This Malaria Operational Plan has been endorsed by the President's Malaria Initiative (PMI) 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 — Year Three (FY 2010)

GHANA

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ABBREVIATIONS

Focus Region Project	New USAID/Ghana health project, to focus on Western, Central and Greater Accra Regions in 2009–2014
ACT	Artemisinin-based combination therapy
AGA	AngloGold Ashanti mining company
AMFm	Affordable Medicines Facility for malaria
ANC	Antenatal care
AOTR	USAID Agreement Officer's Technical Representative
AS/AQ	Artesunate-amodiaquine
AL	Artemether-lumefantrine
ART	Anti-retroviral therapy
BCC	Behavior change communication
BCS	Behavior Change Support Project
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
CMS	Central medical stores
DDT	Dichloro-diphenyl-trichloroethane
DFID	Department for International Development, UK
DHAP	Dihydroartemisinin-piperaquine
DHIMS	District health information management system
DHS	Demographic and Health Survey
DMIS	District Management Information System
DSS	Demographic surveillance site
EPA	Environmental Protection Agency, Ghana
FANC	Focused antenatal care
FBO	Faith-based organization
FDB	Food and Drug Board
FSN	Foreign Service National
FY	Fiscal Year
Global Fund	The Global Fund to Fight AIDS, Tuberculosis and Malaria
GHS	Ghana Health Service
HBMF	Home-Based Management of Fever
HMIS	Health Management Information System
HSS	Health Systems Strengthening
IAA	Inter-agency Agreement
IDSR	Integrated disease surveillance and response system
IEC	Information, education and communication
IMaD	Improving Malaria Diagnostics
IMCI	Integrated Management of Childhood Illnesses
IPTi	Intermittent preventive treatment of infants
IPTp	Intermittent preventive treatment of pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated net
LCS	Licensed Chemical Sellers

LF	Lymphatic filariasis
LLIN	Long-lasting insecticide-treated net
LMIS	Logistics Management Information System
MCH	Maternal and child health
M&E	Monitoring and evaluation
MICS	Multiple Indicator Cluster Survey
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
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
NTD	Neglected Tropical Diseases
NQCL	National Quality Control Laboratory
PEPFAR	President's Emergency Plan for AIDS Relief
PLWHA	People living with HIV/AIDS
PMI	President's Malaria Initiative
PROMPT	Promoting Malaria Prevention and Control in Ghana project
RCC	Rolling Continuation Channel (Global Fund proposal type)
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
RFA	Request for Applications (signifies a new project)
RTI	Research Triangle Institute
SP	Sulfadoxine-pyrimethamine
SPS	Strengthening Pharmaceutical Systems
USG	United States Government
USP	United States Pharmacopeia
UNICEF	United Nations Children's' Fund
USAID	United States Agency for International Development
VCT	Voluntary Counseling and Testing for HIV
WHO	World Health Organization

EXECUTIVE SUMMARY

In December 2006, President Bush announced that Ghana had been selected as one of the 15 focus countries in a five-year, $1.2 billion initiative to rapidly scale-up malaria prevention and treatment interventions in high-burden countries in sub-Saharan Africa. Ghana is now entering its Year 3 planning cycle.

Malaria is transmitted throughout Ghana and the entire population is at risk. Malaria is a major cause of morbidity and mortality directly contributing to poverty, low productivity, and reduced school attendance. Between 3.1 and 3.5 million cases of clinical malaria are reported each year by the Ministry of Health (MOH) and about 900,000 of these cases are children under five years of age.

Ghana has received funding for malaria control from several organizations including the MOH, the World Bank, the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund), Japanese and European foreign aid organizations, other UN organizations, and the President's Malaria Initiative (PMI). Most recently, Ghana was successful with a five-year Global Fund malaria grant in Round 8.

This PMI Year 3 Malaria Operational Plan (MOP) was based on progress in Years 1 and 2 and was developed with the participation of the NMCP and nearly all national and international partners involved with malaria prevention and control in the country. The activities that PMI is proposing to support in Year 3 fit well with the MOH's *Strategic Plan for Malaria Control in Ghana 2008–2015* (National Strategic Plan). Activities supported by PMI were scaled up rapidly in Year 1, and Year 2 activities are ongoing. The following paragraphs describe the progress to date and the proposed activities for Year 3.

Insecticide-Treated Nets (ITNs): The preliminary results of the 2008 Ghana Demographic and Health Survey (DHS), which provide the baseline for PMI Ghana, showed relatively low rates of ITN ownership and use among pregnant women and children under five. Joining forces with the Global Fund, NMCP and other donors, PMI is a major participant in national campaigns for the free, mass distribution of nets; and also provides support for subsidized routine net distribution including voucher schemes and targeted sales in MOH clinics. In Year 2, PMI is procuring and distributing 640,000 LLINs for the nationwide integrated child health/ITN campaign and will procure an additional 130,000 LLINs for distribution through antenatal care (ANC) and child welfare clinics in Western Region and 100,000 LLINs for distribution through the voucher program in Central Region. PMI has also invested in behavior change communication (BCC) and mass media to promote ownership and use of ITNs.

In Year 3, PMI will procure and distribute 1.2 million free LLINs through an integrated national or regional campaign. An additional 350,000 LLINs will be procured to fill gaps through existing mechanisms in four focus regions (Greater Accra, Central, Western, and Northern regions) of which 15,000 will be for PLWHA. PMI will also continue to support the voucher scheme in the Central Region with 100,000 LLINs and BCC activities to reinforce LLIN demand, ownership, and use.

Indoor residual spraying (IRS): Ghana's 2008 – 2015 National Malaria Control Strategy calls for rapid scale up of IRS, building on the successful PMI IRS program in Northern Region and the AngloGold Ashanti (AGA) mining company's program in the Obuasi district. In Year 2,

PMI expanded IRS from five to six districts, protecting over 708,000 residents. The PMI-supported program is rapidly building national capacity and paving the way for further scale up of IRS to one-third of the 138 districts in the country under the recently approved Global Fund Round 8 grant. In Year 3, PMI will support spraying in the same six districts and expand to an additional two districts, protecting over 900,000 persons. Year 3 activities will continue to include technical assistance, environmental compliance monitoring and support for insecticide resistance monitoring.

Intermittent preventative treatment in pregnant women and infants (IPTp, IPTi): Ghana adopted IPTp with three doses of sulfadoxine-pyrimethamine (SP) in 2004. The drug is locally produced and is provided free-of-charge at ANC clinics. In Year 2, PMI is continuing its support of training and supportive supervision of health care workers related to malaria in pregnancy, and will provide supplies to ensure that SP can be administrated under direct observation. In Year 3, PMI will improve the provision of quality, integrated focused antenatal care (FANC) services in 80 targeted districts out of 138 nationwide. PMI will also support non-governmental organizations (NGOs) and NGO networks to extend the reach of malaria in pregnancy interventions to underserved areas. PMI-funded BCC activities will promote early and frequent ANC attendance. In addition, PMI funding will enable the Ghana Health Service (GHS) to sustain an IPTi pilot that was previously supported by the Bill and Melinda Gates Foundation and UNICEF until the World Health Organization endorses this approach.

Case management:
Diagnostics — In Year 2, PMI technical assistance related to malaria laboratory diagnosis was focused on in-service training, supervision, and quality assurance. Procurements of microscopes and laboratory equipment are helping to fill gaps in the national laboratory system. In Year 3, PMI will procure additional microscopes and microscopy kits, and will also procure 600,000 rapid diagnostic tests (RDTs) for distribution in approximately four regions.

Treatment — In Year 2, PMI made an emergency procurement of 1.1 million artesunate-amodiaquine (AS/AQ) treatments to address a predicted stock out. PMI procured additional artemisinin-based combination therapies (ACTs) and artesunate suppositories for pre-referral treatment of severe malaria. Year 2 technical assistance is focused on nationwide training for public and private-sector health care workers and scaling up of home-based management of fever (HBMF). In Year 3, PMI will procure ACTs, artesunate suppositories, and supplies for the treatment of severe malaria in addition to supporting the training and supportive supervision of healthcare workers. PMI will also support the scale up of HBMF in the four focus areas of Greater Accra, Central, Western and Northern regions

Pharmaceutical management — In Year 1, PMI supported an assessment of the pharmaceutical supply chain, which resulted in a plan of action for strengthening the commodity management system. In Year 2, PMI concentrated on implementing that plan, strengthening drug quality monitoring capacity and assisting with the development of a national pharmacovigilance program. In addition to promoting rational use of ACTs, PMI is providing technical assistance to the Food and Drug Board in drug quality monitoring. In Year 3, PMI will continue its support of activities to strengthen malaria drug management and will fund activities nationwide to strengthen public sector procurement and logistic systems, drug quality monitoring capacity, and *in vivo* monitoring of the clinical efficacy of antimalarial drugs.

Capacity building: PMI is continuing its support of indigenous NGOs and faith-based organizations (FBOs) in Ghana. In order to extend the reach of malaria interventions to the community level, PMI in Year 2 is strengthening the capacity of NGOs/FBOs to undertake malaria prevention and control activities, building upon the NMCP's existing NGO subgrants program. In Year 3, PMI will expand its program of subgrants to NGOs to implement ITN, malaria in pregnancy, ACT promotion, and BCC activities. Further, during Year 3, PMI will provide technical assistance to NGOs who have received grants in order to build the capacity to manage and implement those grants. PMI will also support the professional development of key NMCP staff members and continue operational support.

Monitoring and Evaluation (M&E): The NMCP has established a strong foundation for malaria monitoring and evaluation (M&E) but the system remains fragmented. In Year 1, PMI supported the development of a comprehensive national malaria M&E plan, established five sentinel sites for surveillance of malaria morbidity and mortality, and funded the malaria module of the 2008 DHS survey. During Year 2, PMI is supporting the implementation of the national M&E plan and is adding two additional sentinel sites to the original five sites. In Year 3, PMI will continue the support of the seven sentinel sites, and will fund the Malaria Indicator Survey (MIS) to collect data on health care utilization. PMI will also support an assessment of IRS in the Northern Region in order to demonstrate the impact of the PMI IRS program, to confirm the validity of one spray round per year, and to meet MOH/NMCP expectations for IRS programs.

The proposed fiscal year (FY) 2010 PMI budget for Ghana is $34.0 million. Of this amount, 22% will be for the procurement of ACTs and improvement in case management, 37% will support procurement and distribution of ITNs, 20% is for IRS, 4% MIP activities, 7% M&E, and 10% for the other areas of NGO collaboration, capacity building, HIV/AIDS malaria collaboration, and in-country staffing. A total of 45% will be spent on commodities.

PRESIDENT'S MALARIA INITIATIVE

In June 2005, the United States Government (USG) announced a new five-year, $1.2 billion initiative to rapidly scale-up malaria prevention and treatment interventions in high-burden countries in sub-Saharan Africa. The goal of this Initiative is to reduce malaria-related mortality by 50% in PMI countries. This will be achieved by reaching 85% coverage of the most vulnerable groups - children under five years of age and pregnant women with proven preventive and therapeutic interventions, including artemisinin-based combination therapy (ACT), ITNs, IPTp, and IRS.

