below the national-level. In addition, health workers are not distributed evenly or proportionately throughout the country. The shortage of staff, both in terms of their numbers and level of training, affects the quality of service at each of these levels. The overstretched NMCP headquarters staff has very limited resources to conduct training and supervision at the regional and lower levels. The NMCP office lacks reliable electricity and communications capability that significantly constrains the NMCP's effectiveness. In addition, NMCP and other staff frequently mention the need to upgrade epidemiological and management skills of its staff to improve the level of service.

Entomological capacity is fairly strong both within the MOH and at research institutes such as the University of Bamako's Medical School and MRTC. In 2009, the NMCP recruited a full time entomologist, and has been engaged in the planning, analysis and reporting of all activities supported by PMI, including IRS, entomological monitoring and operations research. The NIH-supported MRTC has over 50 malaria experts including laboratory scientists, epidemiologists and entomologists. It has ongoing collaborations with the NIH, University of California (at Los Angeles and Davis), Johns Hopkins University, Tulane University, Gates Foundation, and the WHO Africa Regional Office.

The quality, completeness and frequency of malaria-specific supervision are starting to improve thanks to joint efforts of PMI implementing partners and MOH divisions involved in malaria control. Since FY2008 PMI has funded efforts to strengthen malaria-focused supportive supervision, including direct funding to the NMCP and other government entities plus technical assistance through PMI's implementing partners. There continues to be limited funding for supervision visits below the district level. Support for monitoring comes through the PRODESS using HIPC or donor funding. District-level teams carry out integrated supervision for all health interventions at CSCOMs, using a supervision guide. National and regional health teams perform integrated supervision more regularly than that focused on malaria.

Challenges for the NMCP include ensuring effective coordination among malaria partners, beginning at the central level, and training new staff s in malaria control. The NMCP also faces additional challenges to its coordination and management functions with the suspension of the Global Fund Round 6 Phase 2 grant and the pending status of the Round 10 grant. In addition, the NMCP occupies a small, deteriorated structure with inadequate space for its 50 employees and poor electricity and internet facilities. A new building has been located, but due to changes within the Ministry, planning activities have been put on hold.

Progress during the last 12 months:

In 2010 and 2011, PMI contributed substantially to building capacity of the NMCP and other GOM entities (including MRTC and the Ministry of Social Development) through direct funding of specific activities. PMI provided this direct funding based on demonstrated capacity to manage US Government funds appropriately.

<b>Malian Government Entity</b>	<b>Activity Supported</b>
National Malaria Control Program (NMCP)	Supervise LLIN distribution, train and supervise health workers on case management, and disseminate the malaria monitoring and evaluation plan; collaborate with PPM and DPM in forecasting and managing distribution of malaria commodities; coordinate technical and supervisory activities with the Division of Reproductive Health; report and disseminate data for program planning through district-level meetings.
National Center for Information and Communication in Health (CNIECS)	Coordinate and monitor implementation of the malaria communications plan.
Division of Public Hygiene and Safety (DHPS)	Strengthen coordination with the NMCP on district-level IRS operations
Directorate of Reproductive Health	Train and supervise health workers on IPTp, evaluate LLIN distribution and IPTp practices in antenatal clinics, support collaborative MIP approaches with the Mali Midwives Association.
Directorate of Pharmacy and Medicines (DPM)	Train and supervise health agents who prescribe ACTs at all levels to recognize and notify about adverse events
National Pharmacy (PPM)	Assess practices, inform key partners about proper ACT and other malaria commodities procurement and distribution, and conduct supervision in their capacity as Central Medical

Malian Government Entity	Activity Supported
	Store.
Malaria Research and Training Center (MRTC)	Completed operational research on larviciding during the rainy season and IRS near the Niger River; support entomological monitoring and surveillance activities in IRS districts; conduct in vivo drug efficacy monitoring for ACTs, assist with impact assessment meta-analysis; analyze effect of IPTp on birth outcomes; support NMCP and INRSP in improving diagnostic quality and adherence to test results in case management
National Health Laboratory (LNS)	Train pharmacists and laboratory technicians and implement test for quality control for LLINs and malaria medicines, support implementation of the pharmacovigilance plan
National Institute of Public Health Research (INRSP)	Train CSREF laboratory technicians and regional pharmacists on malaria diagnostics; establish and oversee implementation of malaria diagnostics quality assurance/quality control.
Directorate of Social Development	Train social development agents at the national and regional levels on malaria communications strategies, train school teachers and pupils on malaria prevention.

Other sections of the MOP describe on-going capacity building in all interventions through training, supervision, and on-the-job training in technical, operational and management practices by PMI in-country and headquarters staff and implementing partners. At the time of writing, the MOH had not yet developed a renovation plan for a new office. PMI will continue to encourage efforts to accelerate the renovation, and will consider supporting the renovation with other partners once the plan is in place and needs are clearly identified.

Proposed activities with FY2012 funding: (costs covered in other sections)

PMI will continue its strong focus on building technical and managerial capacity at all levels of the health care system, both through implementing partners and direct support to the NMCP and other government partners. Most inputs in training, supervision and operational support are described elsewhere in the MOP.

**Strengthening NMCP functions:** To help the NMCP reach its coverage targets for key malaria interventions, PMI will continue collaboration with other partners to support NMCP structure and staff, specifically to increase capacity at all levels to plan, implement, supervise, forecast commodity needs; improve distribution systems; coordinate with partners; and monitor and

evaluate malaria prevention and control activities. The new NMCP entomologist will be trained in IRS-related entomological monitoring and insecticide resistance management activities by MRTC. Strengthening NMCP managerial capacity will be critical as PMI supports scale-up of all interventions. In-country and headquarters PMI staff and implementing partners will continue to provide on-the-job training and support to improve NMCP management and coordination capacity (costs covered in ITN, IRS, CM, and ESR sections).

