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

**PRESIDENT'S MALARIA INITIATIVE**

**Malaria Operational Plan — FY 2012 (Year 5)**

# GHANA

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**ABBREVIATIONS**

| | |
|---|---|
| ACT | Artemisinin-based combination therapy |
| AGA | AngloGold Ashanti Mining Company |
| AMFm | Affordable Medicines Facility - Malaria |
| ANC | Antenatal care |
| AS/AQ | Artesunate-amodiaquine |
| AL | Artemether-lumefantrine |
| BCC | Behavior change communication |
| BCC strategy | National Behavior Change Communication Strategy |
| BCS | Behavior Change Support Project |
| BEST | Best practices at scale in the home, community and facilities |
| CBA | Community-based agent |
| CCM | Country Coordinating Mechanism |
| CDC | Centers for Disease Control and Prevention |
| CHIM | Center for Health Information Management |
| CHPS | Community-based Health Planning and Services |
| CHV | Community health volunteer |
| CMS | Central medical stores |
| DfID | Department for International Development, UK |
| DHAP | Dihydroartemisinin-piperaquine |
| DHIMS | District Health Information Management System |
| DHIS2 | District Health Information System |
| DHS | Demographic and Health Survey |
| EPA | Environmental Protection Agency, Ghana |
| FBO | Faith-based organization |
| FDB | Food and Drugs Board |
| FELTP | Field Epidemiologic and Laboratory Training Program |
| FRHP | Focus Region Health Project |
| FSN | Foreign Service National |
| FY | Fiscal Year |
| Global Fund | The Global Fund to Fight AIDS, Tuberculosis and Malaria |
| GHI | Global Health Initiative |
| GHS | Ghana Health Service |
| GMP | Good Management Practices |
| HCW | Health care workers |
| HIV/AIDS | Human immunodeficiency Virus/Acquired Immune Deficiency Syndrome |
| iCCM | Integrated community case management |
| IDSR | Integrated disease surveillance and response system |
| IEC | Information, education and communication |
| IMaD | Improving Malaria Diagnostics project |
| IPTp | Intermittent preventive treatment of pregnant women |
| IRS | Indoor residual spraying |
| ITN | Insecticide-treated net |
| LCS | Licensed chemical sellers |

| | |
|---|---|
| LLIN | Long-lasting insecticide-treated net |
| M&E | Monitoring and evaluation |
| MICS | Multiple Indicator Cluster Survey |
| MIP | Malaria in pregnancy |
| MOH | Ministry of Health |
| MOP | Malaria Operational Plan |
| NHIS | National Health Insurance Scheme |
| National Strategic Plan | Strategic Plan for Malaria Control in Ghana 2008-2015 |
| NGO | Non-governmental organization |
| NMCP | National Malaria Control Program |
| NMIMR | Noguchi Memorial Institute of Medical Research |
| OTSS | Outreach Training and Supportive Supervision |
| PEPFAR | President's Emergency Plan for AIDS Relief |
| PMI | President's Malaria Initiative |
| PPME | Policy, Planning, Monitoring and Evaluation |
| RBM | Roll Back Malaria |
| RDT | Rapid diagnostic test |
| RFA | Request for Applications |
| SP | Sulfadoxine-pyremethamine |
| SSDM | Stores, Supplies and Drug Management |
| TA | Technical assistance |
| UNFPA | United Nations Population Fund |
| UNICEF | United Nations Children's Fund |
| USG | United States Government |
| USP | United States Pharmacopeia |
| USAID | United States Agency for International Development |
| 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 Human immunodeficiency Virus/Acquired Immune Deficiency Syndrome (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 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 fiscal year (FY) 2014. Programming of PMI activities follow the core principles of GHI: encouraging country ownership and investing in country-led plans and health systems; increasing impact and efficiency through strategic coordination and programmatic integration; strengthening and leveraging key partnerships, multilateral organizations, and private contributions; implementing a woman- and girl-centered approach; improving monitoring and evaluation; and promoting research and innovation.

Malaria is a major public health concern in Ghana with the entire population of 24.2 million at-risk. More than 3 million cases of clinical malaria are reported in public health facilities each year, of which 900,000 cases are in children under five years. Despite this, significant progress in malaria control is being achieved in Ghana through the combined efforts of the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund), PMI, and other partners.

Ghana became a PMI country in December 2007. Large-scale implementation of malaria interventions began with FY2008 funding and has progressed rapidly with support from PMI and other partners. This FY2012 Malaria Operational Plan is based on progress over the previous three years and was developed with the participation of the National Malaria Control Program (NMCP) and national and international partners involved with malaria prevention and control in the country. The activities that PMI is proposing to support with FY 2012 funding fit well with the Ministry of Health's (MOH) *Strategic Plan for Malaria Control in Ghana 2008–2015* (National Strategic Plan) and complement funding from other donors. The proposed PMI funding of $27.01 million for FY2012 will be focused on the following areas:

**Insecticide-treated Nets (ITNs):** Ghana's National Strategy calls for universal coverage (one net for every two people) with long-lasting insecticide treated nets (LLINs) by early 2012. PMI is Ghana's primary development partner providing technical assistance for LLIN distribution. The principal development partners supplying LLINs in Ghana are PMI, the Global Fund and the United Kingdom's Department for International Development (DfID). These partners procured and delivered to Ghana 5.6 million LLINs between 2009 and 2010 and an additional 8.5 million are pledged to be procured in 2011. PMI is procuring approximately 1.9 million nets in FY2011 to be used to achieve universal coverage for a new cohort of pregnant women and infants, and to begin the process of replacing worn out nets. PMI is also funding technical assistance, logistical

support, and community mobilization for the universal coverage campaigns. With FY2012 funding, PMI will procure approximately 1.3 million LLINs for distribution through routine systems to replace worn out ITNs and maintain coverage of vulnerable populations. In addition, PMI will provide technical assistance for planning and logistics to strengthen Ghana's routine distribution systems and will continue to support behavior change communication (BCC) activities at the national and local levels to promote net ownership and usage.

**Indoor residual spraying (IRS)**: Ghana's National Strategic Plan calls for a rapid scale up of IRS, building on the successful programs supported by PMI in Northern Region and the AngloGold Ashanti (AGA) Mining Company in the Obuasi District of Ashanti Region. The PMI-supported IRS program is building national capacity and expanded spray operations to nine districts in 2011. IRS activities supported by PMI include pesticide procurement, environmental assessment and compliance monitoring, insecticide resistance monitoring, community mobilization, spray operations, data collection and reporting. PMI-supported IRS protected 926,699 persons in 2011 and achieved 92% coverage of sprayable structures. With FY2012 funding, PMI will continue to support IRS in all nine districts in the Northern Region and will continue to support entomologic and environmental monitoring and build capacity in IRS planning, operations and supervision. PMI will also assist the Global Fund/AGA program to expand IRS activities across the north.

**Intermittent preventive treatment in pregnant women (IPTp)**: The National Strategic Plan target is for 100% of all pregnant women to receive at least two doses of Sulfadoxine-pyremethamine (SP) by 2015. In 2008, the Demographic Health Survey (DHS) reported that 78% of pregnant women attend ANC clinics four or more times in Ghana and this strong ANC attendance positions Ghana well to make gains in IPTp coverage. PMI has been the NMCP's primary partner supporting training in malaria in pregnancy, including IPTp. Over the past year, PMI has supported the Ghana Health Service (GHS) to conduct malaria in pregnancy (MIP) pre-service training at 31 midwifery and community health nursing schools and to conduct in-service training for 7,497 health care workers (HCW). PMI has continued to integrate MIP BCC messages into United States Agency for International Development's (USAID) maternal and child health program and is continuing community mobilization through non-governmental organizations (NGOs), community health volunteers (CHV) and other health officers and groups. With FY2012 funding, PMI expects to strengthen MIP services at ANC through on-site supportive supervision and quality improvement and to continue to strengthen the pre-service training of nurses and midwives, and to expand these services to schools for other relevant cadre of health worker. PMI will continue to support BCC activities to increase early and regular attendance at ANC and full adherence to IPTp.

**Case management**:
*Diagnostics* — A major objective of the NMCP is to improve the care of individual patients by promoting rational use of artemisinin-based combination therapies (ACTs) and to strengthen diagnostics. During the past year, PMI funding provided four rounds of Outreach Training & Supportive Supervision (OTSS) reaching 240 clinical laboratories. In addition, PMI donated 725,000 rapid diagnostic tests (RDTs) to bridge a gap in Global Fund shipments and trained over 7,015 clinicians to accurately diagnose malaria with RDTs. With FY2012 funding, PMI

proposes to procure additional laboratory equipment, as necessary, and continue to build capacity for microscopy and RDT use.

*Treatment* — Widespread and prompt access to safe and effective antimalarials is a cornerstone of malaria control in Ghana. To help ensure that Ghana can provide this level of care, PMI has collaborated with the GHS in training over 7,513 HCWs in updated case management protocols and to strengthen pre-service training at 31 midwifery and community health nursing schools during the past year. PMI is also providing technical assistance to identify strategies for launching community case management of malaria. With FY2012 funding PMI expects to fill gaps in antimalarial medications, support pre-service training in malaria case management, support community case management, and use BCC to improve malaria care and treatment-seeking behavior.

*Pharmaceutical management* — Despite evidence of progress, there continues to be a need to maintain support for commodity availability, quality and rational use. PMI is continuing to support strengthening of the pharmaceutical management system to ensure availability and appropriate use of malaria commodities including ACTs and RDTs as well as strengthening drug quality monitoring capacity. An end-use verification activity in seven regions identified strengths and weaknesses in the logistical system and a drug quality monitoring exercise uncovered substandard and counterfeit drugs and took action to remove the drugs from the market. With FY2012 funding, PMI will continue to strengthen logistics and supply chain systems and strengthen the drug management capacity. PMI support will also continue to improve drug quality monitoring capacity in collaboration with the Food and Drugs Board (FDB).

**Integration with other Global Health Initiative programs**:
The USG supports integrated health programs in Ghana to strengthen health systems while addressing specific goals in maternal and child health, nutrition, reproductive health, water and sanitation, malaria and HIV/AIDS. The USG works at the community, district, and regional levels to encourage positive behavior change, improve the quality of service delivery, and improve health management systems across the full spectrum of health elements. In FY2012 PMI will support USG efforts to strengthen health system commodity supply chains, strengthen training institutions for midwives, support the NMCP roll out of community-based care, and improve laboratory systems.

**Capacity building and health system strengthening**:
The NMCP in Ghana was established to operate at the national and zonal levels and work with the regional and district-level GHS staff to implement malaria programs. The NMCP expanded its staff and capacities over the past year to lead Ghana's growing malaria program but there is a continuing need to support more intensive management and strengthen coordination of activities. During the past year, PMI focused on supporting the capacity of the GHS and NMCP to utilize community volunteers as health outreach workers through training and technical assistance. PMI continues to make significant contributions to health system strengthening in the areas of supply chain management, laboratory quality assurance, drug quality testing, and routine health data management among others. In FY2012, PMI proposes to continue this support to improve management systems for supervision in approximately 60 districts and to support the networking

of NMCP's central office with zonal offices. Further, PMI is requesting additional support for supervisory visits and monitoring activities by NMCP and GHS officials to strengthen overall malaria management and supervision efforts.

**Communication and coordination with other partners**:
The principal health sector donors include the Royal Netherlands Embassy, the Danish International Development Agency, DfID, the Global Fund, the World Bank, Japan International Cooperation Agency, United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), World Health Organization (WHO) and the African Development Bank. During the past year, PMI and the NMCP successfully integrated their planning processes to produce one consolidated work plan for all their activities and allowed for all development partners to assess gaps and contribute more easily to the NMCP's strategic priorities. In addition, USG staff played an important role in ensuring effective oversight of Ghana's Global Fund grants for malaria. PMI is also working with the Peace Corps to plan joint interventions under a new collaboration. A key objective in FY2012 will be to revive the Roll Back Malaria (RBM) Coordinating Committee to better coordinate the ITN, Vector Control, Communication, Home Management of Malaria and Case Management sub-committees.

**Behavior change communication**:
Ghana has a relatively well developed media infrastructure, with national television coverage, over 100 small radio stations which together cover most of the country, and the print media with a few national-level publications. Awareness among the general population about malaria is fairly high, however many misconceptions about malaria and malaria interventions persist. With FY2012 funding, PMI will support community mobilization, mass media, and other communications activities to dispel misconceptions and to promote LLIN use, IPTp uptake, prompt diagnosis, and treatment with ACTs. The BCC activities will be linked with related malaria control activities such as LLIN distribution campaigns. Additionally, PMI will strengthen the integration of behavior change messaging in the health care setting to strengthen the role of the HCW as an active promoter of malaria interventions.

**Monitoring and evaluation (M&E)**: The main sources of routine health information in Ghana are the GHS new open-sourced District Health Information System (DHIS2), Integrated Diseases Surveillance and Response System (IDSR), and the NMCP's enhanced parallel surveillance system that collects specific data on LLIN distribution and IPTp coverage as well as other Global Fund supported activities. National surveys also provide data on health and the most recent DHS was conducted in 2008. PMI is supporting a Multiple Indicator Cluster Survey (MICS) in 2011 that will include malaria indicators. PMI has also supported the implementation of the NMCP's M&E plan through a variety of capacity building activities and is conducting a study to assess whether one or two annual rounds of IRS are necessary in Northern Ghana. For FY2012, PMI proposes to continue to strengthen GHS and NMCP routine systems, support the 2013 nationwide DHS survey, monitor antimalarial drug efficacy at multiple sites, and implement the end-user verification survey.

## INTRODUCTION

### Global Health Initiative

Malaria prevention and control is a major foreign assistance objective of the U.S. Government (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through the GHI, the United States will help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns and children. The GHI is a global commitment to invest in healthy and productive lives, building upon and expanding the USG's successes in addressing specific diseases and issues.

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

### President's Malaria Initiative

The President's Malaria Initiative (PMI) is a core component of the GHI, along with HIV/AIDS, and tuberculosis. The PMI was launched in June 2005 as a 5-year, $1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, funding for PMI has now been extended through FY2014 and, as part of the GHI, the goal of the PMI has been adjusted to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. This will be achieved by 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).