PMI began in three countries in 2006: Angola, Tanzania, and Uganda. In 2007, four countries were added: Malawi, Mozambique, Senegal, and Rwanda. In 2008, eight additional countries were added to reach a total of 15 countries covered under PMI. Ghana was one of these final eight countries added in 2008. Total PMI funding began with $30 million in FY 06, increased to $135 million in FY 07, $300 million in FY 08 and FY 09, and is expected to reach $500 million in 15 countries by FY 2010.

In implementing PMI, the USG is committed to working closely with host governments and within existing national malaria control plans. Efforts are coordinated with other national and international partners, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund), Roll Back Malaria (RBM), the World Bank Malaria Booster Program, and the

non-governmental and private sectors, to ensure that investments are complementary and that RBM and Millennium Development Goals are achieved. Country Assessment and Planning visits for PMI, as well as subsequent evaluations, are highly consultative and held in collaboration with the NMCP and other partners.

This document presents a detailed one-year implementation plan for the third year of PMI in Ghana. This plan briefly reviews the current status of malaria control and prevention policies and interventions, identifies progress to date, and provides a description of planned Year 3 activities under PMI. The implementation plan was developed in close consultation with the NMCP and with the participation of many national and international partners involved in malaria prevention and control in Ghana. In Ghana, PMI activities were funded at level of $16.9 million in Year 1 (FY 08) and $17.3 million for Year 2 (FY 09). The total amount of PMI funding requested for Ghana in Year 3 (FY 10) is $34.0 million.

MALARIA SITUATION IN GHANA

Disease Burden

Malaria is hyperendemic in all parts of the country, with the entire population of 23.5 million at risk. Transmission occurs year-round with seasonal variations during the rainy season. According to the Ghana Health Service (GHS), 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. The groups affected most by malaria are children under five years and pregnant women who constitute 20% and 4%, respectively, of the general population.

The prevalence of fever among children under five years has also been used as proxy for malaria prevalence. Available data suggest that the prevalence of fever has remained relatively stable at about 22% between 2003 and 2006. The crude parasite rates range from 10–70%, with *Plasmodium falciparum* accounting for about 90–98% of all infections, *P. malariae* for 2–9%, and *P. ovale* for 1%.

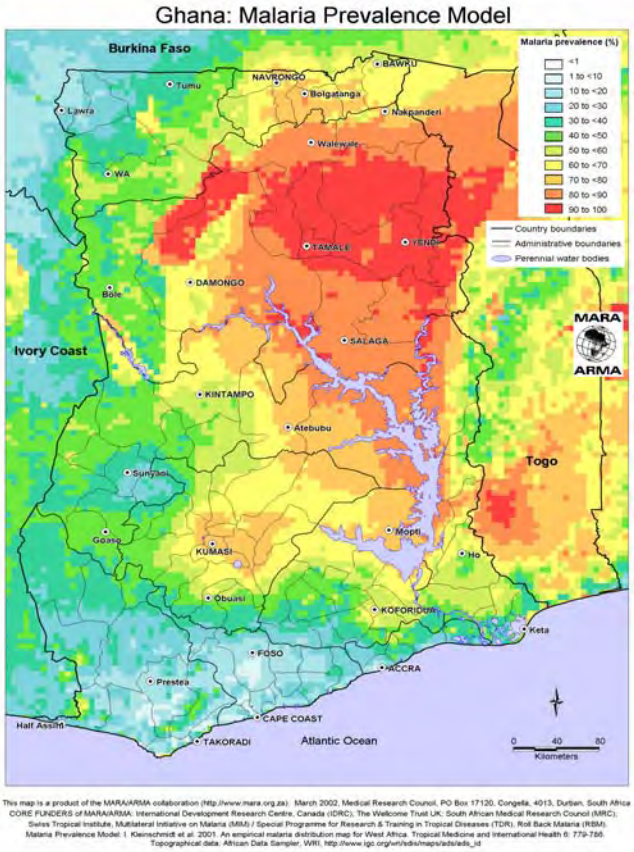
Preliminary 2008 DHS data suggest an under-five child mortality rate of 80/1000, which represents a remarkable 28% reduction in the five years since the 2003 DHS. In a highly endemic country like Ghana, such a rapid decline in child mortality suggests strongly that the malaria burden is also decreasing. This would be consistent with the findings of the recently published *Ghana Impact Evaluation Study* (Macro: June 2008), which was carried out for the five-year Global Fund evaluation. This study reviewed a variety of data sources and concluded that the infusion of substantial sums of money from Global Fund and other sources in Ghana has "resulted in steady improvements in intervention coverage, disease incidence, diagnostics and averted deaths in children".

Distribution of Malaria

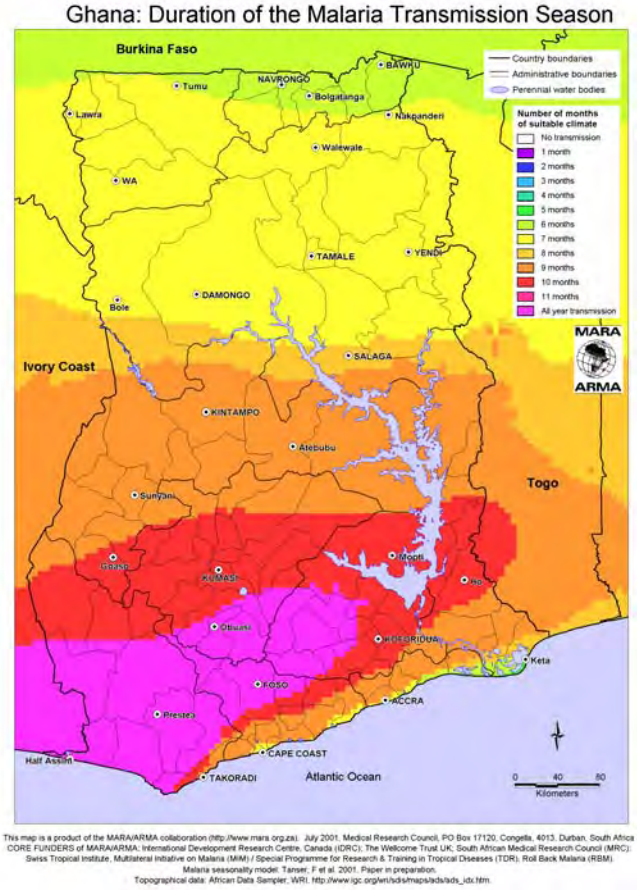
Ghana can be stratified into three malaria epidemiologic zones: the northern savannah; the tropical rainforest; and the coastal savannah and mangrove swamps. The major vectors are *Anopheles gambiae* and *An. funestus*. Characteristically, these species bite late in the night, are indoor resting, and are commonly found in the rural and peri-urban areas where socio-economic

activities lead to the creation of breeding sites. *Anopheles melas* is found in the mangrove swamps of the southwest and *An. arabiensis* in savannah areas of northern Ghana.

Although malaria is hyperendemic in Ghana with year-round transmission, there is pronounced seasonal variation in the northern part of the country, which has 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 through to September. There are no areas of epidemic malaria.



This map is a product of the MARA/ARMA collaboration (http://www.mara.org.za). March 2002. Medical Research Council, PO Box 17120, Congella, 4013, Durban, South Africa
CORE FUNDERS of MARA/ARMA: International Development Research Centre, Canada (IDRC), The Wellcome Trust UK, South African Medical Research Council (MRC), Swiss Tropical Institute, Multilateral Initiative on Malaria (MIM) / Special Programme for Research & Training in Tropical Diseases (TDR), Roll Back Malaria (RBM).
Malaria Prevalence Model: I. Kleinschmidt et al. 2001. An empirical malaria distribution map for West Africa. Tropical Medicine and International Health 6: 779-786.
Topographical data: African Data Sampler, WRI, http://www.igc.org/wri/sdis/maps/ads/ads_id



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Swiss Tropical Institute, Multilateral Initiative on Malaria (MIM) / Special Programme for Research & Training in Tropical Diseases (TDR); Roll Back Malaria (RBM).
Malaria seasonality model: Tanser, F et al. 2001. Paper in preparation.
Topographical data: African Data Sampler, WRI. http://www.igc.org/wri/sdis/maps/ads/ads_idx.htm.

NATIONAL MALARIA CONTROL PLAN AND STRATEGY

Overview of the Health System

The Ministry of Health (MOH) and the GHS collectively oversee both the public health and clinical care sectors in Ghana. The MOH exercises oversight and overall control of the entire health system, as well as policy formulation, and monitoring and evaluation (M&E) of progress in achieving set targets. GHS is largely responsible for delivery of public health and clinical services, operating in tandem with the two functional teaching hospitals in Accra and Kumasi. GHS operates at four levels: national, regional, district, and sub-district. There are over 320 hospitals, 760 health centers, and 1120 clinics in the country. Of these facilities, 83% are in the public sector and 9% are faith-based institutions most of which are closely integrated with GHS. The remaining 7% of facilities in the private sector are found mainly in the larger cities. The penetration of GHS services at the community level is variable. In many rural areas, networks of government-trained community health volunteers 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), initially implemented in 2006. By July 2008, 50% of the population had been enrolled, resulting in increased attendance at health facilities.

National Approach to Malaria Control

The NMCP falls under GHS and enjoys strong leadership, an excellent record of MOH implementation under the Global Fund, and high-level political commitment. The NMCP is

headquartered in Accra, with zonal offices in Accra and Kumasi. The disease control officers and the malaria focal persons at the district and regional levels work closely with the NMCP at the central level. In June 2008 the NMCP led the development of a revised National Strategic Plan, which calls for a reduction in malaria disease burden (morbidity and mortality) of 75% by the year 2015 (using 2006 as the baseline). The primary interventions include early diagnosis with prompt and effective treatment of malaria using ACTs, scaling-up vector control measures emphasizing universal ITN coverage, targeted indoor IRS application in selected areas, and IPTp. The emphasis on ITNs and/or IRS varies by district, depending upon the epidemiological setting and funds available. Other key elements of the National Strategic Plan are to strengthen M&E and operational research; strengthen the health systems that deliver malaria services; create awareness among the community and health workforce; and forge functional partnerships and mechanisms between departments and programs within and outside the health sector.

Key objectives from the National Strategic Plan

INTERVENTION AREA	STRATEGIC OBJECTIVES
ITN use in children under five years	• Increase the number of children under five years sleeping under ITNs to 85% by 2015.
ITNs use in pregnant women	• Increase the number of pregnant women sleeping under an ITN to 85% by 2015.
Malaria prevention in pregnancy	• All pregnant women (100%) shall be on appropriate intermittent preventive treatment (receiving at least 2 or more doses of SP) under direct observed therapy) by 2015.
Malaria case management	• All (100%) health facilities will provide prompt and effective treatment using ACTs. • At least 90% of all patients with uncomplicated malaria will be correctly managed at public and private health facilities using ACTs.
Indoor residual spraying	• Rapid scale up to cover one third of the country and ensure 90% of all structures in targeted districts are covered.

Source: Adapted from NMCP, *Strategic Plan for Malaria Control in Ghana 2008–2015*, March 2009.