**Direct support to the NMCP and other government partners:** Support will continue in FY2012 for assisting the NMCP and other government partners to conduct training and supportive supervision in all malaria program interventions supported by PMI. These activities are described in the table above and in the various subsections of the MOP. In FY2012, PMI will continue training and mentoring NMCP staff to increase their skills in data analysis, interpretation and reporting of findings both from routine supervision and other data sources such as large household and health facility surveys. Scopes of work for implementing partners will include provision, whenever feasible, for collaborating with the NMCP in building staff managerial and technical capacity. New areas for direct support in FY2012 to MRTC include funding for district-level refresher training and supervision in diagnostics, evaluation of dual insecticide nets, mapping of insecticide resistance and mosquito biting behavior, and strengthening of capacity in epidemic surveillance and response (costs covered in ITN, IRS, CM, and ESR sections).

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

### Background:

The NMCP was established in 1993 and, until July 2007, remained under the oversight of the Disease Control Division of the National Health Directorate (DNS). In July 2007, the GOM elevated the NMCP to the Directorate level in the MOH organizational chart, and the NMCP Directorate was officially established in April 2008. The MOH through the NMCP Directorate guides and coordinates all malaria control activities. The NMCP director supervises one administrative and four technical divisions, and reports directly to the Secretary General of Health. With this higher profile, the NMCP can influence decision making about malaria control more effectively, including development of MOH work plans and budgets.

The NMCP establishes strategies for all malaria interventions, coordinates research, proposes policies, norms and guidelines, and develops and oversees implementation of partner work plans. The NMCP also supports decentralized regional and district health teams through training and supervision. The NMCP cites coordination of partner and donor efforts as its biggest challenge, given the increased number of partners interested in malaria control. The NMCP seeks better mechanisms for ensuring that partners share information on the timing and nature of key activities.

Communications among malaria control partners in Mali are coordinated through the NMCP partners meetings, through the Technical and Financial Partners' Forum, and through the Global Fund Country Coordinating Mechanism (CCM). Malaria control is part of the national sector-wide approach, a strategic Ten Year Plan for Social and Health Development Plan as

operationalized through a five-year health development program (PRODESS). The Plan is supported by the Financial and Technical Partners' Forum, which meets monthly to share information on ongoing programs, new initiatives, strategies, and policies, to coordinate interventions, and to help leverage resources.

In relation with Global Fund support to Mali, the CCM has 25 members including nine from the public sector, nine from civil society and private sector including people affected by the diseases, and six representatives from the donor community. The CCM holds quarterly meetings and can call extraordinary sessions as needed. The CCM chairperson and deputy chair are elected for a two-year term that can be extended only once. The CCM oversees all three Global Fund target diseases: HIV/AIDS, tuberculosis, and malaria. In 2009, the Global Fund Office of the Inspector General was alerted about suspected misuse of Global Fund financial resources in Mali. Following a long investigation, the Global Fund suspended its grants to malaria and TB. As a result, the NMCP looked to PMI to help fill the gaps in malaria commodities including ACTs and RDTs. Currently, the Global Fund IG is working to award a new principal recipient and is negotiating with the GOM in regards to payback of misappropriated funds. The status of disbursements of life-saving ACTs and RDTs, however, are uncertain under the suspension phase.

Starting in November 2009, the NMCP and partners began monthly meetings to monitor the progress of the NMCP annual work plan. The NMCP maintained its working relations with local and international NGOs, and with private sector players, mainly with the Associations of Employers and Business Owners (or *Patronnat du Mali*) and the Chamber of Commerce (both with support from the Mali Voices Project), the Malian singers, the mining companies, private medical practitioners in clinics, laboratories, and pharmacies, and with net vendors.

## **PRIVATE SECTOR PARTNERSHIPS**

The NMCP has a long-established collaboration with bed net vendors in the country. Recently it has partnered with the Association of Employers and Business Owners (*Patronnat du Mali*), and is making efforts to collaborate with the mining industry in regards to IRS and ITNs and with private medical clinics, pharmacies and laboratories in regards to diagnosis and case management with ACTs. With the country's well-established net culture, net vendors in Mali enjoy a big market in both urban and rural areas. The NMCP is planning to organize information sessions targeting representatives of net vendors to ensure they import and sell long-lasting ITNs at affordable price.

Partnership with the *Patronnat* is about three years old now and has benefited from advocacy activities with the Mali Voices Project. The members of the *Patronnat* hold malaria prevention awareness events and pledge to provide free nets to their employees and their family dependents.

Private clinics, pharmacies and laboratories are opening up in country with a larger presence in urban areas. To date, the NMCP has provided them with diagnosis and malaria case management information based on country guidelines. The NMCP plans to train and supervise their personnel in order to ensure they understand and apply the national directives related to malaria diagnostics and treatment.

The mining industry is among the rare fast-growing industries in Mali. Currently, at least five mining companies are supporting IRS activities in their employees' residence sites and neighboring villages. PMI will continue to facilitate a dialogue between the NMCP and the mining companies to ensure that they adhere to national and international IRS standards, and to promote introducing best practices such as entomological surveillance.

Proposed PMI support for FY 2012: (Costs covered under case management & coordination)

**Collaboration with private sector for LLINs:** Given Mali's net culture, PMI will maintain communication with LLINs private vendors and encourage their work targeting more affluent members of the general population (no additional costs incurred to PMI).