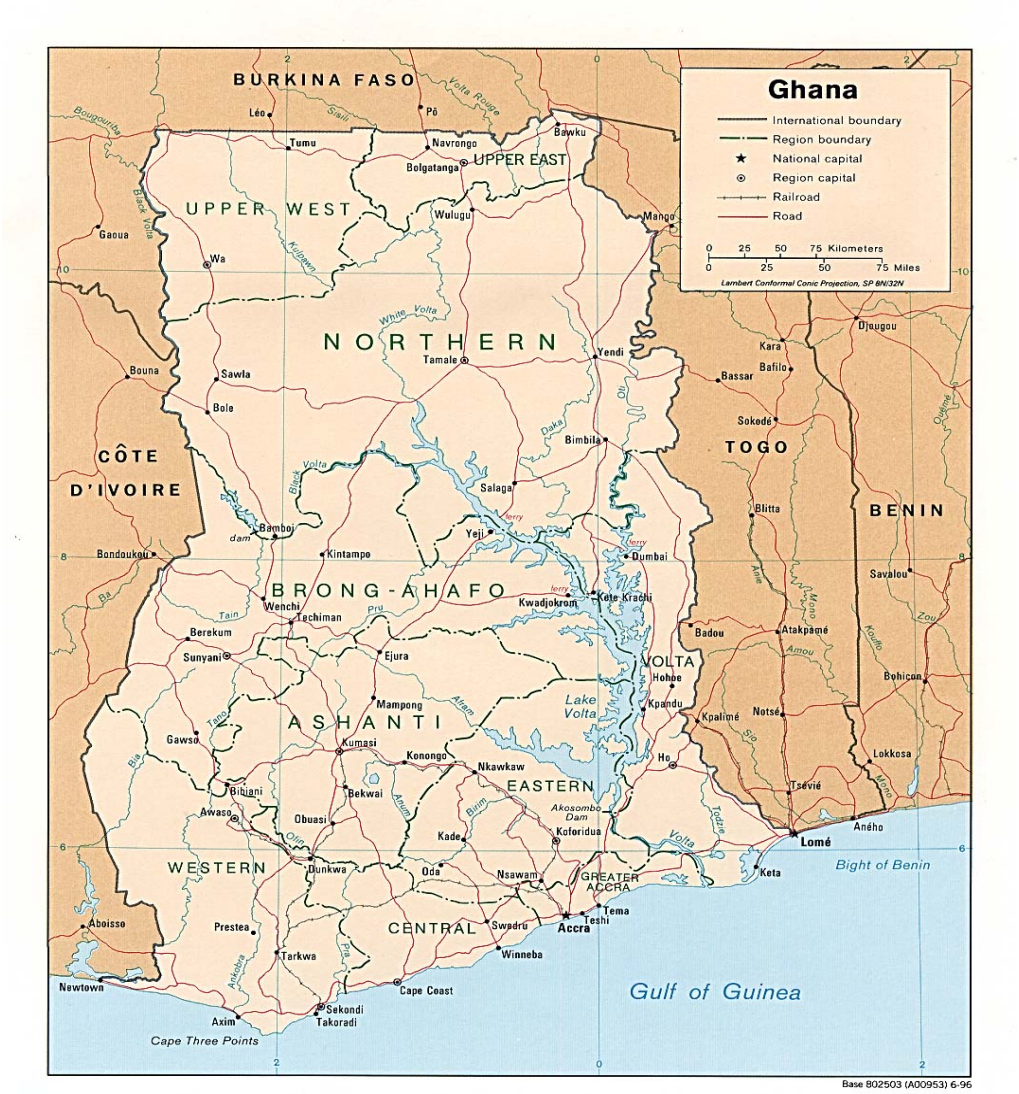
Ghana was selected as a PMI country in FY2007. Large-scale implementation of ACTs and IPTp began in 2008 and has progressed rapidly with support from PMI and other partners. Artemisinin-based combination therapies and IPTp are now available and being used in all public health facilities nationwide. More than 4.8 million long-lasting insecticide treated nets (LLINs) have been distributed with PMI support in the last four years and 950,000 residents are under IRS protection.

This FY2012 Malaria Operational Plan presents a detailed annual implementation plan for Ghana, based on the PMI Multi-Year Strategy and Plan and the National Malaria Control Program's (NMCP's) 7-Year Strategy. It was developed in consultation with the NMCP and with the participation of national and international partners. The activities that PMI is proposing to support build on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund malaria grants. This document briefly reviews the current status of malaria control policies and interventions in Ghana, 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.

## MALARIA SITUATION IN GHANA

Malaria is hyperendemic in all parts of the country. Ghana's entire population of 24.2 million is at risk of malaria, although transmission rates are lower in some urban areas. Transmission occurs year-round with seasonal variations. According to the Ghana Health Service (GHS) health facility data, malaria is the number one cause of morbidity, accounting for about 38% of all outpatient illnesses, 36% of all admissions, and 33% of all deaths in children under five years. Between 3.1 and 3.5 million cases of clinical malaria are reported in public health facilities each year, of which 900,000 cases are in children under five years. An estimated 14,000 deaths in children under five were attributable to malaria in 2008. The verbal autopsy component of the 2008 Demographic and Health Survey (DHS) household survey found that malaria accounted for 43% of all deaths in children aged 29 days to 5 years, and that roughly half of the deaths in children under five occurred at home.

Ghana can be stratified into three malaria epidemiologic zones: the northern savannah; the tropical rainforest; and the coastal savannah/mangrove swamps. The major vectors are *Anopheles gambiae* and *An. funestus*. These species generally bite late in the night, are indoor resting, and are commonly found in the rural and peri-urban areas where socio-economic activities lead to the creation of breeding sites. PMI, in collaboration with the Noguchi Memorial Institute for Medical Research (NMIMR), has documented high rates of outdoor biting (typically >50% out biting pre-IRS) in the northern savannah. *Anopheles melas* is found in the mangrove swamps of the southwest and *An. arabiensis* in savannah areas of northern Ghana. Northern Ghana experiences pronounced seasonal variations with a prolonged dry season from September to April. The normal duration of the intense malaria transmission season in the northern part of the country is about seven months beginning in April/May and lasting until September.




**Current Status of Global Fund Malaria Grants and other partners**

The NMCP is currently implementing a consolidated Global Fund grant, with total commitments for 2004-2016 of $140 million. Funding past 2013 will be contingent upon performance. The Round 4 Rolling Continuation Channel grant, awarded in 2004 and 2009, is focused on scaling up prompt and effective treatment of malaria at health facilities, expanding IPTp for all pregnant women, and scaling up universal coverage of ITNs. A Round 8 grant was added in 2009 to scale-up integrated community case management (iCCM) (referred to as home-based care in the Round 8 grant). An Affordable Medicines Facility- malaria (AMFm) component was added in 2010 to provide subsidized ACTs through public and private channels. The AMFm is an unproven two-year pilot program which hopes to drive out monotherapies and substandard medications through market forces. In June 2010 these various smaller grants were merged into one "consolidated malaria grant," managed by the Ministry of Health (MOH) as the common principal recipient.

A $130 million, five-year Round 8 malaria grant was awarded to AGA Malaria Foundation to expand IRS coverage into approximately 40 districts in various regions, but predominantly in the

north. Although the grant was signed in November 2009, implementation was delayed until July 2011 due to an impasse over tax exemption, which has now been resolved.

In addition to the Global Fund, other major malaria control partners in Ghana include the World Health Organization (WHO), UNICEF and DfID. WHO plays an ongoing consultative and facilitative role in a range of technical and strategic areas. In 2010, DfID procured and supported distribution of 2.3 million LLINs through a grant to UNICEF and DfID has pledged an additional 2 million LLINs for 2011. The Chinese and Cuban governments have also made significant recent donations in the areas of larviciding and ACTs.

**National Malaria Control Plan and Strategy**

The MOH and the GHS collectively oversee both the public health and clinical care sectors in Ghana. The MOH exercises oversight and control over policy formulation and monitoring and evaluation (M&E) of progress in achieving set targets. GHS is responsible for delivery of public health and clinical services, in parallel with the three teaching hospitals in Accra, Kumasi, and Tamale. The GHS operates at four levels: national, regional, district, and sub-district. There are over 320 hospitals, 760 health centers, and 1,120 clinics in the country. Of these, 83% are in the public sector and 9% are faith-based institutions, most of which are closely integrated with the GHS. The remaining 8% of facilities in the private sector are located primarily in the larger cities. The penetration of the GHS services at the community level is variable. In many rural areas, networks of government-trained CHVs are active. Approximately 5% of Ghanaians also have access to community health nurses through the innovative Community-Based Health Planning and Services (CHPS) program. A major recent development in health system financing is the National Health Insurance Scheme (NHIS), implemented since 2006, which has increased attendance at health facilities.

The NMCP which falls under the GHS is headquartered in Accra, with zonal offices in Accra and Kumasi. In June 2008, the NMCP led the development of a revised National Strategic Plan, which calls for a 75% reduction in malaria (morbidity and mortality) by the year 2015 (using 2006 as the baseline). The primary interventions supported in the National Strategic Plan include:

1. Universal coverage with ITNs (targets: 1 ITN available per 2 persons by 2013, and 85% of children under five years and pregnant women sleeping under an ITN by 2015);
2. Rapid scale up to cover one third of the country with IRS (target: 90% of all structures in targeted districts are covered); and
3. IPTp with Sulfadoxine-pyremethamine (SP) (target: 100% of pregnant women receiving at least two doses of IPTp by 2015).
4. Early diagnosis of malaria using microscopy or rapid diagnostic tests (RDT) (target: originally allowed for empiric diagnosis in under 5s, but amended in 2009 to aim for universal testing as soon as practicable);
5. Prompt and effective treatment with ACTs (target: 90% of patients with uncomplicated malaria will be correctly treated using ACTs at public and private facilities by 2015).

During the FY2012 PMI Malaria Operational Plan development process, discussions with the NMCP/GHS and other stakeholders identified several priority areas that would benefit from PMI attention in the 2012-13 timeframe. Supply chain bottlenecks were identified as a cross-cutting

challenge. Procurement challenges faced by the NMCP in 2009-2011 (most notably affecting LLINs, RDTs, and SP) were caused by Global Fund implementation problems. The grant had enjoyed "A" ratings in 2003-2008, but is now facing low burn rates of <10% and a "C" rating. Other priority areas identified included:

- Establishing approaches for sustaining LLIN coverage following the LLIN mass distribution campaigns
- Managing insecticide resistance
- Strengthening malaria diagnosis, especially operationalization of RDTs
- Increasing IPTp provision rates by health facilities (to match high ANC attendance)
- Resolving implementation bottlenecks in community/home management of malaria

## CURRENT STATUS OF MALARIA CONTROL INDICATORS

The most recent DHS was carried out in July–October 2008. Between the 2003 and 2008 DHS surveys, the United Nations Children's Fund (UNICEF) conducted a Multiple Indicator Cluster Survey (MICS) in August–October 2006 and used the MICS methodology in a survey conducted in three northern regions in 2007. Less nationally representative data are also available from NMCP surveys conducted in 2007 and 2008, which were weighted toward the districts and regions that received focused support from the Round 2 and Round 4 Global Fund grants. The 2008 DHS data provide the baseline for key PMI indicators. A MICS with a full malaria module is planned for 2011 and will provide data for PMI in Ghana after three full years of implementation.

Ghana has achieved steady gains in many of the key malaria intervention indicators. Between 2003 and 2008 ITN ownership and use, uptake of IPTp, and treatment with ACTs have all increased significantly (Table 1 details the national level increases in the key indicators). However, significant regional differences in the coverage of key interventions demonstrate that efforts to scale up interventions must continue for Ghana to achieve Roll Back Malaria (RBM), PMI and national targets.

In the 2008 DHS, ITN ownership averaged 33% nationwide but varied from 47% in the Upper East Region to a low of 20% in the Greater Accra Region. The largely rural Northern Region had only 27% ITN ownership and was the focus of PMI net distributions in 2010. Coverage with IPTp2 was 44% nationally but varied from a high of 64% in Brong Ahafo Region to 26% in Upper East Region.

| Table 1. Recent Estimates of Malaria Indicators | | | |
|---|---|---|---|
| **Indicator** | **2003 DHS** | **2006 MICS** | **2008 DHS** |
| Proportion of households with one or more ITN | 3% | 19% | 33% |
| Proportion of children under five years old who slept under an ITN the previous night | 4% | 22% | 28% |
| Proportion of pregnant women who slept under an ITN the previous night | 3% | NA | 20% |
| Proportion of women who received two or more doses of IPTp during their last pregnancy in the last two years* | 0 | 28% | 44% |
| Proportion of children under five years old with fever in the last two weeks who received treatment with ACTs* | NA | 3% | 12% |

*ACTs were adopted in 2004; SP was adopted for IPTp in 2003.

## GOALS AND TARGETS OF THE PRESIDENT'S MALARIA INITIATIVE

The goal of PMI is to reduce malaria-associated mortality by 70% compared to pre-Initiative levels in the 15 original PMI countries and to reduce malaria-associated mortality by 50% in new countries added to PMI in FY2010 and later. By the end of 2014, PMI will assist Ghana to achieve the following targets in populations at risk for malaria:

- >90% of households with a pregnant woman and/or children under five will own at least one ITN;
- 85% of children under five will have slept under an ITN the previous night;
- 85% of pregnant women will have slept under an ITN the previous night;
- 85% of houses in geographic areas targeted for IRS will have been sprayed;
- 85% of pregnant women and children under five will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the last 6 months;
- 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and
- 85% of children under five with suspected malaria will have received treatment with ACTs within 24 hours of onset of their symptoms.