Current Status of Global Fund Malaria Grants

While GHS covers most NMCP personnel and operating costs, virtually all NMCP programming in recent years has been funded through Global Fund grants, and this trend is expected to continue. Therefore, a brief review of the status of Global Fund malaria grants is essential for understanding the present and future strategic direction of the NMCP.

The Round 2 grant ($8.9 million) expired in September 2008 and was implemented in 20 districts with a focus on IPTp, ITNs, antimalarial drug policy, and the promotion of HBMF. The Round 4 grant ($38.8 million) expired in March of 2009 and focused on scaling up the activities in Round 2 to cover the population in all 138 districts. Based on its excellent performance rating under the Round 2 and 4 grants, Ghana was invited to submit for a six-year Rolling Continuation Channel (RCC) proposal. The RCC application was submitted in July 2008, with award signing anticipated by the third quarter of 2009. It focuses on three major interventions: scaling up provision of prompt and effective treatment of malaria at health facilities, provision of IPTp to all pregnant women, and targeted provision of ITNs/LLINs to pregnant women and children under five. Whereas the Round 2 and 4 grants aimed at achieving coverage rates of 75% for IPTp and 60% for ITNs, the RCC proposal aims to reach 90% coverage for ACTs at health facilities, 95% coverage of pregnant women with IPTp and 100% ITN/LLIN coverage of children under five and pregnant women. The requested budget amounts to $175 million over six years: $110 million for treatment, $19 million for diagnosis, $2.3 million for malaria in pregnancy (MIP), $34 million for ITNs, $4.1 million for M&E, $690,000 for monitoring drug resistance and $5.3 million for BCC community outreach.

In mid-2009, Ghana is also expected to be awarded an ambitious Round 8 grant, focused on IRS, HBMF, and health system strengthening (HSS). The HBC component targets children under five and intends to expand a successful pilot to 123 districts by promoting improved recognition of malaria symptoms at the household level and deploying trained community drug distributors to provide prompt and effective treatment with ACTs. The IRS component will be implemented by the AngloGold Ashanti mining company (AGA) mining company as the Principal Recipient. It would scale up the current IRS pilot programs from six districts to 45 districts over five years. The Round 8 proposal will also invest in improved awareness of malaria prevention and control at the national and community levels.

The Ghana Country Coordinating Mechanism (CCM) plans to submit a Round 9 proposal for HSS, focused on routine data collection systems in both the private and public sectors. This grant is linked to a tuberculosis proposal, but would benefit M&E for tuberculosis, HIV, malaria and other diseases.

CURRENT STATUS OF MALARIA CONTROL INDICATORS

Main Data Sources

The most reliable household-level indicator data is obtained in the periodic DHS, the last of which was carried out in July–October 2008. The 2008 DHS data provide baseline estimates for key PMI indicators. A Malaria Indicator Survey (MIS) is planned for 2011. It will repeat the malaria-specific content of the DHS survey and will provide data for PMI in Ghana after three full years of implementation.

During the interim between the 2003 and 2008 DHS surveys, United Nations Children's Fund (UNICEF) conducted a Multiple Indicator Cluster Survey (MICS) in August–October 2006. UNICEF also used the MICS methodology in an unpublished 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. A NetMark survey sampled households in six regions in 2004 and 2008, focusing on bed net use.

Trends in Malaria Intervention Indicators

A preliminary report from the 2008 DHS was released in April 2009. The proportion of households owning one or more ITNs increased from 3% in the 2003 DHS to 19% in the 2006 MICS and to 33% in the 2008 DHS. The proportion of children reported to have slept under an ITN the night before the survey was 4% in the 2003 DHS, 22% in the 2006 MICS, and 28% in the 2008 DHS. In the 2003 DHS, ITN ownership was found to vary significantly by region, with the highest rate in the Upper West Region (32%) and the lowest in the Western Region (8%). The proportion of pregnant women reported to have slept under an ITN the night before the survey was 3% in 2003 and 20% in 2008.

Other recent surveys using different methodologies have found higher rates of ITN ownership and usage. Among these was the 2008 NetMark study, which surveyed households with pregnant women and mothers/guardians of children under five years of age in six regions. However, these results are not nationally representative and only represent households with at least one child, while the DHS results are national and include all households.

Implementation of IPTp with SP began in 2003. Coverage with IPTp2 rose from 2% in the 2003 DHS to 28% in the 2006 MICS to 41% in the 2008 DHS. Ninety-five percent of all women responding reported at least one ANC visit with a health professional for the most recent birth in the five-year period before the survey and 78% of pregnant women made at least four ANC visits.

The proportion of children receiving an "appropriate" anti-malaria treatment within 24 hours of fever onset increased from 44% in 2003 (DHS) to 48% in 2006 (MICS), but decreased to 24% in 2008 (DHS). The fall in this proportion is likely due to a change in the drug policy from 2006, when chloroquine was considered appropriate, to 2008 when chloroquine had been removed from the approved list of antimalarial treatments. ACTs were introduced in 2004, and according to the 2006 MICS, only 3.4% of children with fever received an ACT; this increased to 12% in the 2008 DHS.

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	3%	NA	20%

slept under an ITN the previous night			
Proportion of targeted houses adequately sprayed with a residual insecticide in the last 12 months	NA	NA	NA
Proportion of women who received two or more doses of IPTp during their last pregnancy in the last two years	<1%††	28%	41%
Proportion of children under five years old with fever in the last two weeks who received treatment with an antimalarial according to national policy within 24 hours of onset of fever	44%	48%	24%
Proportion of children under five years old with fever in the last two weeks who received treatment with ACTs	N/A††	3%	12%

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

GOAL OF THE PRESIDENT'S MALARIA INITIATIVE

The goal of PMI is to reduce malaria-associated mortality by 50% compared to pre-Initiative levels in PMI countries after three years of implementation. By the end of 2011, PMI will assist Ghana to achieve the following targets in populations at risk for malaria:

- More than 90% of households with a pregnant woman and/or children under five will own at least one ITN;
- 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 houses in geographic areas targeted for IRS will have been sprayed;
- 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 will have ACTs available for treatment of uncomplicated malaria; and
- 85% of children under five with suspected malaria will have received treatment with ACT within 24 hours of onset of their symptoms.

Baseline coverage figures for PMI/Ghana will come from the 2008 DHS data and will be compared to the MICS 2011 survey to gauge overall effectiveness of PMI program.

EXPECTED RESULTS — YEAR 3

Prevention:

- A total of 3.2 million LLINs (of which PMI will contribute 1.5 million) will be distributed. These new LLINs, when added to ITNs currently available in-country, are

expected to achieve the National Strategic Plan target of at least one net per household on average;
- Two additional districts will be targeted for IRS, for a total of eight districts, spraying over 85% of the structures in each district and protecting over 900,000 residents; and
- The number of pregnant women who receive two or more doses of IPTp with SP will increase to greater than 85% in at least 80 districts.

Treatment:
- ACTs, and rectal artesunate, and severe malaria treatments will be procured as necessary to fill gaps at the national and regional levels. These procurements will total $3.4 million in value, and will be complemented by PMI investments to ensure efficient delivery to end users through a strengthened pharmaceutical supply chain;
- 600,000 rapid diagnostic tests (RDTs) and a total of 60 microscopes and/or microscopy kits will be purchased to fill gaps in laboratory coverage. Laboratory training, quality control, and supervision will have been completed for all public health laboratories; and
- Support the training of health workers at different levels of private and public sectors to include new case management policy training in at least 60% of public health facilities.

Other:
- Seven sentinel sites representing all of Ghana's epidemiological zones will continue to collect data on malaria disease burden.

INTERVENTIONS — PREVENTION

Insecticide-treated nets (ITNs)

Background
Historically, the MOH/GHS policy has been to target the most vulnerable groups with ITNs, namely pregnant women and children under five. The 2008–2015 National Malaria Strategic Plan expands this historical mission and now calls for universal coverage for all population groups. The specific national targets for 2015 are to increase the proportion of the general population sleeping under an ITN to 80%, increase household ownership of at least one ITN to 100%, increase the number of children under five sleeping under an ITN to 85% and increase the number of pregnant women sleeping under an ITN to 85%.

Ghana continues to promote a "mixed model" of distribution for ITNs as outlined below:
1. Subsidized distribution at health facilities, including ANCs and child welfare clinics;
2. Discount voucher schemes;
3. Free mass distributions through government-led campaigns;
4. Free or subsidized distributions by NGOs, corporations, and other private entities; and
5. Commercial sales at full cost.

Incorporated into the "mixed model" of distribution are large national integrated campaigns that target specific vulnerable groups. These have been organized to "piggy back" on the integrated maternal/child health campaigns (typically in November) and Child Health Week (typically in May). The campaigns have been either nationwide or have targeted selected regions in some cases. In 2006, 2.1 million LLINs were distributed in an integrated child vaccination/ITN

campaign. In 2007, an additional 1.5 million LLINs were distributed in a similar campaign. Although no national campaign occurred in 2008, UNICEF distributed approximately 400,000 LLINs in a targeted distribution in several selected regions. The next ITN campaign is planned for May 2010, to coincide with the annual child health week, with nets to be contributed by the Global Fund, UNICEF, PMI, and possible other donors.

Ghana also has a vibrant commercial sector that distributes nets at a cost of $6–10 each, depending on size and shape. A local net industry exists on a smaller-scale, which stitches and distributes untreated nets. Many of these have been treated during retreatment programs sponsored by the UK Department for International Development (DFID), PMI and the Global Fund. In addition, there are a variety of target subsidy programs in Ghana that allow ITNs to be sold at a reduced price. A typical end-use price varies from $0.50 to $4.00, depending on the type of net and the actual price paid for the net is $1.00 – $1.50. PMI supported LLIN distribution to pregnant women and under fives in the Central Region through a voucher scheme in 2008 and supported the increase of the subsidy value nationally. PMI also provided training and supplemental funding to voucher schemes in four southern regions, which are run by the GHS with Global Fund support.

The MOH supports a national highly subsidized routine net distribution program through MOH antenatal and maternal and child health (MCH) clinics for pregnant women and children under five. This program runs parallel to the voucher scheme in five regions. As currently conceived, the RCC Global Fund grant will target four of these regions for subsidized sales through the voucher scheme at health facilities, while in other regions the nets may be provided free of charge. It is not clear whether this approach will be politically or technically feasible. In response to such challenges and uncertainties, the NMCP has proposed to conduct a review of the voucher schemes and other routine distribution methods, with future programming of Global Fund presumably dependant on the results. Ensuring sustainable net supplies to all health facilities for routine distribution to pregnant women and children under five has been a persistent problem.

Current Status and Gap Analysis

The previously cited 2008 DHS data suggest that, although ITN ownership and use has increased greatly, it remains well below national and PMI targets. In addition to PMI, three other principal donors support ITN distribution in Ghana. The Global Fund supports ITN distributions by 50 local NGOs. The recent RCC proposal to the Global Fund is providing more than $34 million over six years to scale up the ITN distributions from expiring Round 2 and 4 grants. Ghana expects approximately 1.8 million LLINs to be made available from the Global Fund over the next two years: 742,630 in 2009 and 1,035,008 in 2010. The World Bank also has been a consistent net provider with an estimated 200,000 ITNs per year. UNICEF also has supplied nets with over 1 million ITNs contributed in the 2007 and 2008 campaigns.