**Collaboration with mining companies:** There are opportunities for PMI to support collaboration with mining companies in malaria control. Currently, companies in five mining areas (Karana, Morila, Loulo, Sadiola, Yatela) are implementing IRS in employee residences sites and neighboring villages, and new mining companies are starting business in Mali. Given the NMCP's ambitious plan to expand IRS to more than 80% of the endemic south in the next five years, PMI will facilitate the dialogue between mining companies and NMCP (no costs incurred).

**Collaboration with private clinics, pharmacies and laboratories:** The potential of improving malaria diagnostics and case management through private clinics, private laboratories, and pharmacies is immense. Currently, private clinics administer malaria treatment based on clinical symptoms only, and pharmacies deliver drugs to virtually anyone who requests an anti-malarial. In line with both WHO guidelines and MOH directives on parasitological confirmation, PMI will facilitate the dialogue between the NMCP and the private practitioners to include them in training and supervision (no additional costs incurred to PMI).

## **BEHAVIOR CHANGE COMMUNICATIONS**

### Background:

PMI and other partners IEC/BCC activities are coordinated and led by the *Centre National d'Information, Education et Communication pour la Santé* (CНИЕCS). In 2011, PMI supported the CНИЕCS's review of the national malaria communication strategy. The strategy includes year-round LLIN utilization, community mobilization for IRS, early uptake of ANC services including appropriate management of malaria in pregnancy, and promotion of prompt care seeking for fever, especially among children less than five years of age. As policies are modified and updated, it will be critical to ensure that target populations understand, adopt desired preventive behaviors, and seek appropriate services for malaria control.

PMI is supporting the BCC/IEC strategy development at all levels, ensuring consistency of messages and appropriate use of all communication channels and target audiences. At national level, malaria control in Mali received support from the Mali Voices Project, which was

successful in bringing Malian singers and business owners to engage in malaria control. UNICEF is active in the design and development of training materials and their dissemination.

Progress during last 12 months:

PMI has targeted BCC efforts to highly influential persons, such as religious leaders. A policy dialogue tool on malaria, pregnancy and Islam, developed in 2010 with PMI support, has been used with the Islamic Network for Child Survival, the Islamic Network for Population Development, and the National Union of Muslim Women. The tool is based on passages from the Koran that encourage dialogue among couples about malaria and pregnancy.

In addition to the relais, PMI has supported the introduction of Community Health Workers or ASC, a new cadre of health workers providing a full package of integrated case management services at the community level as well as supporting BCC/IEC and door to door health promotion visits. Specific to malaria control, in addition to using RDT for case confirmation and management, the ASC conducts door-to-door home visits, checks the status of LLIN use, disseminates malaria prevention among pregnant women, and keeps up awareness about the disease. In addition, PMI is supporting the dissemination of a variety of pre-tested counseling materials and radio spots in local languages, as well as facilitated interpersonal communication through community groups. PMI partners developed subcontracts with different radio stations and teachers' training centers, and have trained over 7,500 Youth Ambassadors against Malaria (YAAM). The Young Ambassadors are school pupils trained and equipped to disseminate malaria prevention messages at school, in their families, and community. The 2011 World Malaria Day saw the official launch and scaling up of YAAM approach, presided over by the US Ambassador and the GOM Ministers of Health and Education.

Proposed activities with FY2012 funding: (costs referenced in other sections)

PMI will work at the national level to support the CNIECS to support BCC/IEC at all levels and ensure consistency in technical messages and appropriate targeting of audiences. PMI will work with other partners to explore ways to promote desired behavioral outcomes. PMI and partners will continue to include schools, NGOs, and religious leaders in targeted BCC/IEC activities and messages. Where appropriate, PMI will link BCC/IEC activities with HIV/AIDS.

Among the interventions, some key components include (each technical area is referenced in the appropriate section with related costs):

**BCC/IEC of ITNs:** Support for BCC/IEC activities will reinforce the correct use of bed nets throughout the year. While reported net usage is high during the high transmission season, efforts are needed to maintain high usage during the low transmission season. Identifying the remaining barriers to correct hanging, use and maintenance of nets and promoting year-round use is extremely important to help meet NMCP and PMI goals. PMI will support innovative ways to combine tracking of LLINs with targeted BCC messages, emphasizing the necessity to continue sleeping under LLINs during the dry seasons. PMI will identify multi-channel strategies to design, develop and communicate this information, including door-to-door message dissemination by *relais* in their communities. BCC/IEC coordination among PMI and NMCP partners at the national and community levels is even more critical in Year 5 to ensure correct

and consistent use of nets, uniformity of messages from various interventions, regular monitoring, and subsequent reorientation as needed.

**IEC/BCC messaging to community:** PMI will support development of communication approaches and messaging to provide accurate understanding and behaviors related to IRS. PMI will support the development of specific information around IRS by CНИЕCS, linking IRS to malaria prevention best practices, in line with the NMCP communication strategy. These efforts are not intended to replace house-to-house mobilization which allows rapid and efficient movement of household effects before, during, and after spraying each house.

**BCC/IEC for ANC and IPTp:** PMI will support a multi-channel strategy targeting pregnant women, women of child bearing age, and men, focusing on knowledge and perceptions related to malaria in pregnancy, women's awareness of risks of malaria during pregnancy, early and frequent ANC attendance at the CSCOMs, early use of IPTp in the second trimester, completion of the recommended two treatments courses of IPTp, ensure a LLINs are given free to pregnant women at their first ANC visit, and demand for proper treatment of malaria in pregnancy. PMI will continue to link BCC/IEC activities with HIV/AIDS messaging where appropriate.