## EXPECTED RESULTS – YEAR FIVE

*Prevention:*

- The proportion of households with one or more ITNs is expected to increase significantly nationwide to 85%
- The proportion of children under five years of age who slept under an ITN the previous night is expected to increase to 65%
- The proportion of pregnant women sleeping under an ITN the previous night will have increased to 65%
- Over 95% of the houses targeted for IRS will have been sprayed

*Treatment*

- Proportion of children under five years of age with fever in the last two weeks who received treatment with ACTs will have increased to 30%

## INTERVENTIONS — PREVENTION ACTIVITIES

### Insecticide-Treated Nets (ITNs)

Background

Ghana's National Strategy calls for universal coverage with LLINs, (one net for every two people), with specific targets to 1) increase the proportion of the general population sleeping under an ITN to 80%, 2) increase household ownership of at least one ITN to 100%, and 3) increase the number of children under five and pregnant women sleeping under an ITN to 85% by 2015. From 2002 through 2009, the NMCP embraced a mixed model of ITN distribution but results were disappointing with only 33% ITN ownership being reported in the 2008 DHS. Beginning in 2010, the NMCP and its partners are focusing on a "catch up" strategy of rolling free mass distribution campaigns targeting universal coverage of LLINs in all ten regions by early 2012. This strategy will distribute approximately 14 million LLINs that are either currently in the country or are expected to arrive within the next 10 months.

The LLINs are distributed through a program of door-to-door visits by community volunteers in each region. These door-to-door visits include a hang-up element that has been tested through the initial targeted distribution campaign in the Northern Region in May, 2010. The remaining series of free distribution campaigns will target the regions with the most need first and ending with a net distribution campaign in Greater Accra. The following table outlines the general campaign timing:

| YEAR | MONTH | REGION | COVERAGE | STATUS |
|---|---|---|---|---|
| **2010** | May | Northern Region | Targeted <5, and Pregnant women | Completed |
| | November | Eastern Region, 10 districts | Universal Coverage | Completed |
| **2011** | May | Eastern Region, 11 districts | Universal Coverage | Completed |
| | June-August | Volta, Central, Western | Universal Coverage | In process |
| | November | Upper East, Upper West, Northern, Ashanti | Universal Coverage | Planned |
| **2012** | 1st Half | Brong Ahafo, Greater Accra | Universal Coverage | Planned |

PMI is the primary development partner providing technical assistance for LLIN distribution and a major partner supplying LLINs to Ghana, along with the Global Fund and DfID. Over 5.6 million LLINs were procured for Ghana in 2010 and an additional 8.3 million LLINs are pledged to be procured in 2011. The following table outlines the LLINs procured and expected:

**LLIN delivered and pledged by donor**

| Donor | 2010 (procured) | 2011 (pledged) | 2012 (pledged) |
|---|---|---|---|
| **PMI** | 630,000 | 1,880,000 | 1,350,000 |
| | 830,000 | | |
| | 325,000 | | |
| | 1,474,000 | | |
| **Total PMI** | 3,259,000 | | |
| **DfID** | 2,350,000 | 2,000,000 | |
| **Global Fund** | | 4,366,160 | |
| **World Bank** | | 100,000 | |
| | | | |
| **Total** | 5,609,000 | 8,346,160 | 1,350,000 |

The LLIN needs in Ghana are aimed at universal coverage and this goal is expected to be achieved by mid-2012. With FY2011 funding PMI will procure 1.88M LLINs. The majority of these LLINs will be used to complete the universal coverage targets and the remainder will be distributed to the new cohort of pregnant women and infants estimated at 4% of the population and to begin the process of replacing worn out nets.

In calculating the net gap for Ghana, the information above and information on population growth and number of nets per person were entered into the PMI LLIN need/gap calculator. A surplus of approximately 660,000 LLINs is anticipated for 2013 to provide a buffer for variations in population growth and to maintain stock requirements at the regional, district, and facility levels to fill routine distribution requirements. Over the next year, Ghana will be rebuilding its LLIN routine distribution mechanisms. Determining consumption rates and the most appropriate stock levels at each step in the supply chain will be a learning process. Ghana plans to use the NetCalc tool, developed by the PMI NetWorks project, to assist with this process. However,

maintaining a surplus is important because of the practicalities of implementing LLIN replacements. For example, differentiating among the population that owns a viable net and the population that needs a replacement net is a challenge and will likely lead to trade-offs resulting in a high percentage of people owning unviable nets. Ghana expects to contribute to the international body of knowledge for determining net replacement needs and processes in high net ownership communities as the country works through these issues. While questions about consumption and stock level requirements remain, PMI Ghana will procure a buffer stock of LLINs to prevent shortages which would be counter-productive when the country is building a net use culture. If data received in 2012 indicates that the country will have a large surplus of LLINs, PMI is prepared to reprogram funds to other priority activities.

## Ghana

### LLIN need/gap calculator based on # of persons protected

**Inputs**

| **Criteria if using nets per person** | **Country data** |
|---|---|
| At-Risk Population 2010 | **24,223,431** |
| Expected annual population growth | **2.86%** |
| Average number of persons per net | **1.8** |
| **Distributed LLINs** | |
| Distributed LLINs in 2010 | **1,087,525** |
| Distributed LLINs in 2011 as of October 2011 | **1,863,500** |
| Additional pledged to be distributed in 2011 and 2012 | **11,004,135** |
| **Pledged LLINs** | |
| Pledged LLINs in 2012 for distribution in 2013 | **1,350,000** |
| Pledged LLINs in 2013 | **0** |
| Pledged LLINs in 2014 | **0** |

**Calculations for 2013**

| | |
|---|---|
| **Population at risk in 2013** | **26,361,809** |
| **Total number of LLINs needed** | **14,645,450** |
| **Nets distributed plus pledged** | **15,305,160** |
| **LLIN gap or (surplus)** | **(659,710)** |

Progress During Last 12 Months

Over the past twelve months PMI has supported Ghana to complete LLIN distribution campaigns in the Northern, Eastern, and Volta Regions and to establish concrete plans for rolling campaigns to cover two additional regions by December 2011. In May 2010, Ghana successfully completed the first large-scale, door-to-door distribution and hang-up campaign. Community volunteers distributed and hung a total of 563,000 LLINs in the Northern region targeting children under five and pregnant women in eligible households. PMI provided the LLINs and technical assistance and logistics support to develop and implement this unique distribution program. A post campaign evaluation determined that the Northern Region ITN ownership jumped from 27% (2008 DHS) to 82%, and use among children under five increased from 11% to 52%.

Following the Northern Region campaign, PMI has provided approximately 2.2 million LLINs plus technical assistance, logistics, and community mobilization for the universal coverage campaigns in the Eastern Region, with ten districts covered in November 2010 and eleven districts covered in June 2011 and the Volta Region in July 2011. Similar PMI support will continue as Ghana rolls out universal coverage campaigns in the remaining regions throughout the country. Campaign implementation is expected to be completed in the Central and Western Regions by December 2011 with plans to cover the remaining regions in 2012.

PMI promoted LLIN use through radio; information, education and communications materials (IEC); community mobilization using CHVs, NGOs, Faith-based organizations (FBO), and information officers; traditional communication tools; and other methods. PMI aired 2,444 radio spots on local radio stations throughout the country and reached 1.6 million people in the Eastern Region alone through multiple channels of communication. PMI achieved a high level of integrated social mobilization activities for hang-up in the Eastern Region through advocacy with 124 traditional leaders, mobile van announcements in 860 communities, and radio spots.

In 2011 PMI is providing the NMCP and GHS with technical assistance to redesign and strengthen their continuous LLIN distribution system. The assistance will build on Ghana's mixed model of distribution methods, draw on successful models from other African countries, and apply lessons learned. The NMCP and GHS intend to pilot the new continuous distribution system in the Eastern Region in early 2012 and to roll out the revised system in mid-2012.

Proposed Activities with FY12 funding: ($10,100,000)
With the expectation that Ghana will achieve universal LLIN coverage through mass campaigns by early 2012, PMI support for LLIN distribution in the FY2012 Malaria Operational Plan will target LLIN procurement and distribution to cover the new cohort of pregnant women, replace worn out LLINs, and maintain keep-up through routine systems. Through BCC and community mobilization activities, PMI will continue to promote LLIN demand and use.

1. Procure LLINs for routine replacement and keep-up distribution: ($7,200,000)
   Procure approximately 1,350,000 LLINs at an average cost of $5.33 per LLIN for distribution through routine systems such as ANC and child welfare clinics to maintain coverage of vulnerable populations and other routine mechanisms to replace worn out ITNs. Geographic targeting will depend on previous campaign results, the status of improvements to routine distribution systems rollout, and MOH guidance.

2. Planning, logistics, distribution, and evaluations for LLINs and strengthened routine LLIN distribution systems: ($1,900,000)
   PMI will provide technical assistance to improve LLIN supply chain management and to strengthen distribution through ANC and Child Welfare Clinics. PMI provide technical assistance to develop and refine the revised continuous distribution system and provide operational assistance to implement some components of the system such as school-based distribution, NGO-based distribution, and potentially a social marketing mechanism. Work has begun on redesigning the continuous distribution system and the system will be refined and enhanced as lessons are learned through implementation.

3. Promote ITN use through BCC and community mobilization: ($1,000,000)
   PMI will support BCC activities to promote ITN use at all levels from national to local utilizing mass media, IEC, community mobilization, and integrated health promotion campaigns. The PMI ITN promotion will be evidence-based and guided by the National Malaria Communications Strategy. PMI will continue to provide technical assistance to the National Malaria Communications Committee to ensure harmonized messaging and maximum geographic and population coverage. Evaluations of the ITN campaign and other ITN distribution activities will include a BCC component to assess effectiveness of BCC activities.

**Indoor Residual Spraying (IRS)**

Background

Ghana's National Strategic Plan calls for a scale up of IRS to one third of its 170 districts nationwide by 2015. To date, the major programs are those supported by AGA in one southern district and PMI in nine northern districts. AGA has conducted IRS and larviciding since 2005 in Obuasi municipality, an urban area of intense, year-round transmission. Starting in January 2012, AGA will begin implementing a five-year Global Fund grant to scale up IRS to as many as 40 new districts. Small-scale IRS operations have been funded by Newmont, Red Back, other smaller mines, and a few plantations and district assemblies, at scattered locations in southern Ghana, reflecting increasing private sector interest in IRS. In order to enhance collaboration and strengthen MOH/NMCP oversight among IRS implementers, the Malaria Vector Control Oversight Committee was re-established in June 2009. This committee has developed national standard operating procedures and is developing insecticide resistance management strategies.

The PMI-supported program began in 2008, with a focus on local capacity building, strict environmental compliance, and careful monitoring of mosquito populations. From its inception, the program has worked closely with the GHS, the Ghanaian Environmental Protection Agency (EPA), district assemblies, and local communities. The PMI field operations rely on the existing systems of the GHS for storage and office space as well as for community mobilization through the network of CHVs.

The PMI/GHS program has demonstrated that IRS can be scaled up quickly and safely in Ghana, even in the more remote and deprived rural areas of the country. Northern Region was selected due to its high malaria burden and relatively short transmission season (which presumably allows for one spray campaign per year). Long-acting pyrethroid pesticide formulations have been used to date. In 2008, the program protected a population of over 601,000 in five districts. The program expanded to six districts in 2009, and eight districts in 2010 covering a population of over 849,000.

The increased IRS activity in Ghana has relied on the country's laboratories, insectaries, and research facilities to support the necessary entomologic and epidemiologic monitoring. For example, the entomologists of the NMIMR at the University of Ghana have provided technical oversight for aspects of the PMI-funded IRS program, including construction of an insectary, training of field technicians, and technical backstopping for the program's entomologist. Meanwhile, epidemiologists at NMIMR are collaborating with PMI in operations research, as

described below, however, there is a need for investments to upgrade national monitoring capacity, as the key institutions are already over-stretched.

The NMCP has identified an insecticide resistance management strategy as a priority with oversight of all antimalarial vector activities falling to the Malaria Vector Control Oversight Committee. Insecticide rotation to a class other than pyrethroids for IRS should follow early detection of resistance and determination of resistance mechanism that allows evidence-based decisions. Continued vigilance is essential, as resistance to multiple classes of pesticides is well known in southern Ghana (associated with intensive pesticide use in agriculture) and elsewhere in West Africa. Of particular concern is that routine resistance monitoring in *Anopheles* currently consists essentially of AGA's one site in Obuasi, PMI's four sites in the Northern Region, and a single PhD student's project in Navrongo. Additional monitoring is done on an ad-hoc basis. In light of the expected distribution of 14 million LLINs between 2010 and 2012 and the imminent scale up of IRS to over 6 million persons, the country needs to establish at least an additional three to four sites for routine monitoring across ecologic zones, in order to approach international standards.

Progress During Last 12 Months

The 2011 campaign covered 383,018 structures in 9 districts, protecting approximately 926,700 residents. Operations were conducted at 31 sites, covering 92% of sprayable structures. This vast operation used over 78,800 sachets of pesticide, distributed 95,850 household spray cards , and employed over 1,190 seasonal staff from local communities, including 381 spray operators and 369 community educators, as well as hundreds of mechanics, driver, clerks and supervisors.

The program is maturing as it enters its fourth spray round, as evidenced by the increasing emphasis placed on evaluation, monitoring, operational research, and quality control. Enhanced entomologic monitoring has demonstrated adequate susceptibility of local vectors to the pyrethroids used, residual killing effects of more than 7-8 months, and the desired shift to a younger *Anopheles* population, with drops in infected bite rates (EIRs) of 140 to 10-60 at the various monitoring sites. The database for tracking IRS operations has been upgraded, additional entomologic sites have been added, soak pits have been remodeled, and a number of research activities are being undertaken.

PMI is supporting operations research to help answer the question of whether a single spray round provides adequate protection in the northern savannah zone, and conversely, whether the extra costs of a second spray round are justifiable. In the ninth district (Bunkpurugu-Yunyoo), PMI and NMIMR have conducted household surveys of anemia and parasitemia rates during the recent high and low transmission seasons. It was found that 68% of children under five were infected in the high season (November 2010), while 32% were infected in the low season (March 2011). One-half of the district was sprayed in April-May 2011 and will be sprayed again in November 2011, while the other half will be sprayed in April-May only.