Ghana conducted a gap analysis for the Global Fund Round 8 proposal that included LLIN requirements for pregnant women, children under five years, and a scale up to cover all remaining populations to achieve universal coverage. These data are presented below along with estimates of expected procurements from the principal donors for 2009 and 2010. The resulting gap in the number of LLINs needed is also calculated.

ITN Gap analysis

	2009	2010	Total
Need by category	**Number of LLINs**		
Children under 5 years	742,630	1,035,008	1,777,638
Pregnant women	329,306	254,578	583,884
Scale up additional population for universal coverage	2,435,054	781,292	3,216,346
Total need	**3,506,990**	**2,070,878**	**5,577,868***
Expected procurements			
GF	742,630	1,035,000	1,777,630
UNICEF	430,000	400,000	830,000
WB	200,000	200,000	400,000
PMI	680,000		680,000
NMCP	250,000		250,000
Total expected procurements	**2,302,630**	**1,635,000**	**3,937,630**
GAP	**1,204,360**	**435,878**	**1,640,238**

*The NMCP rounds up and considers 6 million as the total need.

Progress During Last 12 Months

During Year 1, PMI supported voucher schemes in five regions in partnership with the Global Fund and NetMark (more than 236,000 vouchers redeemed with PMI support) and PMI had an active role in promoting commercial distribution of nets (over 1.23 million ITNs sold by commercial partners). Subsidized sales in MOH clinics were supported through the procurement of 350,000 LLINs for Western Region. PMI supported mass re-treatment campaign of more than 429,000 nets during Year 1, but has since focused solely on LLINs (it is estimated that a majority of these retreated nets have either been replaced by LLINs or are falling into disuse). PMI also developed and implemented BCC programs, and supported the development of an ITN database to assist the NMCP with the management and distribution of ITNs.

In Year 2, PMI is procuring 640,000 LLINs for a nationwide integrated maternal child health campaign and continues to advocate for additional nets from various other donors. PMI supported the distribution of an additional 100,000 nets in the Central Region through a voucher scheme and will procure 130,000 LLINs in a subsidized program in targeted regions for vulnerable groups.

Support in the form of technical assistance is being provided to strengthen and enhance the sustainability of net distribution and logistics systems. PMI is providing technical assistance to the NMCP and other partners for ITN distributions. PMI will provide funding to address bottlenecks in net distribution, as well as technical assistance to support campaign planning, organization, and logistics.

Proposed Year 3 Activities: ($12,450,000)
Given the lower-than-expected net ownership and usage in the 2008 DHS, PMI Ghana is proposing to support a more aggressive "catch up" strategy in Years 2 and 3. In Year 3, PMI plans are to focus on mass campaigns for the free distribution of LLINs to vulnerable groups, support the distribution logistics, fill gaps in routine distribution, continue support to the voucher program, and support BCC activities.

Of note, in the area of system strengthening for ITN distributions, as well as in ACTs and M&E, PMI will take advantage of the new Focus Region Project, 5-year framework for USG assistance to the MOH, which is being set up with United States Agency for International Development (USAID) support beginning in 2009. By concentrating resources and management innovations in Western, Central, and Greater Accra Regions, this new framework aims to make a significant impact toward addressing serious health system weakness. By resolving financial, administrative, and logistic bottlenecks, this partnership with the MOH will benefit MCH, family planning, nutrition, and malaria programs, among others. The three regions were selected for focused USG support for their strong potential in the area of public–private partnerships and to fill geographic areas not covered by other major donors such as UNICEF, the Global Fund, and the World Bank.

1. Support procurement of LLINs for 2010 nationwide integrated campaign: ($6,600,000)
   Procure 1,200,000 LLINs for free distribution to vulnerable groups in the 2010 integrated national campaign and/or subsequent national or regional campaigns as they become known. The PMI team will work with the NMCP and other partners to advocate for additional support from other donors to ensure that nationwide ITN needs are met for these campaigns. Geographic targeting will depend on previous campaign results and MOH guidance.

2. Logistical support for net distribution: ($650,000)
   Provide logistic support and other technical assistance to GHS/NMCP for the 2010 campaign(s) to strengthen the logistical management of the campaign, to improve ITN distribution to the end-user.

3. Support for planning, logistics, distribution, BCC and evaluations for the 2010 nationwide integrated campaign: ($725,000)
   Provide technical assistance to GHS to improve planning, operations, BCC, and post-campaign evaluation for the nationwide 2010 maternal/child integrated campaign and/or other campaign(s). BCC activities will include community mobilization; hang-up activities; IEC; mass media; etc. This will focus on improving ITN uptake and use by households. The activity will leverage the campaign contributions of other partners (such as UNICEF, the World Bank, Global Fund and NMCP), which historically have been devoted primarily to net procurement.

4. Procure LLINs for distribution to vulnerable groups: ($1,925,000)

Procure 350,000 LLINs for routine distribution to pregnant women, children under five and PLWHA in targeted regions (Greater Accra, Central, Western and Northern). The focus will be to fill gaps in existing systems through targeted sales at ANC and child welfare clinics and through NGO distributions during community mobilizations to ensure vulnerable groups have adequate supplies of nets. At least 15,000 LLINs will be targeted for PLWHA. Distribution procedures and any co-pays by end users will be consistent with national guidelines at the time. For example, the NMCP is likely to continue its current policy of collecting $1.50/net copay from subsidized sales at MOH clinics, 30 cents of which stays at the district level, while the remainder is used to fund ITN activities. In 2009, the NMCP used such recouped funds to purchase 250,000 ITNs for the national campaign.

5. Provide technical assistance for the routine LLIN distribution program to vulnerable groups in focused regions: ($300,000)
   Provide technical assistance to systems and facilities in three focus regions to improve planning, logistics, management and operations for routine LLIN distribution to vulnerable groups. Assistance to be integrated with maternal/child health activities.

6. Support routine ITN distribution through a voucher scheme in the Central Region: ($800,000)
   In keeping with NMCP expectations, and capitalizing on the program's history of high redemption rates, PMI will maintain support for the voucher scheme in the Central Region. The scheme will distribute at least 100,000 LLINs, targeting pregnant women and children under five ($550,000). To reach these populations, vouchers will be made available at public health facilities, including ANC and child welfare clinics. Technical assistance ($250,000) will also be provided to target pregnant women and children under five through community mobilization. Expansion of voucher schemes into new regions is not envisioned at this time.

7. Support the World Health Organization: ($50,000)
   Support the World Health Organization (WHO) country office to provide technical assistance to WHO inter-country teams on ITN distribution, replacement and use. The WHO country office will access regional expertise to conduct an assessment of ITN distribution channels in Ghana, documenting best practices to guide future programming. (The WHO inter-country team has proven capacity to provide the NMCP with valuable targeted technical assistance, such as during the drafting of the new National Strategic Plan in 2008.)

8. Support BCC activities to promote ITN use: ($1,400,000)
   PMI will support BCC activities at the national level utilizing mass media, IEC, community mobilization and other innovative approaches to promote ITN use. Activities will focus on ensuring the consistency of NGO subgrantee activities with national efforts, and may include door-to-door hang up campaigns to encourage use. Malaria content will be highlighted in national MCH messaging. This PMI investment in BCC activities for ITN uptake is substantial, and it addresses an identified NMCP priority. In order to maximize efficiency and impact, it will be coordinated with the BCC activities of other partners through the newly formed national malaria communications committee.

Indoor Residual Spraying (IRS)

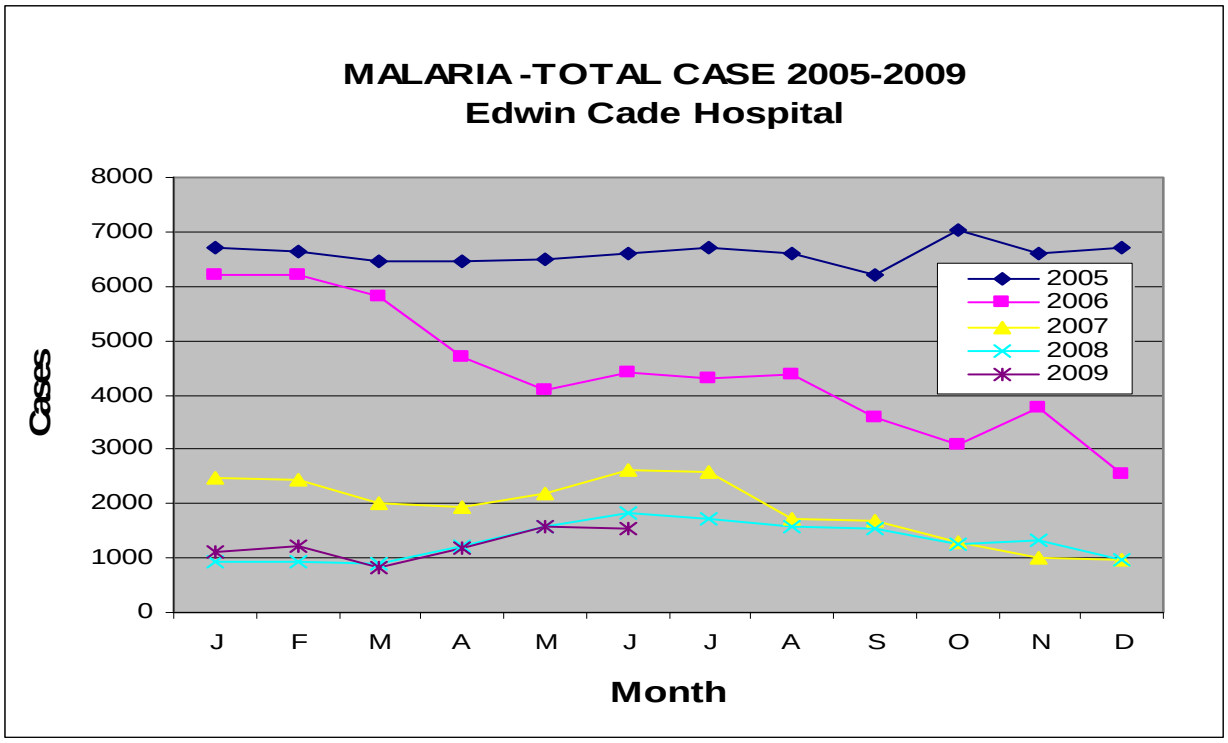
Background

Ghana continues to move vigorously to adopt IRS as one of the major interventions in the national malaria control strategy. Until 2005, IRS had been undertaken sporadically and on a limited scale, mainly by small private interests, and in some cases funded by NGOs, tourist resorts, or district assemblies (as in the Northern Region). In the past four years, several major developments have taken place and have brought IRS to the fore. On the international front, WHO began recommending IRS for consideration in areas of hyperendemic transmission. At the local level, there was the successful piloting of IRS in the Obuasi District by AGA, beginning in 2005. In April 2007, the National Policy for Vector Control was rewritten to incorporate IRS as part of an integrated vector control program.