**BCC/IEC for case management:** PMI will continue to support the dissemination of IEC/BCC messages related to case management of malaria through mass media and interpersonal communication and to harmonize malaria prevention and treatment messages. The strategy will promote care-seeking for febrile children and compliance with treatment regimens. PMI will also support training on treatment of malaria with ACTs at the facility and community levels, and training in ACT compliance monitoring by ASCs. The ASCs and *relais* will also educate care givers on signs of severe malaria that require referral.

## MONITORING AND EVALUATION

### Background:

The MOH's Planning and Statistical Unit oversees all monitoring and evaluation (M&E) activities, in close collaboration with health training and research institutions. As part of the reorganization of the NMCP, the GOM created the Division of Planning and Monitoring and Evaluation, which is tasked with developing operational plans and monitoring and evaluating program implementation. The Division of Epidemiological Surveillance and Research is in charge of promoting research on malaria, establishing an early warning system to detect and respond to malaria epidemics, and supporting operational units in epidemic response.

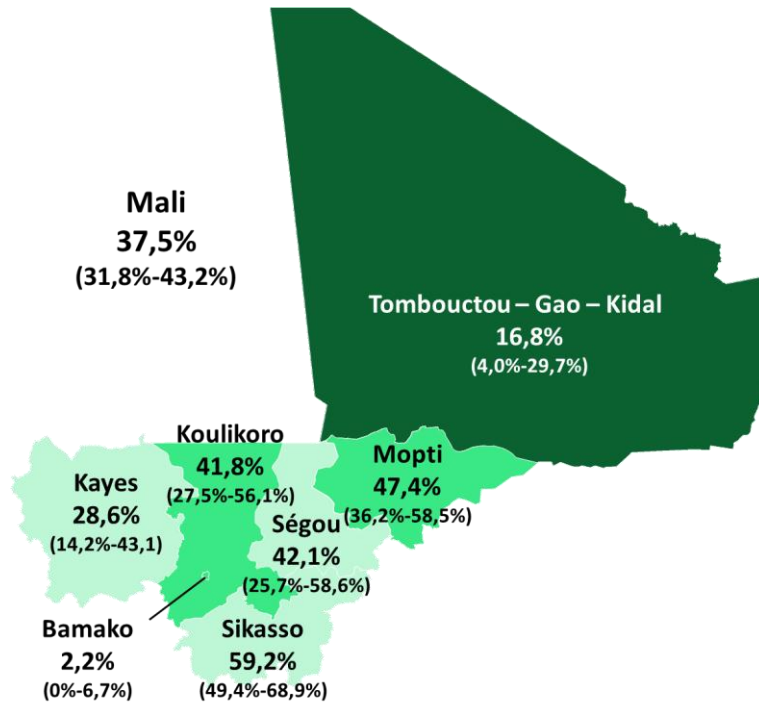
A National Malaria M&E plan was developed, adopted and costed in 2008, and subsequently disseminated nationwide. This plan will be reviewed during the next year as part of the review of the National Strategic Plan for 2012-2016. The current plan includes collection and analysis of routine data through the health information system known as *Systeme Local d'Information Sanitaire* (SLIS), implementation of sentinel sites for malaria surveillance, and periodic national surveys to evaluate malaria prevention and treatment activities. The quality of routine data collection, analysis and reporting through the SLIS is variable and feedback is not delivered in a

timely manner to assist program planning and management. Because so few cases of malaria are laboratory confirmed (10%, SLIS 2009), SLIS data are unreliable as an indicator of malaria prevalence.

To supplement the SLIS, the NMCP proposed establishing sentinel sites for enhanced malaria surveillance to monitor trends in suspected and laboratory-confirmed cases of malaria over time in five malaria transmission zones. Supporting five of these sites from 2009-2010, PMI worked with the NMCP and MRTC to develop a training manual and a protocol; provided microscopes, slides, reagents, and RDTs to laboratory confirm all suspected malaria cases. The five sites reported case-based data on suspected and laboratory-confirmed malaria cases directly to the NMCP. After withdrawal of PMI support these sites continue to confirm a high percentage of malaria cases, but monthly data transmission to the NMCP has stopped.

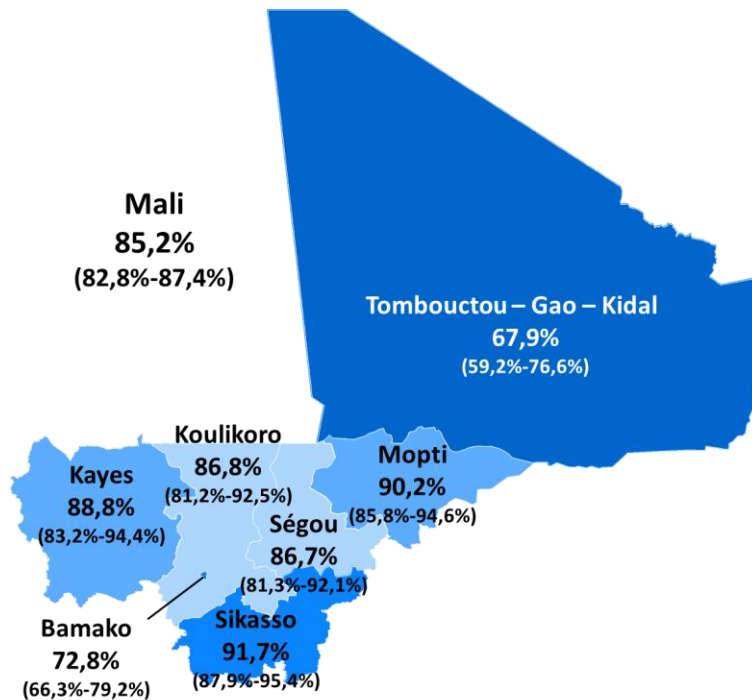
Population-based surveys currently provide the most accurate data on malaria in Mali. A national Anemia and Parasitemia (A&P) survey conducted with PMI support in 2010 during the peak transmission period (Sept-Oct) showed that 38% of children 6-59 months of age were parasitemic and 85% were anemic (hemoglobin <11g/dL). The parasitemia results are baseline rainy season estimates. While there are somewhat high levels, given the high rates of LLIN use, they could actually have been much lower than pre-PMI intervention had earlier nationwide measures been available for comparison. The 2010 A&P survey had a sample size designed for nationwide prevalence estimates, and therefore regional estimates should be viewed with caution.