This study is proving to be especially timely, given that questions have emerged regarding the epidemiologic impact of the spraying, in spite of high operational standards. A formal assessment of malaria burden data at four district hospitals in the IRS area through three full spray seasons failed to show a clear reduction in malaria burden indicators such as under-five

admission and slide positivity rates (where available) as compared to non-IRS districts. Such trends cannot give a definitive picture, however, due to the well-recognized limitations of retrospective facility data. Therefore PMI is supporting ongoing assessment to address questions surrounding human behaviors such as outdoor sleeping, early rising, and the creation of plentiful indoor resting surfaces; as well as vector factors such as outdoor resting, outdoor biting, and the possibility of emerging insecticide resistance, among others.

Proposed Activities with FY12 funding: ($7,434,000)

Maintaining high operational standards, building national capacity, continuing to enhance monitoring and evaluation, transferring increasing responsibility to the MOH, and collaborating with all IRS stakeholders will continue to be guiding principles in Year Five. Having met its original commitment to cover nine districts, PMI plans no further geographic expansion. Instead, PMI will assist other partners such as AGA and the NMCP in scaling up Ghana's IRS coverage, with an emphasis on expanding Ghana's capacity for routine pesticide resistance monitoring. Thus, close cooperation between the PMI–supported program and the future Global Fund program in northern Ghana is anticipated, including joint investments in entomologic monitoring; cooperation in training; and joint planning.

It is expected that the PMI supported program will switch pesticide classes in 2012, due to declining pyrethroid susceptibility found in annual tests. (From 2009 to 2010, alphacypermethrin mean 24-hr mortality dropped from 100 to 88.5%, deltamethrin 95 to 86.7 %, and lambdacyhalothrin 88.8 to 70%. Organophosphate and carbamate susceptibility in 2010 remained good, with mean mortalities of 95% and above.) Additional impetus to change class comes from (1) the apparent lack of clear IRS impact on local malaria case burdens, and (2) the recent documentation of marked pyrethroid resistance in areas to the west (Upper West Region, Ghana) and the east (Atakora, northern Benin) in recent studies commissioned by AGA/Global Fund and PMI/Benin, respectively.

1. Support for IRS program implementation: ($7,400,000)
   In collaboration with the GHS and with a continued focus on building local capacity, support the implementation of the fifth year of the IRS program in Northern Region. This will encompass entomological monitoring, spray operations, data collection, environmental assessment and compliance monitoring, BCC activities including community mobilization, and logistics support to cover a population of approximately 930,000 persons in nine districts. Activities will include continued support for procurement of insecticide and equipment; support for appropriate supervision by GHS, EPA, and NMIMR personnel; and collaboration with the NMCP, the Malaria Vector Control Committee, the Global Fund/AGA IRS program, and other partners. The projected budget takes into account the costs associated with an anticipated change of pesticide class from a pyrethroid to either a carbamate or an organophosphate.

2. Centers for Disease Control and Prevention (CDC) expert TDY visit and provision of supplies to support entomologic monitoring for IRS: ($34,000)
   Provide technical assistance and quality assurance, through two visits by CDC expert personnel, for entomologic monitoring, including support for insecticide resistance monitoring nationwide, and for further assessment of other entomologic factors which might

be undermining IRS impact in the north. Includes limited funding for test equipment and supplies.

**Malaria in Pregnancy (MIP)/Intermittent Preventive Treatment of Pregnant women (IPTp)**

Background

Malaria accounts for approximately 14% of outpatient attendance by pregnant women in Ghana, 11% of hospital admissions, and 9% of maternal deaths (MOH/GHS, 2008). IPTp with SP was adopted as the national policy in 2004, with three doses of SP to be administered to HIV-negative pregnant women starting after quickening (16 weeks or thereafter) with the last dose administered before 32 weeks. The doses are administered at least one month apart with the last dose administered at least one month before delivery. All doses of SP are to be administered under direct observation. HIV-positive pregnant women are expected to receive monthly doses of SP after quickening (with a total of four doses) except if they are receiving co-trimoxazole. The National Strategic Plan target is for 100% of all pregnant women to receive at least two doses of SP by 2015.

The percentage of women attending ANC clinics four or more times increased from 69% in 2003 (DHS) to 78% in 2008 (DHS) and over 86% of women first attend ANC during their 5$^{th}$ month of pregnancy or before. In 2008, a PMI-supported nationwide health facility survey found that IPTp is offered in 94% of facilities sampled. This strong ANC attendance positions Ghana well to make gains in IPTp coverage. However, health workers knowledge and skills, the intervals at which pregnant women are told to attend ANC, and behavioral factors may be limiting gains in IPTp rates. Other challenges include procurement and supply chain inefficiencies resulting in SP stock outs [the Central Medical Stores (CMS) was stocked out of SP from January to April 2011] and the need to update national guidance to conform with the latest WHO guidance. Revised guidance from WHO encourages IPTp administration every four weeks after quickening through the final month of pregnancy until all three doses of SP have been administered.

Progress During Last 12 Months

PMI has focused on rolling out health worker in-service training in MIP, updating pre-service training at nursing and midwifery colleges, supporting pharmaceutical procurement and supply chain, and behavior change and community mobilization to promote early ANC attendance and uptake of IPTp and nightly ITN use. Using the protocols and training manuals that were developed and printed during Years 1 and 2, PMI supported the GHS to conduct MIP in-service training for 2,797 HCWs in two regions with FY09 resources and over 7,497 HCWs in eight regions with FY10 resources. Together PMI and the Global Fund will support the GHS to conduct MIP in-service training covering more than 10,000 HCWs in all ten regions by September 2011. PMI provided post-training supervisory visits for about 30% of the HCWs trained with USG funding and has commenced a quality improvement collaborative to help translate the improved knowledge and skills into service improvements.

PMI is contributing to an integrated USAID project to enhance and update pre-service education for midwives and community health nurses in malaria prevention, diagnostics, and case

management, family planning, and prevention of mother-to-child transmission of HIV. The project supports updating and improving the knowledge and skills of the tutors and preceptors at the school. In an initial assessment of the schools only 37% of the tutors achieved the standards for malaria knowledge and skills and 6% achieved standards on malaria specific equipment and reference materials (e.g. RDTs). The project has developed training materials to update the knowledge, competencies, and skills of the classroom tutors and the field preceptors associated with 31 schools. The project is emphasizing a competency-based approach supported by learning guides, job aids and supportive supervision. The project is developing best practices training materials and learning aids, training in practical skills, providing supportive supervision to strengthen the capacity of tutors and preceptors to teach the skills, and providing targeted IPTp and malaria diagnosis skills.

In Year 2 and 3 PMI had planned to procure ten million doses of SP to meet the IPTp needs for the two years. However, the NMCP identified resources within the Global Fund budget to procure SP. PMI delivered 75,000 doses of the SP procurement to Ghana to help alleviate stock outages and diverted the bulk of the SP procurement to other PMI countries. During the past twelve months PMI has continued to provide technical assistance to improve malaria pharmaceutical management and supply chains (details in pharmaceutical management section).

With FY10 resources, PMI is integrating MIP BCC messages into USAID's maternal and child health program, leveraging the combined resources to build on gains in early ANC attendance and uptake of the full range of MIP services. PMI is continuing community mobilization through CHVs, public information officers, disease control officers, and organized groups (e.g. NGOs, FBOs, professional associations) to promote IPTp and ITN use among pregnant women.

Proposed Activities with FY12 funding: ($1,200,000)

1. Strengthen antenatal care (ANC) services and in-service training to deliver a package of malaria prevention and care services to pregnant women: ($600,000)
   Support the GHS to improve HCW capacity to effectively deliver a package of malaria prevention and care services to pregnant women. Recent research in Kenya indicates that IPTp rates can be increased by providing HCWs with simplified instructions for following the revised WHO guidance. PMI support will draw on lessons from other countries to increase HCW administration of all three IPTp doses through supportive supervision, onsite training, as needed, and quality improvement. PMI will provide technical assistance to update GHS policy to comply with the recently amended WHO guidance to offer IPTp every four weeks starting after quickening and continuing through the final month of pregnancy until the full three doses of SP have been administered.

2. Support pre-service MIP training of nursing, midwife, and medical assistant students: ($200,000)
   Continue to provide technical assistance to strengthen and improve the MIP pre-service training of nurses and midwives. The project will develop and refine best practices training materials and learning aids and provide training in practical skills. Trainings will be followed with supportive supervision to increase the percentage of tutors and preceptors who have achieved standards on malaria knowledge (e.g. IPTp protocols, diagnostic protocols,

knowledge about malaria transmission and prevention, etc.) and skills in RDT use. Supportive supervision will continue at the 31 original schools and training will expand to new midwifery schools to keep pace with Ministry of Health expansion plans for trained midwives.

3. Support BCC activities to increase early attendance at ANC and full adherence to IPTp: ($400,000)
   Support development and implementation of BCC and community mobilization activities directed toward women of child bearing age and people who are influential to women of childbearing age to promote early and frequent ANC attendance, IPTp uptake, and LLIN ownership and use among pregnant women. Incorporate MIP messages into national health promotion and maternal and child health BCC activities. Develop messaging targeted to ANC and other relevant HCWs to increase efforts to administer the full three doses of IPTp and to promote LLIN use among pregnant clients. Employ evidence-based and creative communications techniques that are tailored to each target group to promote MIP interventions. Illustrative activities include mass media, community mobilization activities, and IEC materials. Provide TA and support to the NMCP.

## INTERVENTIONS — CASE MANAGEMENT

### Malaria diagnosis

Background

The NMCP/GHS objectives are to improve the care of individual patients, to promote the rational use of ACTs and other resources, and to strengthen surveillance. Yet, in this highly endemic country with a relatively weak laboratory infrastructure, the sheer volume of suspected cases presents enormous challenges. Appropriate and regular use of malaria laboratory tests has been the exception rather than the rule in Ghana, as documented in a PMI-supported 2008 laboratory assessment. In 2010, a PMI-supported quality assurance exercise found that the great majority of facilities were low performing and in need of improved supervision and training. Where test results were negative, antimalarials were still prescribed 50% of the time in one-half of facilities, 75% of the time in two-fifths of facilities; and 100% of the time in one quarter of facilities.

In late 2009, the NMCP began to actively promote a policy of universal malaria case confirmation (microscopy or RDTs) in all age groups, consistent with the new WHO guidelines. The near-term focus is on scaling-up testing in MOH facilities, as well as private hospitals and clinics. As of mid-2010, the prerequisites for implementation at these levels were largely in place, including: needs assessments, revised policies and guidelines, training of laboratory and front-line HCWs, procurement, and funding. The long-term objective is to scale up RDT use in peripheral settings, notably private pharmacies, licensed chemical seller (LCS) shops, and potentially among volunteer community-based agents (CBAs) in settings of supervised home-based care programs (as described in a later section).

To help scale up and improve quality malaria diagnostics, PMI partnered with the NMCP, the National Public Health Reference Lab, and the newly formed GHS Clinical Laboratories Unit at three levels: 1) developing national policy framework; 2) laboratory capacity; and 3) strengthening front-line HCW capacity. PMI provided major support for the development and dissemination of the *National Guidelines for Laboratory Diagnosis of Malaria*, which includes standard operating procedures and a detailed supervisory checklist.

Guided by the 2008 laboratory assessment, which revealed major deficiencies in quality assurance and on-the-job training and supervision of personnel, PMI has focused its resources in this area. In Year 1 PMI supported a national laboratory assessment and facilitated the development of a new national diagnostic policy and quality assurance system. In Year 2 PMI and GHS provided training to national and regional Quality Assurance Teams in preparation for Outreach Training & Supportive Supervision (OTSS) implementation. The OTSS program consists of periodic national rounds of structured supervisory visits to clinical labs by regional biomedical technologists, during which a checklist is used to assess infrastructure, personnel and efficiency. This is complemented by ongoing internal quality assurance measures, such as saving of slides for expert review. Year 3 focused on implementation, as PMI and GHS launched the OTSS program and entered the scale-up phase.

Progress During Last 12 months

Between March 2010 and May 2011, four rounds of OTSS were conducted, reaching a total of 240 clinical laboratories in all 10 regions, out of a total of 405. More than 890 laboratory staff received on-site training, far exceeding targets. Improvement of technique was documented for RDTs and microscopy, and stock outs fell by 34% by the second round alone. The program has been embraced enthusiastically by technicians and supervisors, although challenges persist in the areas of RDT validation, clinical compliance with results, and data quality. Additional supervisors are being trained, and resources mobilized, such that all 405 labs (both public and private) will be incorporated in the quality assurance program by Year 4. A national archive of malaria reference slides was launched in April 2010 in collaboration with the Kintampo Center of Diagnostic Excellence, as a critical resource for quality assurance and training. It is anticipated that this archive will be a resource for other countries in West Africa.

At the level of the front-line HCW (i.e. non-laboratory staff), PMI continued to provide technical assistance to incorporate RDTs and improved diagnostics in GHS and Pharmacy Council training courses. In early 2011, PMI worked closely with the NMCP to revise and streamline the training curriculum. With FY09 resources, PMI helped train 2,797 HCW in malaria diagnostics and an additional 7,015 HCWs in eight regions with FY10 resources.

By late 2010 and 2011, significant operational bottlenecks had emerged to scaling up RDTs. Most importantly, a lack of forecasting and a dysfunctional MOH procurement regimen led to national stock outs of RDTs, persisting for up to 6 months in some facilities, in spite of available donor funding. PMI donated 725,000 RDTs to bridge the gap until Global Fund shipments could arrive. Diagnostic testing continued to have suboptimal impact on patient care and surveillance due to patient flow bottlenecks in facilities, financial disincentives to ordering tests, and inconsistent capture of test results. Implementation of RDTs was found to be most

straightforward at the level of the smaller health care centers and the CHPS compounds, i.e. where there is no laboratory. In hospital settings, there was persistent confusion regarding the proper role of microscopy versus RDTs.