The momentum continued to build in the 2008, as PMI supported the first large-scale implementation of IRS in the public sector (a 5-district pilot in Northern Region), and as the new National Strategic Plan called for scaling up of IRS rapidly to protect "at least one third of Ghana's districts by the end of 2015." It is anticipated that in late 2009, the Global Fund will complete its Round 8 award process for a major 5-year grant focusing on the scale-up of IRS in Ghana, with AGA as the Principal Recipient. The grant is expected to provide approximately $110 million for implementation of IRS in approximately 35 districts by 2013, covering up to 2 million households.

AGA's "Obuasi Model" and Scale-Up Under the Global Fund

The Obuasi spray program provides an in-country example of a well-managed and well-supported spray operation, with excellent physical infrastructure in terms of spray operators and insecticide storage facilities, training, information management and community outreach facilities, transportation and logistics. The company's main health facility reported a remarkable and sustained 75% decrease in malaria cases between 2005 and 2008 (see figure below).



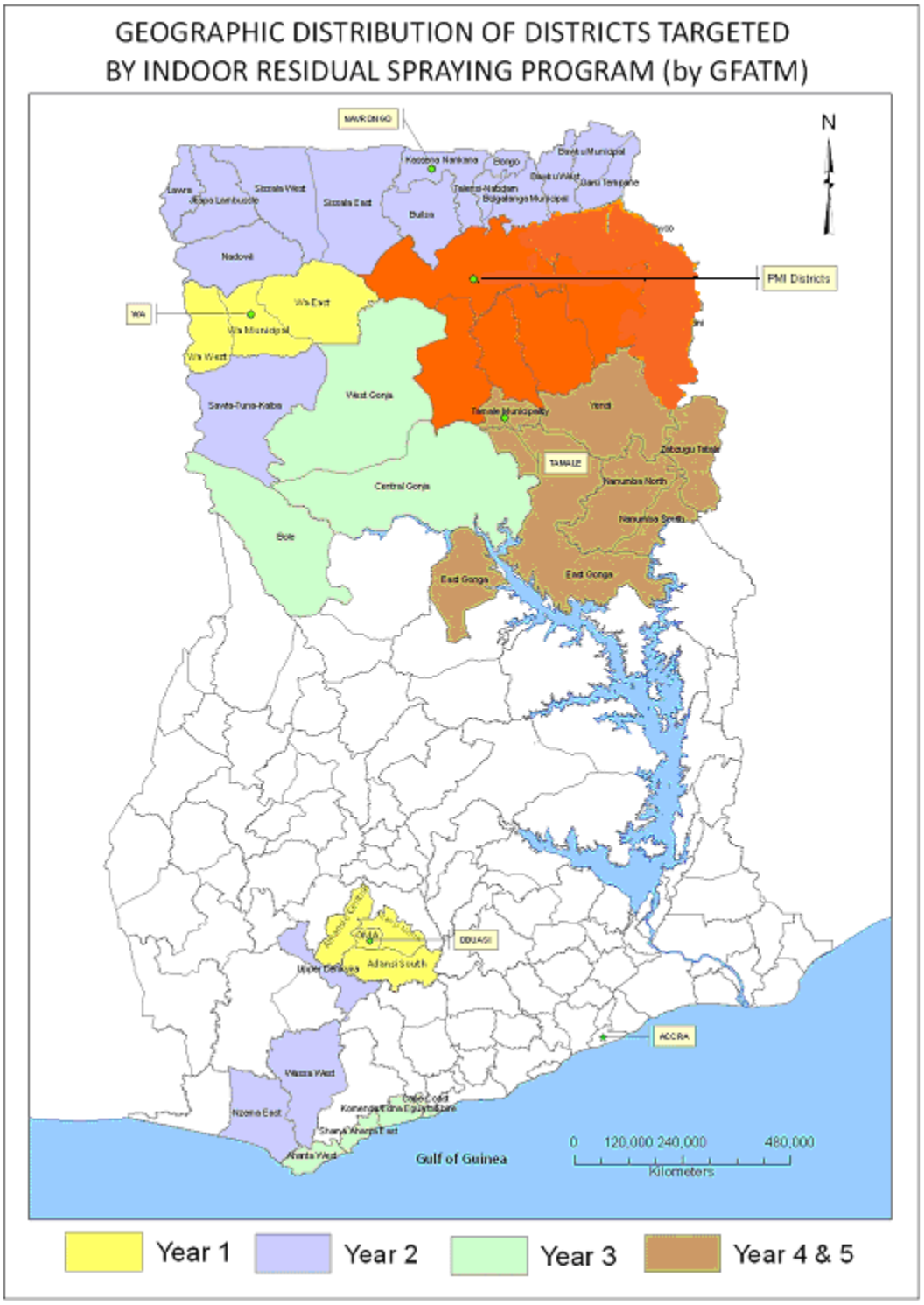
Monthly Malaria Caseload, Edwin Cade Hospital, Obuasi, Ghana 2005–2009. Source: AngloGold Ashanti Malaria Control Program, July 2009.

The PMI–supported approach differs somewhat from the Obuasi Model in that it targets no major urban areas and employs spray teams on a seasonal basis only, relying on one, not two sprays rounds per year. And importantly, its field operations rely heavily on the existing systems of the GHS, in terms of physical structures (e.g., for storage and office space), human resources for training and supervision (e.g., the NMCP officers and regional and district disease control officers), and community mobilization (e.g., the network of community health volunteers). The PMI–supported operations have benefited from AGA assistance and collaboration, particularly in the areas of community sensitization, training of trainers, and training of spray operators.

The plan under the Global Fund Round 8 grant is for AGA to expand into districts around Obuasi, as well as setting up its first remote operations in selected districts of the Upper West Region. To the extent that funding and logistical constraints allow, the program design will adhere fairly closely to the Obuasi Model operationally. It is expected, however, that the approach will also incorporate key elements of the PMI pilot experience, including the need to set up cost-effective operations far from the mining facilities, the need to build on existing GHS systems, and the need to adapt to the north's vast challenging terrain.

In the second year of the Round 8 grant (2010–11), coverage is expected to expand into all of Upper West and Upper East Regions, using the health research center as a focal point for entomologic monitoring and other operations. Close cooperation with the PMI–supported program in the Northern Region is anticipated, including joint investments in entomologic monitoring (e.g., in Navrongo and Tamale); cooperation in training; and joint planning in areas such as procurement, M&E, and insecticide resistance among others.

Districts identified for coverage under the Global Fund scale-up were selected based high malaria burden, more pronounced seasonal peaks in transmission, and, in some cases, on socio-economic factors such as the presence of mining companies and plantations. The Global Fund IRS plans were based on technical inputs from the NMCP, AGA, WHO, PMI, and other key malaria partners; they recognize the need for IRS expansion to be done carefully and with appropriate preparations, in terms of the entomological surveys, the mapping and logistics needs, and the development of community support. (See map below)



Source: Ghana CCM, Round 8 GFATM Malaria Proposal, June 2008

Insecticide Resistance Issues

Insecticide resistance presents a major challenge for IRS operations in Ghana. The University of Witwatersrand in South Africa is providing support to the AGA IRS operations in Obuasi. In a paper published in 2006, the Obuasi group found high levels of resistance to dichloro-diphenyl-

trichloroethane (DDT), bendiocarb, propoxur and some pyrethroids in *A. gambiae* ss and resistance to DDT and bendiocarb in *A. funestus*. The widespread resistance to DDT and other pesticides has been attributed to decades-long use in agriculture, e.g., on cocoa farms. With support from PMI Ghana, the Noguchi Memorial Institute for Medical Research (NMIMR) conducted insecticide susceptibility studies in Northern Region in 2008 to support IRS operations. Susceptibility to pyrethroids was high. Repeat testing is planned for June–July, 2009.

Progress During Last 12 Months

In Years 1 and 2, PMI implemented IRS operations in the Northern Region (savannah zone) in collaboration with the GHS. In Year 1, five districts were targeted; a sixth was added in Year 2. Spraying took place at the start of the rainy season, May through July. Districts were targeted based on high malaria burden, pronounced rainy season transmission, and logistic feasibility. A pyrethroid insecticide, alpha-cypermethrin, was selected based on susceptibility studies carried out by NMIMR, and applied for two consecutive spray rounds.

Planning, surveillance, logistical preparations, and training took place in late 2007 and early 2008. More than 330 spray operators and 138 community volunteers were trained and deployed in 2008. By the close of operations in August, the program exceeded its targets of covering at least 85% of sprayable structures in each district, and protecting at least 500,000 persons. The support of government officials, traditional leaders, and local families was such that in many localities, acceptance rates approached 100%. At the final tally, 68,252 structures were sprayed, and the total population protected was 601,973. Of these, over 108,000 were children under the age of five and 14,000 were pregnant women. Post-spray entomologic monitoring exercises conducted by the NMIMR demonstrated an acceptable level of residual pesticide activity at six and eight months post-spray.

In Year 2, PMI, in collaboration with the NMCP, district health teams, and other partners, again supported IRS and entomological monitoring in the Northern Region, this time expanding into a sixth district. The second spray round was completed in late July, 2009. The operations achieved 90% coverage of sprayable structures, and protected 708,103 people in the six districts, thereby meeting or exceeding their Year 2 targets.

The post-spray entomologic monitoring planned in the coming months will inform the choice of Year 3 pesticide, among other planning decisions. Shortages of trained field personnel in the Northern Region and an impractical contractual arrangement caused some delays in the entomologic monitoring program in Year 1. However, the program was placed on firmer footing for Year 2 through the training of field technicians, the seconding of an entomologist to the Northern Region public health directorate, and the reconfiguration of the partnership with NMIMR's team of experts.

Proposed Year 3 Activities: ($6,664,000)

The NMCP wants PMI to expand its geographic coverage if possible. The assumption for Year 3 is that PMI will support a similar IRS operation in the Northern Region building on the success of the first two years. The operation will expand into an additional two districts if feasible, for a total of eight districts covered and a projected 900,000 people protected. Building national capacity and transferring increasing responsibility for IRS operations to the MOH will continue to be guiding principles in Year 3.

The assumption for PMI planning purposes has been that just one spray round will be conducted annually, to be carried out at the start of the rainy season. The target area was selected not only for its high malaria burden, but because of its apparent suitability for a single spray round per year, based on its short peak malaria transmission season. However, a final determination on whether a second spray round is necessary and cost-effective will need to be made, once sufficient post-spray entomologic data has been collected and analyzed. The need for the PMI pilot to demonstrate the validity of a single spray round will increase if and when adjacent districts are being sprayed twice per year under the Global Fund program.

It will be critical for PMI–supported IRS activities to be well harmonized with those of Global Fund. For the foreseeable future PMI and Global Fund programs will work in different districts, following a step-wise process of increasing harmonization and collaboration. Formal coordination will occur through the newly formed national Malaria Vector Control Oversight Committee. Resistance monitoring and insecticide selection, building of local IRS capacity, selection of districts, and long-range planning will be among the areas requiring close collaboration. In this manner, PMI can help the NMCP to achieve its optimal cost-effectiveness, public health impact, and long-term sustainability of their IRS program. As mentioned, opportunities for joint investments of mutual benefit should be explored, for example is equipment and training for enhanced entomologic monitoring.