**Malaria parasite prevalence by microscopy in different regions of Mali, Anemia and Parasitemia Survey 2010\***



\*Survey not powered for regional estimates; 95% confidence limits included in parathenses

**Anemia prevalence (<11g/dL) by regions of Mali, Anemia and Parasitemia Survey 2010\***



\*Survey not powered for regional estimates; 95% confidence limits included in parathenses

The 2009-2010 MICS showed that 72% of children 6-59 months of age were anemic (hemoglobin <11g/dL). Discrepancies between the two anemia estimates might be attributable to the timing of the two studies - the MICS was conducted from December 2009 - August 2010 and did not include the peak malaria transmission period of September-November. A demographic and health survey (DHS) is planned for 2011, which will provide mortality estimates and incorporate a malaria module including parasitemia and anemia. PMI will support a Malaria Indicator Survey (MIS) in 2013 to provide an additional rainy season measure of parasitemia and anemia for continued program monitoring. This measure is essential because the DHS will collect data for 6-9 months and the parasitemia estimate derived from the DHS will not be comparable to the A&P rainy season estimate.

#### Progress during last 12 months:

Supporting the data collection and analysis needs of the NMCP is essential to ensuring optimal program management. Several data collection tools and parallel instruments to the SLIS were proposed by WHO, World Bank, and other donors. These data collection tools were harmonized and have been field tested by the NMCP with PMI assistance. The new data collection tool will be incorporated into the routine quarterly reporting of the SLIS and will include suspected and confirmed malaria cases, LLINs distributed in vaccination and prenatal care visits, and stockouts of SP, LLINs, ACTs, and severe malaria drugs. National review of the SLIS reporting form is planned for June 2011, with implementation in 2012.

The PMI has been working to strengthen the SLIS in terms of reliable timely and complete reporting, comprehensive analysis of data and evidence-based programmatic decision making. When PMI began working with the SLIS in 2008 the 2006 SLIS data were not yet available. This two year delay in reporting hindered program planning and evaluating program performance. With PMI support the SLIS has become timely – the 2009 SLIS was distributed in June 2010, and the 2010 SLIS was distributed in June 2011 – and SLIS data are frequently discussed at strategic meetings. To date, a PMI implementing partner has developed, piloted, and implemented a malaria data page for the new SLIS reporting form that will provide data on recent policy changes including laboratory confirmation of malaria diagnosis, distribution of LLINs in routine care, and information on stockouts of key malaria commodities. Preliminary results show that the form has increased data quality and timely and complete reporting. The MOH plans to incorporate the form into the routine reporting system.

The 2009-2010 MICS and 2010 A&P survey provided the NMCP with essential information on LLIN ownership and use, timeliness of antimalarial treatment, prevalence of anemia and parasitemia. Ownership and use of LLINs has increased between 2006 and 2010. In 2006, only 50% of households owned an LLIN with 27% of children less than five years of age and 29% of pregnant women sleeping under an LLIN. In 2010, the A&P reported that 85% of households owned an LLIN and 70% of children less than five years of age and 63% of pregnant women slept under an LLIN. Parasitemia, anemia, and antimalarial treatment indicators are discussed in other sections of the MOP. Data on IPTp access from the MICS were not included in the preliminary report.

Proposed activities with FY2012 funding: (\$2,090,000)

**Support to 2013 MIS:** The PMI country team will provide technical guidance and financial support for the preparation and implementation of the 2013MIS. This survey will provide a follow-up measure of rainy season anemia and parasitemia that will be comparable to the 2010 A&P estimate and provide subnational estimates down to the regional level. It will also provide the NMCP with a mid-point estimate of other important programmatic indicators (LLINs use, treatment of fever with ACTs) between the two DHS surveys in 2011/2012 and 2016. (\$1,000,000)

**Strengthening the SLIS and data quality assessment:** PMI has supported strengthening of the SLIS including training, supervision, and routine data reconciliation since 2008. PMI support to the SLIS has greatly improved the timeliness of the annual report – allowing the NMCP to use 2010 data in the elaboration of the 2012-2016 Strategic Plan. This year, a data quality assessment will be completed to evaluate the quality of data reported to the SLIS and to identify weaknesses in reporting that may require new attention from PMI and other partners. (\$300,000)

**On-going M&E technical assistance to NMCP:** Support for assistance to the NMCP and partners will continue for general M&E capacity building and routine reporting. PMI will assist in the revision of the National M&E Plan in 2011 and FY2012 funds will be used to support priorities as outlined in that document. (\$150,000)