Proposed Activities with FY12 funding: ($1,362,000)
In FY2012, PMI plans to continue transitioning the OTSS program to full GHS control. Simplification of the data management tools, moving toward direct funding of regions to conduct the supervision, and institutionalization of regular supervisory visits, will all help toward this end. By FY2012, PMI efforts to help remove the bottlenecks in scaling up RDTs should be coming to fruition. This will be accomplished in part through facilitating policy dialogue at the national level, and by piloting a package of best practices in its "improvement collaboratives" at the facility level (see under Treatment, below). PMI will continue to procure commodities to fill gaps. Because microscopy needs are anticipated to have been largely filled by FY2012, the focus will be on procuring RDTs. Using OTSS experience as a guide, it is anticipated that a number of microscopy kits should also be procured, to prevent stock outs of key supplies.

1. Procure microscopy equipment, RDTs, and other laboratory supplies: ($550,000)
   Procure approximately 750,000 RDTs, as well as microscopy supplies (reagents, slides, lancets, etc.), as needed to increase malaria diagnostic testing capacity in Ghana. The precise numbers and product specification will be tailored to meet national gaps at the time. RDT procurements will be coordinated with those of GHS, the Global Fund, and other partners.

2. Build capacity for microscopy and RDTs and support implementation of diagnostic policy — laboratory settings: ($550,000)
   Support the NMCP and the GHS Clinical Laboratory Unit to improve the capacity of clinical laboratories to perform malaria diagnostic tests nationwide. Further strengthen and extend the reach of the quality assurance program (OTSS), including support for supervisory field visits and on-the-job training. Because the great majority of facilities score low in quality assurance measures at baseline, all clinical labs in the country will continue to be targeted by the program. This will include strengthening the capacity of laboratory systems to provide quality assurance and improved efficiency for RDT use by non-laboratory, front-line personnel such as nurses. Provide technical assistance to further define and address laboratory-level bottlenecks to increase dramatically the rates of malaria confirmatory testing, in line with MOH objectives. The budget level is based on actual costs of OTSS rounds as demonstrated during implementation in 2010-11.

3. Build capacity for RDT use and support implementation of diagnostic policy in front-line clinical settings: ($250,000)
   In support of the national diagnostic policy, continue to provide technical assistance to expand the appropriate use of RDTs by front-line HCWs (i.e. non-lab personnel) in the public and private sectors in targeted regions. Facilitate the piloting and scale up of methods to improve testing rates, provider compliance, and patient acceptance. This will include in-service training and supportive supervisory visits for prescribers. In addition, PMI will provide support to the NMCP to develop and implement guidelines for expanded RDT use by pharmacists, LCS, and CBAs. In order to improve prescriber and patient adherence, PMI

support will also aid the MOH to address bottlenecks in patient flow and health care financing.

4. Provide technical assistance in diagnostics. ($12,000)
   Provide technical assistance from the CDC to realize the full potential of RDTs at all levels. By FY2012, microscopy quality assurance and utilization is likely to be progressing well, such that this technical assistance should focus on RDTs.

**Malaria Treatment**

Background
Widespread, prompt access to safe and effective antimalarials is a cornerstone of malaria control. Yet scaling up appropriate malaria treatment to reach a mass population remains one of the greatest challenges in Ghana. Ghana first adopted ACTs as first-line therapy in 2004, recommending the use of artesunate and amodiaquine (AS/AQ). Artemether-lumefantrine (AL) and dihydroartemisinin-piperaquine (DHAP) therapies are officially endorsed as second-line treatments. The MOH has concluded that offering alternate ACTs is essential for overcoming the public resistance to AS/AQ. All malaria treatment guidelines and training manuals were revised accordingly in 2008-09.

Although PMI recognizes the historical contingencies which led to the current policy, it does not support multiple first-line treatments for malaria. Promotion of multiple first-line treatments for malaria creates inefficiencies in training, supervision, supply chain, and BCC, and is not in harmony with international recommendations. PMI will continue to work with the MOH to move toward adoption of a single-drug policy.

ACTs have been classified as over-the-counter drugs since 2009. Quinine is the drug of choice for severe malaria and for uncomplicated malaria in the first trimester of pregnancy. Rectal artesunate is endorsed for pre-hospital referral settings, though it is little used as of yet. Injectable artesunate is an official alternative to quinine for severe malaria, and unfortunately is commonly used off-label in outpatient settings as single dose adjunct to oral ACTs. According to the 2008 DHS household survey, 12% of children under five years old with fever were treated with an ACT within 24 hours.

Since 2007, the MOH worked to further scale up ACTs through measures such as HCW training, banning monotherapies (in theory), and ensuring that NHIS insurance coverage policies for medications are consistent with the national malaria treatment. Through Global Fund grants and the AMFm mechanism, subsidized ACTs have been made available in the public and private sectors. PMI-funded assessments of pharmaceutical systems (2009) demonstrated that the public sector had made progress in complying with the national malaria treatment policies. Provider adherence was considerably worse in the private sector (e.g. FBOs, clinics, private pharmacies, LCS, and traditional healers), where approximately 60% of Ghanaians initially seek malaria treatment. Use of ACTs by healthcare professionals for confirmed uncomplicated malaria cases was 86% and 66% for the public and private sectors, respectively. Over diagnosis of malaria

was especially rampant in the private sector, according to PMI-funded assessments in 2008 and 2009. Consumers tend to prefer AS monotherapy, chloroquine, SP, or some combination of SP with an adjunct such as artesunate because they are better known and less expensive than ACTs.

Ghana was reportedly the first of the AMFm countries to make the subsidized ACTs available on the market, in spite of a prolonged grant award process. As of February 2011, 2.5 million treatments had arrived in country. By May 2011, a Pharmacy Council study found the average sale price was around the recommended level of $1.00, but availability was low in rural regions and monotherapies continued to be widely sold. Rigorous monitoring and high-volume public sector procurement has yet to materialize. Curiously, the low cost ACTs have been met with suspicion by sectors of the population. Whether this pilot program can achieve its objective of driving out monotherapies through market forces remains to be seen.

Ghana has seemingly been poised for several years to scale up a UNICEF-supported pilot in iCCM, yet only a small portion of malaria cases are currently covered through this approach. This applies even in the original pilot districts (for example, in Savelugu-Nanton district, less than 800 cases were treated in 2010 out of approximately 10,000 total cases). Using a Round 8 Global Fund grant, the NMCP plans to scale up iCCM to 63 districts over five years. Although progress has been made in developing guidelines and training materials for CBAs, the necessary systemic building blocks for iCCM have yet to be put in place on a wide scale, such as scale-up of training, regular supervision, reliable data capture, sustainable volunteerism with community support, conducive financing, and a robust supply chain. Long delays in Global Fund ACT procurements and the perceived need to integrate malaria with management of acute respiratory illness and diarrhea has led to implementation delays, as funding for the non-malaria commodities has not been forthcoming. Yet the rational for community management remains strong, given that formal health services only reach about 60% of the population.

The thrust of PMI support for ACT scale-up in Ghana has been in the areas of policy dissemination and HCW training. In Year 2, a suite of nine documents to support implementation of the national treatment policy were finalized and disseminated. These included case management guidelines as well as training manuals for HCW, pharmacists, and LCS. In 2009, to help fill commodity gaps, PMI contributed $700,000 worth of ACTs and severe malaria medications, including rectal artesunate. To complement HCW training, PMI has supported BCC activities to promote ACTs and appropriate health treatment seeking behavior. To assist the MOH prepare for nationwide scale up of iCCM, PMI supported the finalization of national guidelines and policies. These documents covered management of acute respiratory infection and diarrhea, along with malaria. In target districts, PMI trained and equipped volunteer CBAs (also called Community Drug Distributors).

Progress During Last 12 Months

The PMI and GHS collaborated in conducting case management training. With FY09 resources, PMI helped train 2,797 HCW in malaria case management and trained an additional 7,513 HCWs in eight regions with FY10 resources. PMI supported on-site supportive supervision of approximately 30% of the HCWs trained and quality improvement to build on the learning that was achieved through the classroom based training. In early 2011, PMI supported the redesigned

and strengthened the malaria in pregnancy and case management training curriculum, to increase learning efficiency.

With FY2010 resources, PMI has procured severe malaria medication (e.g. 10,000 doses of injectable quinine, 28,000 doses of rectal artesunate, etc.), 80 microscopes, and 725,000 RDTs. Rational use of ACTs has been promoted through support for Drugs and Therapeutics Committees in leading hospitals in three regions, with a focus on monitoring and enforcing the appropriate use of antimalarials and other essential medications. Recognizing that pre-service training is often out of step with current practice, and that tutors' knowledge can be 10-20 years out of date, PMI is strengthening malaria education at 27 training institutes for midwives and public health nurses. The focus is on training of classroom teachers and clinical tutors, and the revision of teaching materials and examinations. The need remains large in this area, with a need to upgrade the pre-service training medical assistants -- who are typically the work horse prescribers of the health centers and outpatient clinics.

PMI is bringing in expert technical assistance to help identify strategies for launching iCCM in target districts. PMI continues to assist the NMCP in clarifying policy, setting priorities, and to support integration of the activity with other community management of fever.

In 2010-11, PMI was able to readjust resource allocations for malaria treatment to more strategically complement Global Fund activities. For example, the PMI team determined that the NMCP/GF plans are sufficient to cover LCS needs through 2012. Also, it has become clear that the NMCP/Global Fund AMFm activities include significant resources for BCC to promote the AMFm brand and promote ACT use for malaria treatment. This permitted PMI to focus on priority needs such as increasing clinical supervision and sharing of best practices across facilities. It is expected that when the AMFm pilot ends in 2012, gaps in support for malaria management in the private sector will reappear. The need for private-sector capacity building will continue to be high in Ghana, whose economy continues to expand at one of Africa's fastest rates, and where over 50% of medical care is delivered in the burgeoning private sector.

Proposed Activities with FY12 funding: ($2,480,000)
The priority for FY2012 will be to assist the MOH to further scale up the appropriate use of antimalarials in the public and private sectors, focusing on targeted procurement, supportive supervision, improving case management in the private sector, and expanding iCCM. As mentioned, PMI will continue to advocate for a single first-line ACT policy.

1. Procure antimalarial medications to fill gaps: ($500,000):
   Procure rectal artesunate, severe malaria drugs, and potentially ACTs, in quantities to be determined. Through late 2012, the NMCP plans to procure sufficient AS/AQ and AL through Global Fund/AMFm grants to cover all ACT needs in the country, complementing NHIS and private sector resources. With the expected end of the AMFm pilot in 2012, PMI resources may once again be needed for procurement of ACTs. The status of the AMFm and Global Fund ACT procurement following the AMFm pilot are unpredictable and PMI will monitor the situation closely to support ACT procurements as needed. The primary aim will be to fill gaps and help prevent stock-outs of antimalarial medications in 2013.

2. Support Pre-Service Training in Malaria Case Management: ($200,000)
   Continue to support pre-service training in malaria case management for nurses, midwives, and establish support for pre-service training of medical assistants, both on a national scale. The project will develop and refine best practices training materials and learning aids and provide training in practical skills. Trainings will be followed with supportive supervision to increase the percentage of tutors and preceptors who have achieved standards on malaria knowledge (e.g. diagnostic protocols, treatment protocols, knowledge about malaria transmission and prevention, etc.) and skills in RDT use and administration of ACTs. Supportive supervision will continue at the 31 original schools. The training will expand to new midwifery schools to keep pace with Ministry of Health expansion plans for trained midwives and expand to schools for other cadre of clinicians. The objective will be to leverage GHS resources to bring classrooms teacher and clinical tutors up to date with current malaria diagnostic guidelines and treatment protocols.

3. Support supervision, on-site training and quality improvement to strengthen malaria case management: ($500,000)
   Support on-the-job training and supportive supervision of HCW to increase adherence to treatment guidelines for uncomplicated and severe malaria. These activities will be carried out with a range of HCW, including physicians, nurses, pharmacists, and drug vendors in the private and public sectors. Support strengthened adherence to case management protocols at teaching hospitals, other pre-service institutions, and additional public sector service delivery points that did not receive training in Years 1 – 4. PMI may also make a small amount of funds available to procure commodities, such as weighing scales, to allow for the correct ACT dosing.

4. Support Integrated Community Case Management: ($400,000)
   Support the NMCP's goal of mass scale up of iCCM, leveraging Global Fund support, by providing targeted technical assistance and logistical support to address key bottlenecks and fill gaps in the national iCCM program. PMI's support will shift from training of CBAs toward aiding the Ghana Health Service to establish more robust systems for supervision, data capture, sustaining volunteerism, financial management, and supply chains. These activities will be carried out in close coordination with the GHS/NMCP, UNICEF, WHO, and other stakeholders.

5. Support private sector dispensers, including LCS, to improve malaria treatment: ($230,000)
   Filling gaps created by the ending of the AMFm pilot in 2012, support activities to build capacity for improved malaria case management in the private sector, focusing primarily on LCS and private pharmacies. Partnering with the relevant professional societies (such as the Pharmaceutical Society of Ghana) and regulatory bodies [such as the NMCP and the Food and Drugs Board (FDB)], and building on the experience of pilot programs (e.g. the Pfizer-funded Mobilizing Against Malaria activities in Ashanti and Brong-Ahafo regions), PMI will support supportive supervision, BCC, and other methods to increase private sector compliance with malaria treatment guidelines and improve the safety and quality of services provided.

6. Support BCC to improve malaria care and treatment-seeking behavior: ($650,000)
   Support BCC strategies targeting HCW and the general public to promote correct and consistent use of ACTs by vulnerable groups. Activities will promote appropriate testing and treatment for malaria among the general population and healthcare providers. The PMI investment in BCC to promote appropriate malaria testing and treatment will be geographically, temporally, and programmatically linked with other case management activities to maximize impact. This activity is part of a comprehensive BCC strategy that is directly linked to the National Malaria Communications Strategy and to other malaria prevention and treatment BCC. PMI will continue to provide technical assistance to the National Malaria Communications Committee to ensure harmonized messaging and maximum geographic and population coverage. The messages and materials that are developed will employ evidence-based and creative communications techniques. The BCC activities may include mass media, IEC materials, and community mobilization (e.g. CHVs, information officers, NGOs, etc.).