1. Support for IRS program implementation: ($6,600,000)
   In collaboration with GHS and with a focus on building local capacity, support the implementation of the third year of the IRS program in Northern Region. This will encompass entomological assessment and monitoring; spray operations; data collection; BCC activities including community mobilization; and logistics support to cover at least 900,000 persons in at least eight districts. Activities will include continued support for program offices in Accra and Tamale, procurement of insecticide, procurement of IRS equipment as needed to complement Year 2 stocks, support for appropriate supervision by GHS and Environmental Protection Agency (EPA) personnel, and collaboration with the Global Fund IRS program and other partners.

2. Technical assistance for IRS implementation including entomologic monitoring: ($34,000)
   Provide technical assistance for entomologic monitoring resistance testing. This will include two visits and support for specific reagents and other laboratory diagnostic materials.

3. Environmental compliance monitoring for IRS: ($30,000)
   Conduct an independent evaluation of the PMI–supported IRS operations' environmental compliance. This is to be carried out in collaboration with the EPA, the NMCP, and appropriate USG officials at the Ghana USAID Mission and PMI headquarters level. Environmental compliance will be assessed against appropriate international and national yardsticks, including the Pesticide Evaluation Report and Safer Use Action Plan that was developed at the commencement of PMI–supported IRS operations in early 2008.

Intermittent Preventive Treatment in Pregnant Women (IPTp)

Background

Malaria during pregnancy is a serious public health problem in Ghana, accounting for 14% of outpatient attendance by pregnant women, 11% of hospital admissions, and 9% of maternal

deaths (MOH/GHS, 2008). Ghana has adopted a three-pronged response to this problem: 1) use of IPTp with SP, 2) sleeping under an ITN, and 3) prompt case management. IPTp with SP was adopted as the national policy in 2004, which calls for three doses of SP to be administered to HIV-negative pregnant women starting after quickening (16 weeks or thereafter). 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 objective of the revised national malaria strategy is 100% coverage of all pregnant women in Ghana with IPTp by 2015.

Attendance at ANC clinics has risen in recent years, with the percentage of women attending ANC clinics four or more times increasing from 69% in 2003 (DHS) to 78% in 2008 (DHS). The 2008 DHS found that 55% of pregnant women made their first ANC visit before the fourth month of pregnancy and 87% made their first visit before the sixth month.

By 2005, one year after it became a national strategy, IPTp had been scaled up to all districts nationwide. Two recent population based surveys, the 2006 MICS and the 2008 DHS, found that 67% and 41% of pregnant women respectively took at least two treatment doses of SP during their last pregnancy. Also in 2008, PMI supported a health facility survey that found that 62% of pregnant women who visited health facilities were documented to have received IPTp1, 38% IPTp2, and 36 % IPTp3. This survey found that IPTp is offered in 94% of facilities sampled; however, SP stock outs had occurred in 27% of health facilities in the previous six months. These stock outs are likely related to supply chain management programs rather than a drug shortage at the central warehouses.

The treatment regime for uncomplicated malaria for pregnant women in the first trimester is a seven-day course of oral quinine alone, or a three-day course of quinine in combination with clindamycin. The treatment of choice in the second and third trimesters is a seven-day course of oral quinine, or a three-day course of an ACT. Severe malaria during pregnancy is treated, as are other cases of severe malaria, with a course of intramuscular or intravenous quinine depending on the setting.

Progress During Last 12 Months:
ANC clinic attendance continues to increase and uptake of IPTp appears to be rising, but much remains to be done to reach PMI and NMCP targets. In order to improve the delivery of IPTp and case management of malaria, PMI efforts in Year 1 focused on revising and finalizing training tools for both pre- and in-service training for nurses and midwives at all levels of the health system. Training of trainers for in-service training is expected to be completed by the end of 2009. The training of health workers in all GHS facilities is expected to be completed by mid-2010. Another accomplishment that will assist the MOH and PMI to achieve their goals was the successful application for the Global Fund RCC proposal, which included considerable support for MIP, including IPTp.

Proposed Year 3 Activities: ($1,250,000)

1. Strengthen FANC to deliver a package of malaria prevention and care services to pregnant women: ($650,000)
   Provide support to improve the provision of quality, comprehensive and integrated FANC services to enhance malaria prevention and care to pregnant women, including the use of an ITN and complete three doses of IPTp. National and health facility–level support will

include improving health worker capacity to effectively deliver a package of malaria prevention and care services, e.g. support supervision, training, and quality assurance. Partners may purchase limited quantities of water filters, cups and other supplies. This activity should target at least 80 districts.

2. Strengthen malaria in pregnancy (MIP) interventions at the community level: *(cost included under NGO capacity building activity)*
   Support NGOs to extend the reach of MIP interventions, in particular, to increase attendance to ANCs and use of IPTp early in pregnancy; to promote use of ITNs by pregnant women; and to promote the prompt recognition and treatment of malaria in pregnant women.

3. Support BCC to increase full adherence to IPTp: ($400,000)
   Support BCC activities focused on vulnerable groups to improve early presentation at ANC and increase full adherence with IPTp. This will be integrated with case management BCC activities. Care will be taken to ensure that these BCC activities are not duplicative of those covered in the ITN section.

Intermittent Preventive Treatment of Infants (IPTi)

Intermittent preventive treatment of infants (IPTi) consists of the regular administration of treatment doses of an antimalarial drug given at the time of routine infant immunization visits (usually at 8–10 and 12–14 weeks of age and again at 9–12 months of age) to reduce the severe consequences of malaria during the first year of life. Evidence from pilot studies in Ghana and elsewhere, many of them supported by the Gates Foundation, recently led the WHO to recommend that IPTi be scaled up in Africa. The WHO is currently preparing guidelines for the IPTi scale-up.

In Year 1 and 2, PMI/Ghana supported the continuation of a GHS IPTi pilot in the Upper East Region that had previously been supported by the Gates Foundation and UNICEF. The rationale at the time was to ensure that this first-hand in-country experience was not lost, pending a final WHO recommendation. It is now expected that the GHS will be reviewing its IPTi policy in 2009–10 with the likely intention of scaling up the intervention.

Proposed Year 3 Activities: ($200,000)

1. Support the GHS to implement IPTi: ($200,000)
   Provide support for the development of national implementation plans for IPTi, in response to the recent WHO recommendation for scale-up. As it is not yet clear how much of a priority the Ghana Health Service will place on IPTi going forward, PMI will maintain a flexible stance. PMI will provide technical assistance to the NMCP to build capacity and quality assurance for IPTi. PMI will also support the GHS to begin scaling up IPTi in targeted regions, assuming that it is consistent with the national strategy in Year 3 (2010–11) and that the activity does not detract from other malaria control interventions.

INTERVENTIONS — CASE MANAGEMENT

Malaria Diagnosis

Background

The NMCP has indicated that improving laboratory capacity for malaria diagnosis is a priority, particularly in the context of large-scale implementation of ACT as first-line therapy in Ghana. The recently finalized GHS policy on laboratory diagnosis recommends the use of laboratory tests, either microscopy or RDTs, in patients over five years old for confirmation of malaria. Diagnosis of malaria in children under five years old can be based on clinical grounds alone in areas of high endemicity, following Integrated Management of Childhood Illnesses (IMCI) guidelines. National policy is to integrate this approach into HBMF, a strategy to provide treatment of malaria, acute respiratory infections, and diarrhea in children under five years old at the community level.

According to the NMCP, regional hospitals, district hospitals, and some health centers at the sub-district level should employ microscopy whenever feasible. The NMCP is interested in improving microscopy but by no means replacing it with RDTs, since the former is still considered the gold standard for malaria diagnosis. A PMI–funded project helped coordinate discussions that that led to the clarification of RDT's role in the National Guidelines for Laboratory Diagnosis of Malaria. The use of RDTs will be prioritized at CHPS compounds and health facilities (polyclinics, health centers) that do not have capacity to perform microscopy. Allowance is made for the use of RDTs at hospitals if caseloads overwhelm laboratory capacity.

It is generally recognized that laboratory services in the public sector are weak, with inadequate infrastructure, insufficient stocks and quality of equipment and supplies, and inadequately trained laboratory personnel. Routine supportive supervision and quality control activities do not take place consistently due to financial and human resource constraints at all levels. In 2008, a PMI–supported nationwide malaria laboratory assessment found that only 63% of health facilities performed thick and thin slide preparations. Appropriate and regular use of malaria laboratory tests is the exception rather than the rule.

An additional health facility survey supported by PMI in 2008 collected data on malaria diagnosis. This survey's report states that 80% of children under five years old who were identified as having malaria by a healthcare provider indeed had malaria based on expert re-examination of patients. However, 42% of true malaria cases were not identified as malaria by healthcare providers. The specificity of malaria diagnosis in children under five was low, with only 58% of cases that were not malaria being classified as not being malaria. Specificity for those over five was higher, at 81%. In addition, only 37% of facilities surveyed had a laboratory. All teaching, regional, and district hospitals surveyed had laboratories. However, of the facilities with laboratories, 36% did not have all items for malaria microscopy (functioning electric binocular microscope, slides, Giemsa stain, and a trained laboratory technician). Blood smears were performed on low proportion of patients hospitalized with severe malaria (varying from 16% to 56% among health facilities) — even though national treatment guidelines require laboratory confirmation in all such cases.

Progress During Last 12 Months

During Years 1 and 2, PMI supported an assessment of the Public Reference Laboratories and health facilities that provided valuable information to guide efforts to strengthen malaria laboratory diagnosis. In addition, a national laboratory working group was convened in May 2008 and worked, with PMI support, on updating the national policy on diagnostics in Ghana. Plans for training of laboratory technicians were developed and implementation started in mid 2009. Finally, recently obligated FY 08 PMI funds were used to purchase microscopes and microscopy supplies to help fill gaps in laboratory equipment.

Proposed Year 3 Activities: ($1,112,000)

1. Procure microscopy equipment and laboratory supplies: ($150,000)
   Procure additional microscopes and microscopy kits (reagents, slides, lancets, etc) to further improve laboratory capacity in Ghana. This funding level will be able to procure approximately 60 microscopes and/or microscopy kits (each kit sufficient for 10,000 tests). Considering the microscope procurements planned by other partners, notably the Global Fund, PMI emphasis will be put in procuring microscopy kits to expand capacity in country.

2. Procure RDTs: ($450,000)
   Procure approximately 600,000 RDTs to support the scale up of malaria laboratory diagnosis in up to four regions in Ghana: North, Western, Central, and/or Greater Accra regions. The procurement specifications and geographic targeting will be coordinated with other partners in country.

3. Build capacity for microscopy and RDTs and support implementation of diagnostic policy — Higher Health Facility Level: ($225,000)
   Support the implementation of the new microscopy and RDT policy that was developed with PMI Year 1 and Year 2 support. This will include in-service training and supportive supervisory visits for laboratory workers at health facilities. Training of healthcare providers is to be coordinated with potential other partners providing support to case management activities. This will allow for laboratory tests (both microscopy and RDTs) to be fully incorporated into malaria case management in Ghana at hospitals and higher level health centers, as recommended in the national policies. This activity will also include the further development and implementation of a quality assurance program for laboratory diagnosis of malaria in Ghana.