**SLIS reporting and dissemination:** PMI will provide funding to the NMCP to coordinate training, supervision and assessment for a new system of reporting and disseminating data for program decision making through quarterly district-level meetings to coincide with SLIS meetings. A portion of the funds will also be used to support quarterly meetings at the district level where peripheral health facilities will share data with the district health team on key indicators, including data on confirmed malaria cases and stocks of malaria commodities such as drugs, LLINs, SP, RDTs and other laboratory reagents. District teams will compile monthly data on quarterly basis and send reports to the regions that in turn will inform the national SLIS database. In addition, district health teams will provide feedback at these meetings to peripheral health centers on the quality of data received at the previous meeting in order to promote quality data collection and data-driven decision-making. (\$100,000)

**Dual insecticide-treated net operational research:** Due to the increasing prevalence of pyrethroid resistance in entomological surveillance sites in Mali, an operational research project will deploy dual insecticide-treated nets (LLINs with two different classes of insecticide impregnation) in one district and compare the impact of the dual-treated nets on the entomological inoculation rate (EIR), prevalence of insecticide-resistant mosquitoes, and prevalence of parasitemia and anemia in the district with the dual-treated nets vs. the same indicators in a control district with traditional LLINs and similar malaria transmission. This will inform PMI about the potential ability of this new variety of LLIN product to affect transmission of malaria in areas with high pyrethroid resistance. A small portion of the funds PMI contributes for nets will be used to procure dual insecticide-treated nets for this study. (\$260,000)

**Entomological monitoring at 10 sites:** Ten entomological surveillance sites in ten health districts were established in 2007 and maintained by the NMCP and MRTC with funding from WHO/AFRO and the Bill and Melinda Gates Foundation. Funding for these sites ended in 2011. These sites have demonstrated considerable variation in resistance to DDT and pyrethroid insecticides. Given the widespread deployment of millions of LLINs in Mali, it will be necessary to continue monitoring the evolution of pyrethroid resistance and examine alternative insecticide products for use in IRS and other applications. Building on the existing platform and baseline data from these sites will result in substantial cost savings to PMI over initiating entomological surveillance at new sites. (\$130,000)

**Strengthening epidemic surveillance and response:** (See the activity description in the Epidemic Surveillance and Response section.) (\$150,000)

## **PEACE CORPS AND PMI COLLABORATION**

With the official launch of the Peace Corps-PMI collaboration in April 2012, PMI Mali and its partners see an excellent opportunity to extend support to PMI-supported interventions especially at the community level. Of nearly 200 volunteers in country, 27 are currently health volunteers with the CSCOMs, where they have participated in child health campaigns and education on malaria in pregnancy. Approximately 15% of volunteers request to stay an additional year, providing an excellent pool of skilled, experienced individuals to focus on malaria. Under the new initiative, volunteers will focus on malaria prevention efforts such as LLIN distribution and promotion and malaria in pregnancy education and communications; they will not be engaged in PMI-supported IRS activities.

For FY2011, the Peace Corps and PMI offices in Mali will support the assignment of a Response or Third-Year Volunteer initially to help plan and implement malaria activities for PC volunteers, and create networks (including electronic resources) among volunteers to share information and updates. PMI has reprogrammed FY2011 funds to cover a portion of the volunteer's support and work expenses.

Proposed FY2012 Activities (costs included in case management section)

**Peace Corps Malaria Volunteer support :** PMI will continue to support two Malaria Peace Corps Volunteer housed with a implementing partners and focusing on scale up of iCCM in Sikasso and M&E activities, as well as assisting with training and updates for other volunteers in country. Support will cover housing, work-related transportation and computer support.

## **STAFFING AND ADMINISTRATION**

USAID and CDC have each hired a health professional serving as Resident Advisor to oversee PMI activities in Mali. The CDC Resident Advisor left Mali in September 2010 and will be replaced in August 2011. In addition, one FSN technical advisor and a Program Management Assistant have been hired to support the PMI team. The current workload requires the hiring of one additional FSN technical advisor. All PMI staff members are part of a single inter-agency

team led by the Mission Health Officer. The PMI team shares responsibility for development and implementation of PMI strategies and work plans, coordination with national authorities, managing collaborating agencies and supervising day-to-day activities.

The PMI professional staff work together to oversee all technical and administrative aspects of the PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, and reporting of results. The CDC Resident Advisor is supervised by CDC both technically and administratively. All technical activities are undertaken in close coordination with the MOH/NMCP and other national and international partners, including the WHO, UNICEF, the Global Fund, World Bank, and the private sector.