**Pharmaceutical Management and Drug Quality**

Background

Despite evidence of progress, there continues to be a need to strengthen Ghana's pharmaceutical management system to ensure commodity availability, affordability, quality, and rational use. Strengths of the system include the NHIS which provides access to affordable malaria treatment, a robust private sector which helps to ensure availability of many essential medicines, and clear treatment policies promoting rational use of malaria medicines. However, the supply chain involves multiple public and private entities with insufficiently defined roles and weaknesses that can result in inefficiencies, limited availability of essential medicines, and risks of substandard medications in both the public and private sectors.

Mass enrollment in the NHIS since 2005 provides affordable access to malaria treatment but has placed a heavy fiscal burden on the MOH because the national levies anticipated to support the NHIS have not been sufficient to sustain the package of services provided. The limited clarity regarding the roles of the MOH procurement unit, the GHS procurement unit, and the CMS at the central level creates challenges for data sharing, forecasting, and procurement planning which can lead to both under and over stock. The ability of Regional and District Medical Stores and public health facilities to procure pharmaceuticals directly from the private sector helps to fill gaps in stock, but creates challenges to monitoring consumption for procurement forecasting. Moreover, decentralized procurements through a fragmented private sector poses considerable risk to quality and contributes to pharmaceuticals in Ghana being sold above the international reference price.

Warehouse facilities at the CMS provide good quality storage and the capacity is sufficient for most commodity needs, with the notable exception of bulky LLINs. Warehouse facilities at the regional, district and local level are more limited even for essential medicines. Vehicles for transporting supplies, particularly LLINs are also in short supply at all levels.

Ghana began implementing the two-year Global Fund AMFm pilot aimed at increasing access to inexpensive, high-quality ACTs in September 2010. If successful, the AMFm pilot activity

could positively impact the availability of quality ACTs in both public and private sectors in Ghana, while resulting in a decrease in demand for malaria monotherapies and malaria combination therapies of unknown quality.

The widespread availability of artemisinin monotherapies and other products not approved for the treatment of uncomplicated malaria in the market highlights the need for improved pharmaceutical management. Although the FDB is active in registering and auditing local manufacturers, the great majority of manufacturers do not adhere to WHO Global Malaria Program standards and the FDB does not appear to have a mechanism to ensure their compliance. PMI supports the FDB to conduct post-market surveillance which has resulted in actions to remove substandard pharmaceuticals from the market and to hold manufacturers accountable.

Progress During the Last 12 Months

In collaboration with the Pharmacy Unit and GHS, PMI is helping to identify strengths and weaknesses in the supply chain distribution system. This activity, which began in Year 2, extends to all ten regional medical stores. As part of overall logistics strengthening, PMI has trained 213 commodity managers in logistics management and helped implement a stock-monitoring exercise at CMS, designed to detect potential shortages in advance, and review forecasting needs as well as gain a better understanding of ACT consumption. Collectively, these efforts are helping CMS improve the management of ACTs which are intended to help the GHS and MOH move away from emergency procurements to routine procurements based on quantifiable needs over time.

An end-use verification activity has been carried out in seven regions, most recently in Northern Region in March 2010, identifying both strengths and weaknesses in the systems. The activity provides important information on the status of malaria pharmaceutical supplies and the rational use of malaria medications. Results of the end-use verification are shared with the facilities surveyed, with the districts and regional health management teams, and with the NMCP and the GHS Stores, Supplies and Drug Management unit for remedial action. In Northern Region, all facilities had unexpired stock of some ACT formulations. The surveys indicate extremely low use of monotherapies for uncomplicated malaria (3%) but challenges remain in training and supervision for personnel managing commodities and results point to continued challenges with rational use of ACTs. In the Northern Region report, the majority of malaria cases are diagnosed presumptively (75%) and up to 39% of RDT negative patients were treated with an ACT. PMI is providing support to a USAID/Ghana effort to identify and implement solutions to Ghana's pharmaceutical supply chain challenges. Potential activities could include technical assistance to expand a schedule delivery system, performance-based supply management, and strengthening the role of CMS.

In addition, PMI collaborated with the MOH, NMCP, and FDB to monitor antimalarial drug quality and assess the pharmacovigilance system, harmonize the adverse drug reaction reporting process, and develop recommendations for improving the safety of antimalarials. Results of drug quality monitoring over the past year at five sites around the country showed that 127 (25%) of 504 antimalarial drugs sampled from local markets failed. Liquid and syrup

formulations had the highest failure rate due to stability issues. The monitoring identified counterfeit and substandard medications and resulted in the FDB removing several products from the market. The monitoring also identified weaknesses in the good manufacturing practices (GMP) of local manufacturers. In FY2011, PMI aims to assist the FDB to meet international standards for the design of a new testing laboratory, scheduled for completion in 2011. Finally, in FY2011, PMI is providing support for *in vivo* clinical efficacy monitoring of antimalarials in collaboration with the NMIMR.

Proposed Activities with FY12 funding: ($900,000)
The PMI has prioritized building capacity of the pharmaceutical management system including strengthening drug quality assurance systems in Year 5 in the following ways:

1. Strengthen logistics and supply chain systems: ($500,000)
   The PMI will provide continued support for strengthening Ghana's procurement, logistics and supply chain system to improve the availability of malaria commodities (including malaria treatments, SP for IPTp, RDTs, and other commodities) throughout all levels of the system. Activities will build on investments made in Years 1 – 4 and on USAID's project to address fundamental reform to the supply chain. Efforts will focus on addressing known bottlenecks in finance, management, forecasting, transportation, and reporting systems which have hindered the distribution of malaria medications and laboratory supplies. Because over 60% of Ghanaians access health care through the private sector, activities will target both the public and private sectors.

2. Strengthen drug management capacity: ($200,000)
   In the context the GHI and an integrated USAID project to strengthen health systems in three focus regions, PMI will promote improved drug management and the rational use of ACTs. Following the principles of country-led approaches, PMI will support the regional and district governments to strengthen their drug management systems, including building more robust systems for ensuring sufficient stock of high quality pharmaceuticals and for monitoring and supervisory systems within the regional health systems. Illustrative activities include training and technical assistance to hospital Drugs and Therapeutics Committees, and supportive supervisory visits by regional and district managers. The targeted regions will be Western, Central, and Greater Accra, which together contain roughly one third of Ghana's population.

3. Strengthen drug quality monitoring capacity: ($200,000)
   Support strengthened drug quality monitoring capacity in collaboration with the FDB by collecting data on antimalarial drug quality. Activities will build on investments made in Years 1 - 4. Support will enable an expansion of the number of sampling sites from the current five to seven or more sites, so as to include strategic border districts. Increased emphasis will be placed on strengthening FDB enforcement capacity combined with explicit support for activities that raise awareness among the public regarding counterfeit and substandard medicines identified in Ghana.

## INTEGRATION WITH OTHER GLOBAL HEALTH INITIATIVE PROGRAMS

Background

The GHS coordinates and supervises the provision of a comprehensive package of maternal and child health services, including malaria control activities. Intermittent preventive treatment during pregnancy is fully integrated into the focused ANC package. The GHI mirrors the Government of Ghana commitment to achieve its Millennium Development Goals related to health. The USG supports integrated health programs in Ghana to strengthen health systems while addressing specific goals in maternal and child health, nutrition, reproductive health, water and sanitation, malaria, and HIV/AIDS. In three regions, covering one third of Ghana's population, the USG works at the community, district, and regional levels to encourage positive behavior change, improve the quality of service delivery, and improve health management systems, thereby achieving results across a the full spectrum of health elements. USG malaria programming has been integrated into these region-specific efforts to ensure that malaria-specific content is strengthened (e.g. in training and quality assurance), and that health system strengthening will lead to improvement in malaria control indicators (e.g. improved availability of LLINs and ACTs).

The USG is well represented and engaged in oversight bodies in Ghana such as the Health Sector Working Group organized by the MOH, the Country Coordinating Mechanism (CCM) for the Global Fund, and the semi-annual Health Summits that draw participants from all over the country to review and plan national health interventions. USG agencies are frequently asked to provide in-house expertise or consultants to help the MOH or its agencies perform program assessments, develop long-term strategies, or otherwise contribute to the national health agenda.

Proposed Activities with FY12 funding (Funding included in other sections):

PMI will support USG efforts to strengthen health system commodity supply chains for LLIN distribution and management of pharmaceutical products nationwide, with additional support to the lower levels in the Greater Accra, Central, and Western Regions. PMI support is combined with USG funding under President's Emergency Plan for AIDS Relief and other GHI areas, as a concerted effort to improve supply chains for all pharmaceuticals and health commodities.

1. Integrating MIP into ANC:
   PMI's technical assistance to IPTp will include its integration into ANC throughout Ghana. This will include support to strengthen training institutions for midwives throughout the country.

2. Integrating malaria case management:
   PMI will support the NMCP to roll out and manage iCCM for malaria, implemented by community volunteers as part of an integrated child health package at the community level.

3. Harmonizing laboratory strengthening with other key partners:
   PMI investments in laboratory systems will be harmonized with inputs from the grant for tuberculosis control provided by the Global Fund, in order to coordinate microscopy equipment procurements and laboratory technician training and supervision.

## CAPACITY BUILDING AND HEALTH SYSTEMS STRENGTHENING

Background

The NMCP was established to operate at the national and zonal levels and work with the regional and district-level GHS staff to implement malaria programs. The NMCP leads Ghana's malaria control efforts through the formulation of policy strategies, coordination of all actors involved in malaria control in Ghana, and plays the role of Principal Recipient for the country's current malaria-related Global Fund grants. The NMCP collaborates with several partners including USAID, UNICEF, DfID, World Bank, WHO and other international and local NGOs and research institutions to implement the Global Fund projects nationwide. The NMCP expanded its staff and capacities over the past year to lead Ghana's growing malaria program. However, the need for more intensive management and coordination continues to increase, and additional resources are required for the NMCP to address that need.

In FY2011, PMI focused on supporting the capacity of the GHS and the NMCP to utilize community volunteers as health outreach workers. The community volunteers were expected to extend their activities to include key malaria prevention activities such as BCC for IPTp, ITNs and case management. In harmony with this approach, district health workers serving as supervising officers for the volunteers were targeted for training to improve their skills as trainers of the volunteers, as well as supervising malaria control activities implemented by the community volunteers.

Progress in the last 12 Months

In FY2011, the vital role district health promotion, disease control officers and community health nurses played in the promotion and delivery of health was recognized and a large budget made to support their activities in implementing malaria interventions at the community level. This was designed to support community engagement activities being undertaken by NGOs and the CHVs in support of malaria program activities. PMI has funded 25 new NGOs to implement BCC for IPTp, ITNs and case management. This will bring the number of NGOs that have been supported by PMI to implement malaria control activities since FY 2009 to thirty-eight.

An NMCP officer was supported to attend the LLIN session of the Alliance for Malaria Prevention meeting in Geneva. Two officers from the NMCP were also supported to attend a study tour of the LLIN continuous distribution study in Kenya.

Proposed Activities with FY12 funding ($750,000)

1. Strengthen the capacity of the NMCP/GHS to implement community-based malaria prevention and control activities ($250,000)
   Support the GHS to improve management systems for supervision of CBV operating at the sub-district level to identify and treat malaria as a component of an integrated community child health program. Support regional and district managers who were supported in the previous year to plan and implement community based malaria activities to continue to supervise community engagement activities by both the GHS and civil society organizations. These activities are expected to be carried out in 60 districts. The funds will provide management support for the iCCM program at the regional and district level.

2. Strengthen management capacity of the NMCP ($150,000)
   Support the networking of the NMCP's central office with zonal offices. Continue operational support including data management and other information technology infrastructure development.

3. Long-term training – Field Epidemiology and Laboratory Training Program ($150,000)
   Support long-term training of an individual that builds capacity at the NMCP or GHS in epidemiology, monitoring and evaluation, or other malaria program management functions as needed. This would be implemented through the Field Epidemiologic and Laboratory Training Program (FELTP) which was recently established at the University of Ghana's School of Public Health with USG support.

4. Support supervisory visits and monitoring activities ($200,000)
   Support supervisory visits and monitoring activities by public health authorities including NMCP and GHS staff in support of NMCP efforts to strengthen overall malaria program management and supervision effort.

In addition to the specific activities listed above, PMI will implement several activities which will strengthen health systems while achieving goals stated in the previous sections of this document. The PMI program will provide technical assistance to strengthen commodity supply chains for LLIN distribution and management of pharmaceutical products; strengthen routine health information systems; and build capacity for appropriate diagnostic techniques and drug quality monitoring. Each of these efforts will contribute towards improved, effective health systems, as well as contributing to Ghana's malaria-specific goals.

## COMMUNICATION AND COORDINATION WITH OTHER PARTNERS

The National Malaria Control Program (NMCP) of the Ghana Health Service plays the leading role in coordinating all implementation activities related to malaria by both development partners and the Ministry of Health. It also plays a lead role in formulating policies.

The NMCP's budget has been supplemented significantly by the Global Fund since 2002. Three grants to the NMCP were consolidated this year, which are expected to provide a total of $147 million in funding to support malaria control through 2013. The USG is a member of the Global Fund's Country Coordination Mechanism, and participates in its Malaria Oversight Committee.

The RBM Coordinating Committee, once active in Ghana, has been defunct for three years as an umbrella group for coordinating malaria activities. In the years that it existed sub-committees were formed to coordinate the different malaria technical areas. Currently, most of these sub-committees are functional. They include the ITN, Case Management, Vector Control, Communications and Home-Based-Care committees. These committees have enabled different partners such as WHO, UNICEF, DfID, PMI and civil society organizations to coordinate their activities and undertake joint technical work under the auspices of the NMCP.

Main health sector donors include the Royal Netherlands Embassy, the Danish International Development Agency, DfID, the Global Fund, the World Bank, Japan International Cooperation Agency, UNICEF, UNFPA, WHO and the African Development Bank. UNICEF is supporting community-level integrated management of childhood illnesses, which has a malaria component, in four of the ten regions in the country. DfID supports the purchase and distribution of LLINs. The World Bank is also working with the NMCP in a Nutrition and Malaria program in targeted districts of the Northern Region.