4. Build capacity for RDTs and support implementation of diagnostic policy — Lower Health Facility & Community Levels: ($274,900)
   Support the implementation of the new malaria laboratory diagnosis policy, specifically the use of RDTs at facilities in the lower end of the health system in Ghana, such as health centers and CHPS compounds, which are not expected to have functioning microscopy. This will include in-service training and supportive supervisory visits for both laboratory workers and healthcare providers, as part of a comprehensive program in quality assurance for laboratory diagnostics. This activity is expected to take place in up to four regions.

5. Provide technical assistance in malaria diagnostics: ($12,100)
   Provide technical assistance from experts from the Centers for Disease Control and Prevention (CDC) to support the implementation of the 2009 laboratory diagnosis policy.

Malaria Treatment

Background

In 2004, Ghana adopted ACTs as first-line therapy, recommending the use of artesunate and amodiaquine (AS/AQ). However, reports of serious adverse events, likely due to the relatively high doses of amodiaquine in formulations produced in country, were recorded causing a loss of public confidence in ACTs. Through 2007 and 2008, the NMCP and its partners have worked to revise the malaria treatment policy and a new revised policy was approved in January 2009. For

uncomplicated malaria, AS/AQ combination, either as a co-blistered formulation or a fixed dose combination formulation, is the first-line therapy in Ghana. Artemether-lumefantrine (AL) and dihydroartemisinin-piperaquine (DHAP) therapies are the second-line treatments.

Even while recognizing that official promotion of multiple ACTs creates inefficiencies and is not in harmony with the recommendations of the WHO, Global Fund, or PMI, the Ghanaian MOH has made a repeated, conscious decision to continue to pursue this policy, based on its own rationales. The MOH has concluded that offering alternate ACTs is essential for overcoming public resistance to AS/AQ. The inclusion of DHAP reflects ongoing large Chinese donations of the drug, and helps the MOH avoid dependency on Global Fund sourcing of ACTs. The AL and DHAP are to be reserved, at least in theory, for patients who do not tolerate amodiaquine. In the past six months, all malaria treatment guidelines and training manuals have been revised painstakingly to capture the new approach. The MOH is now focusing on implementing the new policy through such measures as health care worker training, banning of monotherapies, applying for increased external funding for ACTs, and harmonizing the NHIS medication policies.

According to accepted international practice, first- and second-line therapies should be stocked in roughly a 95:5 or 90:10 ratios. However, in Ghana, the operating assumption (expressed, for example, during a quantification exercise in May 2008) appears to be that AL would be prescribed in roughly 25% percent of cases because of better tolerance and adherence to AL than AS/AQ. This poses challenges in drug procurement and pharmaceutical management. In addition, having multiple different ACT regimens further complicate training and quality assurance programs.

Pricing policies influence the uptake of ACTs in Ghana. Pregnant women and children under five receive malaria treatment (including ACTs) free of charge. Older children and adults who have enrolled in the National Health Insurance Scheme (NHIS), which now covers 50% of the population, also receive malaria treatment free of charge. The older children and adults who are not covered by insurance are charged a co-pay of approximately $1.00–1.50 per ACT course at public facilities. In the private sector, orthodox ACTs cost approximately $3.50 per course, on average. While improving access to ACTs, NHIS policies have had the unintended consequence of encouraging the overdiagnosis of malaria. The recent addition of AL to the list of medications covered by NHIS has given further momentum to increasing AL procurements.

For severe malaria and for the treatment of uncomplicated malaria in the first trimester of pregnancy, quinine is the drug of choice. Since parenteral treatment for severe malaria is often not possible in more rural settings or as part of HBMF, the administration of rectal artesunate is an alternative for pre-referral treatment.

The National Malaria Control Strategy, revised in July 2008, seeks to ensure that caretakers/parents will be able to recognize symptoms and signs of malaria and respond appropriately and promptly within 24 hours of onset of fever. Home-based care of malaria is to be integrated with acute respiratory and diarrhea, under the IMCI. Implementation of IMCI in Ghana receives major support from UNICEF, WHO and USAID, among other partners. Ghana secured support for scale up of HBMF from the Global Fund Round 8 grant, which is expected to fund a nationwide HBMF program, and a Global Fund RCC grant, which will strengthen case management at the facility level. A HBMF program is currently being implemented in the three northern regions. Community-based agents (CBAs) will be responsible for managing uncomplicated malaria, diarrhea, and respiratory infections in children under five years old.

Since CBAs will not see patients older than five years, no training in RDTs is to be provided to these volunteers at this moment. It is expected that two volunteers will be responsible for approximately 2,000 people. CBAs will be supervised by GHS staff, such as district hospital nurses or community health officers. Under Global Fund Round 8, HBC will be expanded to other areas of the country.

Current Status of Malaria Treatment

Scaling up appropriate malaria treatment remains one of the greatest challenges in Ghana. According to the preliminary report of the 2008 DHS, just 12% of children under five years old with fever were treated with an ACT within 24 hours. The proportion of children under five years old receiving any malaria treatment for an episode of fever with onset within the two weeks prior to the 2008 DHS was 43%. This indicator remained approximately the same when compared to 44% in 2003 (DHS) to 48% in 2006 (MICS).

In the public sector, progress is being made in spite of the challenges. A survey conducted by a USAID–supported health project in targeted southern districts in early 2008 demonstrated that 96% of the health facilities had adopted the use of AS/AQ as the first-line outpatient treatment for malaria, and the percentage of providers who treated malaria appropriately had increased from 1% at baseline to 57% three years later. In mid-2008, a PMI–supported national health facility survey recorded that 91% of public facilities were using AS/AQ in their outpatient dispensaries. However, only 63% of healthcare providers knew the correct AS/AQ dose for a 20 kg patient, which may signal constraints in prescribing appropriate doses of ACTs.

In the private sector, provider adherence to national malaria treatment policy is considerably worse. In Ghana, the private sector is comprised of FBOs, clinics, private pharmacies, drug shops, non-governmental groups and traditional healers. Approximately 60% of Ghanaians seek their initial treatment for malaria outside of public health facilities (Strengthening Pharmaceutical Systems [SPS], 2008). This is due to a number of factors, many of which are common across West Africa, including: confidence in herbal treatments; the high direct and indirect costs of accessing care at facilities (including lost work time, cost of transportation, cost of medical services and drugs if not insured, etc.); the perception of poor quality of services, including ill treatment by staff; local attitudes and beliefs about fever, convulsion, and other malarial symptoms; etc. Clearly, front-line private sector providers must play a central role, if Ghana is to reach the NMCP and PMI goals. The 2008 health facility survey found that just 69% of private for-profit facilities dispensed AS/AQ. When asked the dosage of AS/AQ for a 20 kg child, only 20% of private providers could provide the answer correctly, even if permitted to use reference materials. Ghana's private sector is rife with multiple ACTs and artemisinin monotherapies. Poor public acceptance of AS/AQ discourages patients from purchasing this therapy. Consumers tend to prefer AS monotherapy, SP, or some combination of SP with an adjunct such as artesunate. AL sales are increasing, although it's relatively high price keeps demand low. In general, newer ACTs have relatively complicated treatment regiments, and are more expensive and less familiar compared to their older chloroquine and SP counterparts.

A 2009 PMI study of prescribing and dispensing habits among pharmacists and licensed chemical sellers (LCS) demonstrated poor compliance with national guidelines. When approached for medical advice by a simulated "caregiver of a four-year old girl who has fever without vomiting on and off for a week" only 32.6% of 43 outlets inquired about patient symptoms, just 14% provided appropriate treatment (an ACT), and only 2.3% made appropriate referrals. In a second scenario involving another group of 40 outlets where the simulated

caregiver's "child was unable to keep foods and liquids down due to vomiting", 47.5% inquired about patient symptoms but just 17% provided appropriate treatment (an ACT), and only 2.5% made appropriate referrals. This study validated the importance of the informal private sector as a significant avenue to target future pharmaceutical management interventions if the end-user is to be appropriately engaged. (Source: SPS/Ghana 2009, unpublished report.)

Progress During Last 12 Months

In Years 1 and 2, PMI supported the implementation of ACTs in the public sector in Ghana. These included the above-mentioned national laboratory assessment and health facility survey. PMI worked with the NMCP and its partners to update case management guidelines and assisted in the revising the guidelines, associated training manuals, essential medication lists, and insurance formularies. Following a half-year delay due to slow finalization of national policy, PMI successfully supported the NMCP in nationwide training of healthcare providers in improved malaria case management. The first wave of training targeted doctors, nurses, and community healthcare workers in the public and private facilities. In Year 2, training continued, with increased focus on pharmacists and LCS. Working with the Pharmaceutical Society of Ghana and the NMCP, a national campaign theme for malaria was developed along with a malaria curriculum for registered pharmacies and LCS. In Ghana, there are at least 10,000 LCS. These drug vendors typically do not have a pharmacist on staff and are a heavily frequented as point-of-service facilities at the community level. A malaria handbook targeted to these vendors has been developed and is ready for implementation.

To complement health worker training, PMI is supporting the implementation of new malaria treatment policy through support for BCC activities, including national and district-level educational campaigns. To assist the MOH prepare for nationwide scale up of HBC under the Global Fund Round 8 grant, PMI supported the finalization of national guidelines and policies for HBC. These documents covered management of acute respiratory infection and diarrhea, along with malaria. In target districts, PMI trained and equipped Community-Based Volunteers.

Large-scale procurements of medications also figured prominently in Year 1 and Year 2. A June 2008 quantification exercise supported by PMI predicted a possible stock out of ACTs. In response, over 1.14 million courses of AS/AQ were procured on an urgent basis and donated to the GHS Procurement Unit in November. In reality, the AS/AQ has been moving slowly. This can be explained in part by prescriber preference for AL, but was largely due to the financial distortions and other systemic challenges that are addressed below under "pharmaceutical management." In May 2009, the Central Medical Stores (CMS) received another sizeable Chinese donation of DHAP (the second consignment in 12 months) and a large consignment of the new fixed-dose combination AS/AQ from the WHO. Given the relatively short shelf-life of ACTs, both the NMCP and GHS are anxious to disburse these consignments. In response, PMI Year 2 medication procurement plans are focused on severe malaria medications, with some funds reprogrammed into ITNs.

Gap Analysis

The gap analyses for ACTs are based on the expected population of Ghana in 2009, considering a break down per age group as presented in the table. In addition, one episode of fever per year was considered for ages group <1 year old, children 7–13, and adults, while 2.5 episodes of fever per year was estimated for children 1–6. Health facilities encompass mainly public health facilities and a minority of private ones. Of note, chemical sellers and other informal private sector alternatives are not considered as being health facilities. Finally, it was estimated that

95% of episodes of malaria in children under 13 years old will be treated with AS/AQ, while among adults this proportion will be 75%. Taking into account the anticipated resources available from MOH, Global Fund procurements, and PMI Year 2 commitments, the estimated funding gap for medications in 2010 would amount to $5–7 million per year (see table). Some of this shortfall would be made up for by NHIS and private, out-of-pocket expenditures. Of note, the existing pipelines of ACTs are not factored in. They are assumed to bridge the lag period during which the Global Fund grant is awarded and the lengthy procurement process is completed.