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

**Table 1****Year 5 (FY12) Budget Breakdown by Partner\* (\$25,500,000)**

<b>Partner Organization</b>	<b>Geographic Area</b>	<b>Activity</b>	<b>Budget</b>
ATNPlus	Nationwide	Provide new and refresher training to service providers, and conduct post-training supervision. Support NMCP capacity in supervision.	500,000
DELIVER	Nationwide	Procurement of LLINs, SP, lab consumables, RDTs and ACTs	10,673,000
TBD	Regional	Pre-service training on case management, diagnostics, and IPTp for the 3 northern regions	50,000
HPP	Nationwide	Advocacy for IPTp	150,000
TBD	Nationwide	Support implementation of IVM plan and develop plan to mitigate insecticide resistance	100,000
MCHIP	Nationwide	Coordinate and lead iCCM scale up planning efforts in Mali.	100,000
MEASURE Evaluation	Nationwide	Strengthening SLIS, TA for M&E support	450,000
MEASURE DHS	Nationwide	Support MIS implementation in 2013	1,000,000
MOH (NMCP, EPI, DPM, INRSP, LNS, DSR, PPM, CNI ECS)	Nationwide	Capacity building, training and supervision, M&E (NMCP), EPI strengthening of tracking nets, net forecasting, capacity building (NMCP+ EPI Section), pharmacovigilance (DPM), quality assurance/control for laboratory diagnostics (INRSP), drug quality control (LNS), BCC/IEC (DSR, Midwives Association), logistics strengthening (PPM), Oversight and coordination of BCC/IEC for LLINs, IRS, CCM targeting the community	866,000
MRTC	Nationwide	Support entomological monitoring Provide refresher training on microscopy and RDT; Evaluation of effectiveness of dual insecticide on nets; Mapping insecticide resistance and mosquito biting behavior; Support ESR capacity in 3 northern regions	840,000
Peace Corps	Nationwide	Participate in the implementation of iCCM in Sikasso	20,000
IRS2 TO4	Nationwide	IRS commodities and operational costs, NMCP capacity building	5,100,000
SAVE	Regional	Implementation of iCCM in all 9 Districts of Sikasso	1,000,000
SIAPS	Nationwide	MIP, CM logistics management	500,000
USP/PQM	Nationwide	Drug quality control ; pharmacovigilance	400,000
TBD	Nationwide	IEC/BCC for LLINs, IPTp and Case Management	750,000
TBD	Nationwide	LLINs Distribution; LLINs supply management, tracking and forecasting; Distribution of other malaria commodities from Districts to CSCOMs	1,600,000
CDC IAA	Nationwide	TA for IRS, diagnostics, case management, benefits of in-country CDC PMI advisor (1)	411,000
USAID Mali Mission	Nationwide	Salaries, benefits of in-country USAID PMI staff (1 PSC/2 FSN), contribution to salaries and benefits of Mission support staff, IT support costs, office space, vehicle, attendance at PMI retreat, other Mission program support costs, local costs for CDC PMI advisor.	990,000
<b>Total</b>			<b>25,500,000</b>

**President's Malaria Initiative – Mali**

**Table 2 Planned Obligations for FY2012 (\$25,500,000)**

<b>Proposed Activity</b>	<b>Mechanism</b>	<b>Budget</b>	<b>Geographic Area</b>	<b>Description of Activity</b>
<b>PREVENTIVE ACTIVITIES</b>				
<b>LONG-LASTING INSECTICIDE-TREATED NETS</b>				
LLIN Procurement	DELIVER	8,100,000	Nationwide	Procurement of 1,300,000 LLINs to complement other donor contributions and contribute to LLIN delivery through routine services targeting children under five and pregnant women
		(8,100,000)		
Distribution of LLINs	TBD	1,350,000	Nationwide; specific regions	Distribution of LLINs through a mass campaign and routine services to children <1 and pregnant women.
		(1,350,000)		
Procurement of dual-insecticide treated nets and LLINs for operational research project	DELIVER	143,000	20-30 villages	Procurement of dual-insecticide treated nets and traditional LLINs for operational research project exploring impact of dual-insecticide treated nets on malaria transmission and parasite prevalence.
		(143,000)		
LLIN supply management, tracking, and forecasting	TBD	100,000	Nationwide	Inventory of routine nets at health facilities
LLIN logistics strengthening	NMCP	40,000	Nationwide	Strengthening NMCP in LLIN logistics management, focusing on net tracking, coordination of donor inputs, and improving delivery systems from the district to CSCOM levels
IEC/BCC for LLINs	TBD	300,000	Nationwide	Support IEC/BCC strategy harmonization and message design, including national CНИЕCS malaria communication plan, and conduct supervisory visits to monitor its implementation
	CНИЕCS (through NMCP)	50,000		
<b>INDOOR RESIDUAL SPRAYING</b>				
Indoor Residual Spraying	IRS2 TO4	5,100,000	3 districts	Procure IRS equipment (insecticide, sprayers, etc.), training, implementation, data collection, protocols, guidelines, IEC/BCC, logistic assessment, technical assistance for spraying/entomological assessment (CDC IAA). Technical assistance from CDC entomologist for monitoring IRS implementation.
	CDC IAA	(1,500,000)		
		24,000		
Entomological Monitoring	MRTC	200,000	3 districts	Conduct entomological monitoring for one spraying round. Support

	NMCP	20,000		the NMCP entomologist in conducting IRS-related entomological monitoring. Strengthen capacity of DHPS to provide coordination with NMCP on district IRS operations
	DHPS (through NMCP)	40,000		
Integrated vector strategy development and implementation	TBD	100,000	Nationwide	Support the development, implementation, and coordination of Mali's IVM plan.
<b>SUBTOTAL: Preventive</b>		<b>\$15,567,000</b>		
<b>MALARIA IN PREGNANCY</b>				
SP procurement	DELIVER	30,000	Nationwide	Procurement of SP needs for half of 700,000 pregnant women, as well as cups and water containers.
		(30,000)		
Facility level service provider training and supervision	ATNPlus DSR/Midwives (through NMCP)	300,000	Nationwide	Provide new and refresher training to service providers, and conduct post-training supervision. Support Midwife Association to increase awareness about IPTp and free SP provision.
		80,000		
IPTp Policy/Advocacy	HPP	150,000	1 district	Work with traditional leaders (Imams) in reinforcing advocacy tool to encourage adherence to policies such as the provision of free SP to pregnant women to improve care and utilization of services at regional and district levels. Include assessment activities to improve and expand initiative. Include an evaluation of impact of messages
IPTp IEC/BCC	TBD	150,000	Nationwide	Support efforts to harmonize strategies and design focused messages to promote free SP distribution.
<b>SUBTOTAL: Malaria in Pregnancy</b>		<b>\$710,000</b>		
<b>CASE MANAGEMENT (INCLUDING DIAGNOSTICS)</b>				
Procurement of RDTs	DELIVER	1,000,000	Nationwide	Procure 1 million RDTs to cover gap not covered by Global Fund.
		(1,000,000)		
Procurement of lab consumables	DELIVER	150,000	Nationwide	Procure consumables for microscopy testing for 60 CSREFs.
		(150,000)		
Quality assurance/quality control for diagnostics	INRSP (through NMCP)	150,000	Nationwide	Support implementation of QA/QC plan for RDT and microscopy diagnostics, including supervision. Provide technical assistance on refinement of QA/QC plan and best practices for implementation.
	CDC IAA	12,000		