Progress During the Last 12 Months

The NMCP, USG and other development partners were not successful in attempts to revitalize the RBM Coordinating Committee this year, as there was a lack of high level leadership on malaria coordination within the GOG. Since leadership at the Ministry of Health has recently changed, this remains on the USG agenda for the upcoming year's activities.

PMI and the NMCP successfully integrated their planning processes this year to produce one consolidated work plan for all of their activities. This is a significant achievement greatly appreciated by the NMCP, whose role of coordination and monitoring has been assisted, and it allows all development partners to assess gaps and contribute more easily to the NMCP's strategic priorities.

USG staff played an important role in ensuring effective oversight of Ghana's Global Fund grants for malaria, by participation and technical assistance to the Malaria Oversight Committee.

PMI worked with Peace Corps to plan joint interventions under the PMI-Peace Corps initiative. Position descriptions and proposed activities were created for three Peace Corps volunteers to assist with net distribution and community mobilization and volunteers have been identified to fill two of the positions.

Proposed Activities with FY12 funding: ($20,000)

1. Support Malaria Control Activities with the Peace Corp ($20,000)
   Build on previous activities to continue to support Peace Corps activities around the PMI-Peace Corps collaboration.

2. Revive the RBM Coordinating Committee (no cost)
   Currently most of the sub-committees of the RBM coordinating committees including ITN, Vector Control, Communication, Home Management of Malaria and Case Management are active, but the coordinating committee is defunct. This problem arose because issues that would otherwise be discussed by the committee came to be discussed at the CCM of the Global Fund as the influence of the CCM increased due to the large Global Fund grants. PMI will continue to lobby for the reinstitution of this coordinating body, and the inclusion of non-traditional donors into this forum.

## BEHAVIOR CHANGE COMMUNICATION (BCC)

Background

Ghana has a relatively well developed media infrastructure. There are 13 television stations, one of which has a national reach. Over 100 local radio stations are distributed throughout the country and can be found in almost all districts, with heavier concentrations in the urbanized areas. Local radio stations broadcast in the range of local languages providing opportunity for targeted communications. However, most local stations broadcast over a limited geographic area and thus reaching national coverage through radio requires agreements with many different stations. The print media is not as well developed and only a few news publications are national in character. According to the 2008 DHS 54% of women and 60% of men watch television at least once per week, 76% of women and 88% men listen to radio at least once per week, and 15% of women and 27% of men read print media at least once per week.

Behavior change communications and community mobilization are integral parts of the national malaria strategy, receiving financial support from the Global Fund and technical support from PMI, UNICEF, and the Voices Project (Johns Hopkins University Center for Communications Programs). The NMCP updated the National Malaria Behavior Change Communication Strategy (BCC Strategy) with PMI support in April 2010 providing a coordinated framework for harmonizing BCC and community mobilization objectives, communication channels, and priority target behaviors. The strategy focuses on evidence-based BCC targeting HCW, LCS, pregnant women, mothers, fathers and communities as priority audiences. The NMCP's BCC goals mirror overall malaria control objectives, namely, increasing demand for and use of effective malaria control tools such as LLINs, IPTp, IRS, and ACTs. Priority objectives in the BCC Strategy include:

- Increase household ownership of LLINs to 90% household, and nightly utilization to 85% among children under five years and pregnant women and to 80% among the general population;
    - Increase demand for and intent to use LLINs among the population;
    - Increase knowledge about how to use (e.g. hang, wash, repair, and use) LLINs;
    - Increase the proportion of service providers who promote LLIN use
- Increase the percentage of children under five years of age with fever receiving an appropriate ACT within 24 hours of onset and of all patients with uncomplicated malaria correctly managed at public and private health facilities using ACTs to 90%;
    - Increase the proportion of malaria diagnoses that are laboratory confirmed;
    - Increase awareness of and demand for the recommended ACTs for treatment of uncomplicated malaria;
- Increase early attendance of ANC clinics such that 100% of pregnant women will take at least two doses of IPTp;
    - Create awareness of the benefits and importance of IPTp among women of childbearing age and other influential relatives;
    - Increase the percentage of pregnant women who attend ANC during their first four months of pregnancy and receive their first dose of IPTp after quickening;
    - Increase the percentage of health workers who appropriately instruct, counsel, and give pregnant women IPTp;

- Promote community acceptance of IRS such that at least 90% of structures in targeted communities are sprayed;

Awareness among the general population about basic malaria facts is fairly high. According to surveys conducted over the past three years knowledge that fever is a common symptom of malaria ranges from 77% (NetMark 2008) to 90% (Health Partners 2008); knowledge that malaria is transmitted by mosquitoes ranges from 80% (Health Partners 2008) to 86% (NetMark 2008); and knowledge that LLINs provide protection against mosquito bites that lead to malaria is 92.5% (DHS 2008). However, high awareness is not universal with only 63% identifying AS/AQ as the first-line treatment for malaria and less than 60% aware that the full course of AS/AQ should be completed (DHS 2008).

While awareness about malaria transmission has increased many misconceptions persist. Common misconceptions about the cause of malaria identified in the 2008 NetMark survey include dirty surroundings (42%), eating specific foods (13%), and the weather (13%). In the 2008 Health Partners Group survey over 32% of respondents identified inappropriate methods for preventing malaria (e.g. avoiding the sun, eating or avoiding certain foods, etc.). Moreover, among the general population the word malaria is often used synonymously with fever. High rates of presumptive diagnosis of malaria based on fever contributes to the confusion that all or most febrile illness is malaria. Research conducted in Ghana and West Africa indicate that low LLIN use is at least in part attributed to misconceptions about malaria transmission and to the lack of differentiation between malaria infection and other febrile illnesses.

The PMI BCC and community mobilization strategy aims to address complacency about malaria while promoting accurate information about malaria and positioning malaria control interventions as positive community norms. The strategy uses a combination of mass media (i.e. television and radio), community mobilization, and communications to and through HCWs. Exposure to USAID-sponsored health campaigns in 2010 reached 76% of the Ghanaian population on television and 66% on radio (Synovate Ominbus data). Over the past twelve months PMI has run 2,444 radio spots in six languages with reach in nearly every district in the country and over 1.6 million people have been reached with community mobilization activities. PMI has developed new media spots to elevate awareness about serious complications related to repeated and severe malaria infection (e.g. anemia, child development, and brain damage from cerebral malaria), to dispel misconceptions, and to empower people to use the tools by painting them as positive social norms that are part of a modern lifestyle. The new spots began airing in June 2011. PMI is also developing community mobilization tools (i.e. flip charts, interactive games, etc.) that are linked with the mass media messages and will be provided to community volunteers and other existing groups to promote an integrated approach to behavior change.

In FY11 and FY12, PMI is consolidating BCC activities within one integrated BCC health project to reduce the costs of supporting two partners to conduct similar activities and to concentrate the BCC technical assistance. The consolidation is resulting in a significant cost savings from FY10 levels. Community mobilization will be closely linked with BCC messaging to promote LLIN use, regular ANC attendance and IPTp uptake, early diagnosis, and treatment with ACTs. Specifically, CHVs who are trained to support LLIN distribution and iCCM will also be supported to promote the range of malaria control interventions in their communities.

PMI will assess the effectiveness of the media campaign and revise and/or develop new spots as appropriate. Additionally, PMI will strengthen the integration of BCC messaging in the health care setting to strength the role of HCWs as active promoters of LLINs, IPTp and ACTs (budget and specific BCC activities are detailed in the ITN, MIP, and Case Management sections).

## SURVEILLANCE, MONITORING AND EVALUATION (M&E)

Background

*Routine Data Systems:*
The main sources of routine surveillance information are the GHS's Center for Health Information Management (CHIM), the Integrated Disease Surveillance and Response System (IDSR), and the NMCP's enhanced parallel surveillance system. The CHIM maintains the district health information management system (DHIMS) that serves as the foundation for the country's Health Management Information System. Monthly reports on malaria cases and deaths from all public health facilities and some NGO clinics are reported to DHIMS. These data include both clinical and laboratory-confirmed malaria cases and are managed using Excel spreadsheets at the health facility and national levels. As a result, the system is inefficient, thereby limiting both the timeliness and completeness of data. The DHIMS has been implemented nationally at all health facilities in all regions. However, complete implementation has been hampered by hardware and software problems at the health facility and district levels. The CHIM is scheduled to replace the current DHIMS with the District Health Information System (DHIS2), an open-source web-based tool used for the collection, validation, analysis, and presentation of aggregate statistical data. The system is designed to support integrated health information management activities at all levels of the health system. The initial migration to the DHIS2 is expected to be piloted in two regions in late 2011, and completed in 2012. Historical data from the DHIMS will be migrated to the new system to allow for trend analyses. The DHIS2 will rely on 224 data entry sites; these are comprised of 170 district health facilities and 54 hospitals. Data elements and formats have been harmonized and a center server has been purchased and tested. The remaining obstacles to implementation are training, supervision, hardware, and connectivity limitations in some settings.

In 2000, the GHS through the National Surveillance Unit with collaboration from WHO/AFRO undertook an effort to improve the national infectious disease surveillance system by implementing WHO/AFRO's IDSR strategy. The IDSR provides weekly data on clinically diagnosed and laboratory-confirmed malaria cases and deaths from sentinel health facilities. The strategy has now been implemented nationally; however, data quality varies by district, tending to be better in rural districts.

Data on IPTp coverage, LLIN distribution, malaria cases and deaths and other aspects of Global Fund implementation are collected through a parallel reporting system established and maintained by the NMCP for the purposes of monitoring grant performance and reporting to the Global Fund. These data are collected from the sub-district level and passed through district and regional levels to the national level on a weekly, monthly, or quarterly basis, depending on the measure involved. Data are collated in Excel spreadsheets, analyzed and used at the district,

regional, and national levels. Individual programs have been encouraged to discontinue developing vertical M&E systems in favor of the DHIS2.

*National Surveys:*
The most recent DHS, conducted during the July–October rainy season of 2008 incorporated a malaria module, which included anemia and verbal autopsy evaluations, and communications indicators, among other measures. These data provide baseline estimates (see Table 1 on page 14 for details) for all coverage indicators for use in PMI. PMI is supporting an MICS in 2011 to collect household level data on malaria indicators to provide estimates on all key coverage indicators after three years of PMI implementation.

Progress During Last 12 Months
During Year 1, PMI provided support for the 2008 DHS. PMI also supported the NMCP to organize a workshop with all key malaria control stakeholders to develop a unified and comprehensive M&E plan for malaria control for Ghana. The M&E plan was published in July 2009.

The PMI-supported implementation of the NMCP's M&E plan through a variety of capacity-building activities. The national M&E plan was disseminated, and information officers at regional and district level were trained to improve the quality and utility of malaria data generated by routine systems. In February 2010, PMI and the WHO co-sponsored a workshop to produce priority recommendations for strengthening routine malaria data through the DHIMS. Various stakeholders from the Government of Ghana, international partners, and implementing partners attended the meeting. Priority areas and recommendations included: 1) innovative ways to increase data quality; 2) improving facility data; and 3) methods for optimizing use of facility data by NMCP. PMI sponsored a March 2011 workshop at which the GHS Policy, Planning, Monitoring and Evaluation unit brought disease program officers together to revise patient registers and harmonize data collection forms. In June 2011 NMCP published a summary of 2010 Health Management Information System data in the malaria bulletin newsletter. In 2010-11, PMI procured hardware for the national- and district-level health management information units and is currently supporting upgrades to the NMCP network infrastructure.

Implementation of the anemia and parasitemia surveys in the IRS district (Bunkpurugu-Yuyoo) as part of operational research to compare the impact of annual vs. biannual IRS in the northern savannah setting began in September 2010. Baseline data was collected through household level anemia and parasitemia surveys conducted in October-November 2010 and March-April 2011 (i.e. at the local peak and trough transmission periods). A second series of annual surveys to assess the impact of annual vs. biannual IRS in the study district will be conducted in October-November 2011 and March-April 2012.

Proposed Activities with FY12 funding: ($1,314,000)

1. Strengthen Routine M&E Systems: ($600,000)
   Support the GHS/NMCP to strengthen routine systems for malaria M&E, including training district and regional staff on data collection, analysis and reporting; and limited computer hardware and software to fill gaps. Support strengthening the quality of malaria data

(completeness, accuracy, timeliness, and consistency) at the health facility and district levels. Aid the GHS Policy, Planning, Monitoring and Evaluation unit to disseminate revised patients registers (piloted under the FY11 program in approximately 30 facilities) and to implement a robust malaria module within DHIS2. The target is for routine system to be reliable enough by 2013 to obviate the need for the NMCP to conduct parallel data collection. By that time, regular malaria bulletins, using standardized indicators, will be produced and circulated to managers at all levels. The NMCP will be supported to increasing analyze and utilize data from routine systems to target malaria control programs, instead of having to rely on national surveys. Funds will be targeted roughly proportional to population, with one-third ($150,000) directed toward the USAID focus regions (Western, Central and Greater Accra), and two-thirds ($450,000) going to the remaining 7 regions and to national-level activities.

2. Demographic Health Survey: ($350,000)
   Support the collection and analysis of regional-level household data as part of the 2013 DHS to provide insight into trends in malaria morbidity and mortality.

3. Entomologic Monitoring: ($90,000)
   In collaboration with other partners and national research institutions, continue to support routine insecticide resistance monitoring at a network of sites nationwide. PMI will provide assistance in the form technical assistance, equipment, training, and funding for routine data collection. These resources will leverage other IRS resources for entomological monitoring activities, and will help fill gaps to ensure national coverage.

4. Antimalarial Drug Efficacy Monitoring: ($150,000)
   Support *in vivo* efficacy evaluations of first-line antimalarial drugs in three to four sites where routine periodic evaluations have been ongoing. The WHO protocol, 'Methods for Surveillance of Antimalarial Drug Efficacy' will be followed and the studies will be done in 2013.

5. End-User Verification Survey: ($100,000)
   Implement the PMI protocol to verify end-user receipt of commodities and update the protocol as necessary to address Ghana specific requirements. This tool has been adopted across PMI countries to provide rapid, real-time assessments of the availability of antimalarial drugs at the facility level.

6. Technical Assistance: ($24,000)
   Support for technical assistance from the CDC PMI M&E team. Technical assistance will include working with the NMCP to finalize and implement their harmonized malaria M&E plan, continued support for the implementation and evaluation of the DHIS2 at all levels of the system, and support for the anemia/parasitemia survey.

## STAFFING AND ADMINISTRATION

PMI staff includes two PMI resident advisors, one representing CDC and one representing USAID, one USAID Foreign Service National (FSN) malaria program specialist, and one USAID FSN malaria program management assistant. The PMI staff work collaboratively to oversee and manage all aspects of day-to-day PMI implementation in Ghana.

All PMI team members in Ghana will be part of a single inter-agency team led by the USAID Mission Director or his/her designee in country. The PMI team will share responsibility for development and implementation of PMI strategies and work plans, coordination with national authorities, management of collaborating agencies, and supervision of day-to-day activities. The PMI team will work together to oversee all technical and administrative aspects of PMI in Ghana, including project design, implementing malaria prevention and treatment activities, M&E of outcomes and impact, and reporting results. The PMI resident advisors report to the USAID Mission Director's designee, the USAID Health Population and Nutrition Team Leader. The CDC staff person is supervised by CDC, both technically and administratively. The USAID advisor supervises the PMI FSN staff. All technical activities will be undertaken in close coordination with the MOH, the 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 must be approved by the USAID Mission Director and Controller.

Proposed FY2012 Activities: ($1,450,000)
These funds will be used for coordination and management of all in-country PMI activities including staff salaries and benefits, office equipment and supplies, and routine expenses.

| Table 1 | | | | |
|---|---|---|---|---|
| **FY2012 Budget Breakdown by Partner** | | | | |
| **Partner** | **Geographical Area** | **Budget ($)** | **% of Total** | **Activity** |
| **DELIVER** | **National** | **9,350,000** | **35%** | Procure LLINs for routine distribution and mass campaigns; procure antimalarial medications and laboratory equipment; strengthen logistics and supply chain systems |
| **IQC TO4** | **Northern Region** | **7,400,000** | **27%** | Provide technical assistance (TA), procure pesticides, conduct spraying operations in support of IRS implementation. |
| **New Bilateral** | **National** | **3,480,000** | **13%** | Support LLIN distributions, strengthen malaria Case Management and MIP, and support the national M&E strategy; strengthen NGO capacity and support NMCP management and supervision |
| **BCS** | **National** | **2,300,000** | **9%** | Support malaria BCC activities for all programs focused on vulnerable groups |
| **FRHP** | **Central, Western and Greater Accra** | **950,000** | **4%** | Provide TA to improve systems and facilities; improve planning and logistics management; improve case management and support M&E, |
| **MCHIP** | **National** | **400,000** | **1%** | Pre-service training for nurses, midwives, medical assistants |
| **TBD** | **National** | **550,000** | **2%** | Support implementation of the malaria laboratory policy |
| **TBD** | **National** | **340,000** | **1%** | Various programs |
| **Peace Corps** | **National** | **20,000** | **0%** | Activities related to PMI-Peace Corps initiative volunteers |
| **USP** | **National** | **200,000** | **1%** | Strengthen drug quality monitoring |
| **Measure** | **National** | **350,000** | **1%** | Support the 2013 DHS |
| **CDC** | **National** | **220,000** | **1%** | Provide TA for ento monitoring, for case magement including laboratory diagnosis; and for malaria M&E and FELTP |
| **Admin** | | **1,450,000** | **5%** | |
| **Total** | | **27,010,000** | **100%** | |

| Table 2 (Ghana FY2012 MOP) | | | | |
|---|---|---|---|---|
| **ITNs** | | | | |
| **Proposed Activity** | **Mechanism** | **Total $** | **Geographical area** | **Description** |
| Procure and transport LLINs | DELIVER | 7,200,000 | National | Procure a minimum of 1,350,000 LLINs to replace expired LLINs and to maintain LLIN coverage for vulnerable populations. LLINs may be distributed through routine health services and/or through mass distribution campaigns. |
| TA for LLIN delivery and supply chain | DELIVER | 600,000 | National | Support to GHS to distribute LLINs and provide technical assistance to strengthen routine LLIN distribution planning, logistics, supply chain management, training, and end-user distribution systems. |
| | New Request for Applications (RFA) | 900,000 | | |
| | Focus Region Health Project(FRHP) | 400,000 | Western, Central, Gr. Accra Regions | |
| BCC and community mobilization to promote LLIN ownership and use | Behavior Change Support Project (BCS) | 1,000,000 | National | Support development and implementation of BCC activities to promote LLIN ownership and use, including malaria specific BCC and incorporating LLIN messages into national health promotion BCC. Employ evidence-based and creative communications techniques to promote LLINs. Illustrative activities include mass media, community mobilization activities, and IEC materials. Provide Technical assistance (TA) and support to the NMCP. |
| **SUBTOTAL ITNs** | | **10,100,000** | | |

## IRS

| Proposed Activity | Mechanism | Total $ | Geographical area | Description |
|---|---|---|---|---|
| Support IRS implementation activities, include procurements and TA | IQC TO4 | 7,400,000 | Northern Region | In collaboration with GHS, and with continued focus on capacity building, support IRS operations to cover all communities in at least 9 districts with approximate population of 950,000. |
| CDC expert TDY visit to support entomological monitoring for IRS | CDC | 34,000 | Northern Region and National | Provide TA and quality assurance for entomologic monitoring, including insecticide resistance. management. Budget includes 2 entomology visits including equipment and supplies. |
| **SUBTOTAL IRS** | | **7,434,000** | | |

## IPTp

| Proposed Activity | Mechanism | Total $ | Geographical area | Description |
|---|---|---|---|---|
| Strengthen ANC services and in-service training | New RFA | 400,000 | National | Support the GHS to improve health worker capacity to effectively deliver a package of malaria prevention and care services to pregnant women. PMI support will focus on supportive supervision, on-site training as needed, quality improvement to increase HCW administration of all three IPTp doses, and support for amending WHO guidance. |
| | FRHP | 200,000 | Western, Central, Gr. Accra Regions | |
| Support pre-service training | MCHIP | 200,000 | National | Provide technical pre-service training for nurses, midwives, and medical assistants in prevention of malaria in pregnancy |

| | | | | |
|---|---|---|---|---|
| Support BCC to promote IPTp | BCS | 400,000 | National | Support development and implementation of BCC and community mobilization activities directed toward women of child bearing age and people who are influential to women of childbearing age to promote early and frequent ANC attendance, IPTp uptake, and LLIN ownership and use among pregnant women. Incorporate MIP messages into national health promotion and maternal and child health BCC activities. |
| **SUBTOTAL IPTp** | | **1,200,000** | | |
| **Case Management - Diagnosis** | | | | |
| **Proposed Activity** | **Mechanism** | **Total $** | **Geographical area** | **Description** |
| Procure RDTs and other lab supplies | DELIVER | 550,000 | National | Procure approx. 750,000 RDTs as needed per national needs and contingent with OTSS findings |
| Build capacity for microscopy and RDT use and support implementation of diagnostic policy (laboratory level) | TBD/GHS | 550,000 | National | Support quality malaria testing at the laboratory level to improve capacity. Extend the reach of the quality assurance program to include supervisory field visits and on-the-job training and improved efficacy for RDT use by non-laboratory, front line personnel. Provide TA to address laboratory bottlenecks. |
| TA for diagnostics | CDC | 12,000 | National | Provide TA for microscopy quality assurance going to realize full potential of RDTs at all levels |
| Build capacity for RDT use | New RFA | 250,000 | National | Support the national diagnostic policy and provide TA to expand appropriate RDT use by front line health care workers to include in-service training and supervisory visits by healthcare providers. Also provide support to the NMCP to develop and implement guidelines for expanded RDT use by pharmacists, LCS and CBAs |
| **SUBTOTAL Case Mgmt - Diagnosis** | | **1,362,000** | | |

| Case Management - Treatment | | | | |
|---|---|---|---|---|
| **Proposed Activity** | **Mechanism** | **Total $** | **Geographical area** | **Description** |
| Procure malaria medication | DELIVER | 500,000 | National | Procure rectal artesunate, severe malaria drugs and ACTs in quantities sufficient to fill gaps and prevent stockouts. |
| Support pre-service training | MCHIP | 200,000 | National | Pre-service training for nurses, midwives, and medical assistants in current malaria diagnosis and case management guidelines and treatment protocols |
| Supportive supervision, on-site training, and quality improvement to strengthen malaria case management | New RFA | 350,000 | National | Support on-the-job training and supportive supervision of HCW in public and private sectors on treatment guidelines and adherence to case management protocols and patient education skills |
| | FRHP | 150,000 | Western, Central, Gr. Accra Regions | |
| Support Community Case Management | New RFA | 400,000 | National | Support the NMCP's goal of mass scale up of Community Case management by providing targeted TA and logistical support to address bottlenecks and fill gaps in the national iCCM program focusing on CBAs. |
| Support License Chemical Sellers | New RFA | 230,000 | National | Fill gaps created by the ending of the AMFm pilot in 2012 and support activities to build capacity for improved malaria case management in the private sector. Activities to include training, supportive supervision and BCC. |
| Support BCC to improve care/treatment seeking behavior and increase community mobilization | BCS | 650,000 | National | Support BCC by targeting the general public to promote correct and consistent use of ACTs. Activities will promote appropriate testing and treatment for malaria. These activities to be part of a comprehensive BCC strategy linked to the National Malaria Communication Strategy and will include TA to the NMCC for harmonizing messages. |

| | | | | |
|---|---|---|---|---|
| **SUBTOTAL Case Mgmt - Treatment** | | **2,480,000** | | |
| **Case Management - Pharmaceutical Management** | | | | |
| **Proposed Activity** | **Mechanism** | **Total $** | **Geographical area** | **Description** |
| Strengthen logistics and supply chain systems | DELIVER | 400,000 | National | Provide TA for strengthening logistics/supply chain to improve availability of malaria commodities including SP, RDTs, and other commodities. Activities will focus on addressing bottlenecks in finance, management, forecasting, transportation and reporting systems. |
| | TBD | 100,000 | | |
| Strengthen drug management capacity | FRHP | 200,000 | Western, Central, Gr. Accra Regions | Promote rational use of ACTs by building a more robust monitoring and supervisory system within regional organizations. Activities to include training and TA to hospital Drugs and Therapeutics Committees and supervisory visits by regional and district managers. |
| Strengthen drug quality monitoring capacity | United States Pharmacopeia (USP) | 200,000 | National | Support the strengthening of drug quality monitoring in collaboration with the FDB. Activities to include the expansion of sampling sites and increased enforcement of capacity to raise awareness regarding counterfeiting and substandard medicines. |
| **SUBTOTAL Case Mgmt - Pharma Mgm't** | | **900,000** | | |
| **Capacity Building and Health System Strengthening** | | | | |
| **Proposed Activity** | **Mechanism** | **Total $** | **Geographical area** | **Description** |
| | | | | |

| | | | | |
|---|---|---|---|---|
| Strengthen capacity to implement community-based malaria prevention and control activities | BCS | 250,000 | National | Support the GHS to improve management systems through better supervision of community-based volunteers. Support regional and district staff of GHS to plan and implement community based malaria activities. |
| General capacity building at NMCP and GHS and other GOG partners | New RFA | 150,000 | National | Provide support for networking of NMCP central office with zonal offices. Continue operational support including data management and information technology infrastructure development. |
| Long term training (FELTP) | CDC | 150,000 | National | Support long term training of an individual that builds capacity at the NMCP in monitoring and evaluation or other function as needed. |
| Support for NMCP | New RFA | 200,000 | National | Provide support for supervisory visits and monitoring activities at regional and district level by public health officials including NMCP and MOH/GHS staff in support of NMCP efforts to strengthen overall malaria program management and supervision efforts. |
| **SUBTOTAL - Capacity / Health Systems Strengthening** | | **750,000** | | |
| **Communication and Coordination with other Partners** | | | | |
| **Proposed Activity** | **Mechanism** | **Total $** | **Geographical area** | **Description** |
| Integration with other USG programs | Peace Corps | 20,000 | National | Build on previous activities to continue Peace Corps activities through "Stomping Out Malaria" program |

| | | | | |
|---|---|---|---|---|
| **Subtotal - CC with Partners** | | **20,000** | | |

## Monitoring and Evaluation

| Proposed Activity | Mechanism | Total $ | Geographical area | Description |
|---|---|---|---|---|
| Strengthen routine systems for malaria M&E capacity. | New RFA | 600,000 | National | Support GHS/NMCP to strengthen routine systems for malaria M&E, including training district and regional staff on data collection, analysis and reporting; and limited computer hardware and software to fill gaps. Support strengthening the quality of malaria data, including dissemination of revised patients registers and implementation of a robust malaria module within DHIS2. |
| DHS support | MACRO | 350,000 | National | Support the collection and analysis of household date as part of the 2012 DHS survey |
| Entomological monitoring | TBD | 90,000 | National | In collaboration with other partners and research institutions continue to support routine insecticide resistance monitoring at a network of sites nationwide. |
| Drug efficacy monitoring | NMIMR/**TBD**/CDC | 150,000 | National | Given increased urgency of drug resistance - support enhanced program for routine evaluation of in-vivo efficacy of anti-malarial drugs |
| End use verification | DELIVER | 100,000 | National | Implement PMI standard protocol to verify end user receipt of commodities |
| Technical assistance | CDC | 24,000 | National | Support for technical assistance from the CDC PMI M&E team |
| **SUBTOTAL - M & E** | | **1,314,000** | | |

| Staff and Administration | | | | |
|---|---|---|---|---|
| **Proposed Activity** | **Mechanism** | **Total $** | **Geographical area** | **Description** |
| In-country staff and administrative expenses | ADMIN | 1,450,000 | | Coordination and management of all in-country PMI activities including staff salaries and benefits |
| **SUBTOTAL In-Country Staff** | | **1,450,000** | | |
| **GRAND TOTAL** | | **27,010,000** | | |