Formative supervision of laboratory technicians and clinicians	MRTC	100,000	Nationwide	Provide on-site formative supervision on microscopy and RDTs and integration with case management at the district level and selected lower level health facilities.
Supervision for malaria case management	ATNPlus	200,000	Nationwide	Support formative supervision visits of trained clinicians at all levels, and refresher training as needed.
	NMCP	250,000		
Training on case management, diagnostics, IPTp in the Northern regions	TBD	50,000	Northern regions	Support Gao Nursing School in pre-service training of case management, diagnostics, IPTp for the Northern 3 regions.
Implementation of community case management	Save the Children	1,000,000	Sikasso region	Implement integrated community case management activities in Sikasso region
Peace Corps Volunteer (PCV) for iCCM	Peace Corps	20,000	Sikasso region	Coordinate the implantation and scale up of iCCM in Sikasso.
Technical iCCM coordinator	MCHIP	100,000	Nationwide	Coordinate and lead iCCM scale up efforts in Mali.
Procurement of malaria drugs - ACTs and severe malaria	DELIVER	1,250,000	Nationwide	Procure AL and severe malaria drugs for health facilities and community case management.
		(1,250,000)		
BCC/IEC for case management	TBD	300,000	Nationwide	Support harmonization of messages and communications approaches for case management; implement through <i>relais</i> , train on referral systems at the community level. Support CНИЕCS capacity to develop and implement communications approaches and messaging for case management.
	CНИЕCS (through NMCP)	20,000		
Logistics strengthening	SIAPS	500,000	Nationwide	Facilitate distribution of ACTs and strengthen pharmaceutical management and supply chain strengthening at the national, district and community levels
Distribution from district to CSCOM	TBD	150,000	Nationwide	Ensure commodities go from district to CSCOM
Drug quality control	PQM	250,000		Support testing of the quality of ACTs, RDTs, SP upon arrival in country and support post-market quality control. Also include testing the quality of insecticides on the LLINs distributed in the countries (with the LNS)
	LNS (through NMCP)	(100,000)		
		40,000		
Pharmaco-vigilance	PQM	150,000		Continue support to the implementation of the pharmacovigilance plan developed with PMI funding
	DPM (through NMCP)	40,000		
	CNAM (through NMCP)	36,000		
<b>SUBTOTAL: Case Mgmt</b>		<b>\$5,768,000</b>		

<b>MONITORING AND EVALUATION AND MALARIA SURVEILLANCE</b>				
Support 2013 Malaria Indicator Survey (MIS)	Measure DHS	1,000,000	Nationwide	Support MIS implementation and expenses in 2013
Routine system strengthening and data quality assessment	MEASURE Evaluation	300,000	Nationwide	Evaluate data quality of SLIS and IDSR. Support training and quality control/timeliness for completion of routine SLIS reporting forms, assist in analysis and feedback on malaria indicators and promote use of findings at all levels to improve program performance.
Ongoing TA support for M&E activities at the NMCP	MEASURE Evaluation	150,000	Nationwide	Support NMCP to analyze SLIS and IDSR data for decision making
SLIS reporting, dissemination, and response	NMCP	100,000	Nationwide	Support the reporting and dissemination of data for program decision making through district-level quarterly meetings
Dual insecticide net operational research	MRTC	260,000 (10,000)	20-30 villages	Evaluate the effectiveness of dual insecticide nets on EIRs and parasite prevalence because of increasing pyrethroid resistance. Net distribution costs (\$10,000) included as commodity.
Entomological monitoring	MRTC	130,000	Nationwide	Mapping insecticide resistance and mosquito biting behavior in Mali
Strengthening of epidemic surveillance and response	MRTC	150,000	Nationwide	Strengthen capacity for conducting ESR in three northern regions and other epidemic-prone districts
<b>SUBTOTAL: M&amp;E</b>		<b>\$2,090,000</b>		
<b>IN-COUNTRY MANAGEMENT AND ADMINISTRATION</b>				
In-country staff; Program Administration Expenses	USAID	990,000	Nationwide	Salaries, benefits of in-country USAID PMI staff (1 PSC/2 FSN), contribution to salaries and benefits of Mission support staff, IT support costs, office space, vehicle, attendance at PMI retreat, other Mission program support costs, local costs for CDC PMI advisor
In-country staff; Admin. Expenses	CDC	375,000	Nationwide	Salaries, benefits of in-country CDC PMI advisor (1), attendance at PMI retreat.
<b>SUBTOTAL: Mgmt. and Admin.</b>		<b>\$1,365,000</b>		
<b>GRAND TOTAL</b>		<b>\$25,500,000</b>	<b>53% on commodities</b>	