Antimalarials for Facilities in Ghana: Modified Gap Analysis

Assumptions: Malaria Cases to Treat in Health Facilities						
Age group	**2009 population**	**Estimated Fever episodes/yr**	**Percent treated in health facilities**	**Of those, percent treated for malaria**	**Malaria cases** (uncomp.)	**Severe cases** (3% children 1% adults)
Children <1 (4%)	923,000	923,000	50%	100%	461,500	13,845
Children 1–6 (18%)	4,153,000	10,382,500	50%	90%	4,672,125	140,164
Children 7–13 (10%)	2,376,000	2,376,000	60%	70%	997,920	9,979
Ages >13 (68%)	15,620,000	15,620,000	60%	70%	6,560,400	65,604
Totals	23,072,000	29,301,500			12,691,945	229,592

Cost of Antimalarials for Facilities in Ghana: Modified Gap Analysis

Medication	**Uncomplicated malaria children <13 (95% of 1st line)**	**Uncomplicated malaria adults (75% of 1st line)**	**Severe malaria**	**Total courses**	**Estimated cost**
AS/AQ	5,824,968	4,920,300		10,745,268	$7,522,000,
AL (2nd line)	306,577	1,640,100		1,946,677	$2,141,000
Quinine (severe disease)			229,592	229,592	230,000
Rectal artesunate			168,228	168,228	$117,700
Total Cost					$10,010,700*

Pipeline of Antimalarials in Ghana, June 2009

Pipeline Assessment (Quantification exercise in 3Q 2009 to provide more precise figures)	
Medication	**Analysis as of June 2009**
AS/AQ	Ample stocks (65m courses) of co-blistered formulation.
AL	No stocks in CMS. Facilities sourcing from private sector.
Quinine preparations	Minimal amts in stock, but readily available on local market.
IV arthemeter	In stock.

Rectal artesunate	Not yet stocked in quantity.
DHAP	Large donations received in 2007 and 2009.

Funding available for Antimalarials in Ghana

Funding Available for Public Sector Procurement Through CMS			
Source	**May 09–Apr 10**	**May 10–Apr 11**	**Comment**
Govt. Ghana/CMS	$700,000	$700,000	Commitments to central procurements through CMS. Does not include NHIS or internally generated revenue.
Global Fund	$2,750,000	$2,750,000	$2,300,00/yr requested in approved RCC proposal. $450,000/yr request for ACTs in Rd 8 proposal. Awards pending.
PMI Year 1 & 2 Commitment	$1,000,000	$0	Completed procurement of $1.2m of PMI FY 08 funds for AS/AQ. To procure $1m of reprogrammend FY 09 funds.
Other donors (UNICEF, Italian, World Bank)	$0	$0	Per NMCP estimates. WHO recently procured ACTs, future commitment not known.
Total Committed	$4,450,000	$3,450,000	Note that the '09–'10 estimate does not include NHIS./.
Estimated Cost	$10,010,700	$10,010,700	From estimates of medication needed in the above table. Does not account for medications already in pipeline.
Funding Gap	$5,560,700	$6,560,700	Public facilities also procure significantly outside of CMS, using patient fees and insurance monies to buy on private market. This functionally reduces the funding gap. (Amounts unavailable.)

*For comparison, the Ghana CCM, using somewhat more conservative assumptions of need and costs, arrived at an estimated need of $15,279,400 for 2009.
Sources: (i.) DELIVER/USAID May 2008, "Ghana: Antimalarial Drug Quantification and Supply Planning (April 2008–April 2010) and unpublished supporting documents April and July 2009; (ii.) Ghana CCM, "GFATM Round 8 Malaria Proposal" (June 2008) and " RCC Proposal" (Nov 2008).

Proposed Year 3 Activities: ($5,412,100)

The top priority for Year 3 is to assist the MOH to implement its ACT policy, while helping to prevent stock outs of ACTs and other essential medications. In regard to supporting the procurement of ACTs, PMI customarily funds only the purchase of the first-line ACTs in each country. In Ghana, this has proven to be a sensitive issue. Although AS/AQ is the first-line drug for treatment of uncomplicated malaria, the second-line treatment, AL, is generally more accepted by both the population and healthcare workers. PMI will work within accepted international guidelines and will procure no more second-line ACT treatments than is equivalent to 5% of the required first-line treatments. Recognizing that the Ghanaian policy (of three approved ACTs) is unusual, PMI will monitor the situation closely, and will consider operational research to assess the possible negative effects on training and on patients' and health care workers' adherence to national policies. While the treatment of malaria at public health facility level will be the main focus of PMI support in Year 3, the crucial role of HBMF and private sector providers is recognized, and PMI plans to fund activities in those areas as well.

1. Procure ACTs and severe malaria drugs: ($3,400,000)
   Procure ACTs, rectal artesunate, and severe malaria drugs in quantities to be determined. The primary aim of the Year 3 procurements will be to fill gaps and help prevent stock-outs of antimalarial medications in the public sector in calendar years 2010 and 2011. Funding

allocated to drug procurement would sufficient to purchase approximately 3.4 million ACT treatments.

2. Support the private sector, including LCS, to improve malaria treatment: ($500,000)
   Support improved malaria case management in the private sector, focusing on LCS. Considering that a significant part of the population in Ghana look for health care at these venues, it is important for the LCS to counsel clients and dispense ACTs in accordance with national guidelines. Partnering with the relevant professional societies (such as the Pharmaceutical Society of Ghana) and regulatory bodies (such as the NMCP and the FDB), PMI will support BCC, training, supportive supervision, and other methods to increase private sector compliance with malaria treatment guidelines and improve the safety and quality of services provided.

3. Support in-service training of healthcare workers in malaria treatment: ($500,000)
   Support on-the-job in-service training and supportive supervision of healthcare workers to increase adherence to ACT treatment guidelines. These activities will be carried out within a range of healthcare workers, including physicians, nurses, pharmacists, and drug vendors in the private and public sectors. Special focus to groups missed in PMI Years 1 and 2 will be given. PMI will also make a small amount of funds available to procure commodities, such as weighing scales, to allow for the correct ACT dosing.

4. Support home-based management of malaria: ($500,000)
   Support the NMCP's goal of mass scale up of home-based management of malaria by assisting in training of large numbers of CBAs in targeted regions and support supervision of volunteers, among other activities. Since Global Fund Round 8 proposal was approved, home-based management of malaria is to be implemented in a large scale in Ghana, and PMI sees this as an opportunity to contribute to the success of malaria case management. These activities will be carried out in close coordination with the NMCP, UNICEF, WHO, and other stakeholders.

5. Support BCC to improve care/treatment seeking behavior : ($500,000)
   Support BCC strategies targeting healthcare workers and the general public to promote correct and consistent use of ACTs by vulnerable groups. This activity is part of a comprehensive BCC strategy that is directly linked to activities funded under malaria prevention, above. The messages, materials, and compliance guidelines that are developed will form a coherent package for the promotion of prompt and effective malaria treatment. This package will be implemented through NGOs and home-based management of malaria agents at the community level, through private and public sector facilities and healthcare providers at the district level, and through mass media campaigns at the regional and national levels.

6. Provide technical assistance for strengthening case management: ($12,100)
   Provide technical assistance from the CDC experts to assist with the implementation of the 2009 antimalarial guidelines.

Pharmaceutical Management

Background

Ghana has a well-defined regulatory framework, a robust healthcare policy infrastructure and qualified healthcare workers. Systems are in place that, theoretically, should have resulted in stronger pharmaceutical management capacity. The management of pharmaceutical commodities have, however, proven challenging, and there is an over-dependence on donors, such as the Global Fund, UNICEF, and PMI. Investments in malaria commodities logistics have not produced commensurate gains in supply chain management. The system continues to face potential stock outs, improper drug utilization with concomitant expiry and ineffective management information systems.

Financing: Mass enrollment in the NHIS since 2005 has placed an unanticipated 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. A majority of enrollees are exempt from paying NHIS fees, further confounding the situation. Reimbursements to health facilities for medications have been paid out slowly, leading to the accruement of steadily increasing debt through the entire supply chain. In the absence of sustainable financing for basic recurrent costs, the strain on the public sector logistics and supply chain for all drugs, including antimalarials, has become untenable. This encourages procurement of medicines at a lower price from outside the national essential medicines list, especially in the private sector where oversight is already limited.

With a view to flooding the market with inexpensive, high-quality ACTs, the MOH is working with the Ghana CCM to apply for pilot funding under the Global Fund's Affordable Medicines Facility for malaria (AMFm). If successful, the AMFm pilot could greatly alter the financing of ACTs, and in unpredictable ways. No PMI funds will be used to support the pilot of the AMFm in Ghana.

Supply Systems and Logistics Management Information System (LMIS): In an effort to simplify reporting and streamline procurement processes, Ghana recently introduced the Requisition and Reporting Inventory Voucher form. Implementation, however, has been spotty due to a lack of forms and other bottlenecks. Distribution and transportation of essential medicines and antimalarials remains one of the greatest challenges and poses significant bottlenecks to the delivery of commodities at all levels and in both directions. Neither the Central Medical Stores (CMS), nor the Regional Medical Stores (RMS), nor the health facility service delivery points have sufficient transportation for the volume of commodities needed. The CMS also faces similar constraints and has only half a dozen seven-ton trucks for delivery to all RMS facilities.

The system is further constrained by the absence of a functional LMIS, which further complicates inherently challenging activities such as forecasting and quantification. To help address this problem, during the late 1990s, the MOH programmed some donor funding for the design of a computerized information system. In September 2008, an inventory management system (with a corresponding financial management component) was launched as a pilot project first in CMS, with plans for a roll out at each of the ten regional medical storage facilities and two teaching hospitals. Part of this capacity building plan included the development of a network to enable communication from CMS to and from all RMS' and the teaching hospitals. The system, however, is currently nonfunctional and inventory and stock information remain paper-based down to the health facility level.

Challenges to the supply system are expected to mount during the scale-up of malaria interventions under the Global Fund grants and PMI. For example, as HBMF is rolled out

nationwide, the need for a sustained, uninterrupted supply of ACTs will increase. The procurement of large quantities of RDTs will place additional strains on its absorptive capacity.

Drug Quality and Enforcement: Data from the first round of PMI–supported drug quality testing in 2008 suggest that over 30% of all antimalarials sampled from local markets are counterfeit/substandard (i.e., the active ingredient is either absent or found in sub-therapeutic doses). Of these failed samples, 78% were from private sector facilities. The private market is rife with artemisinin monotherapies and other products not approved for the treatment of uncomplicated malaria, including SP, chloroquine, primaquine, quinine, and proguanil. These findings highlight the need for improved registration processes, strengthened drug surveillance capacity, greater engagement by the FDB in supervision, and an active enforcement unit capable of responding to regulatory infractions. Also, given the relatively prolific local manufacturing presence in Ghana, these findings also emphasize the need for the FDB and GHS to strengthen good manufacturing practices, as local tenders from public and private pharmacies or wholesalers are often awarded to one of the many local manufacturers in Ghana. Although the FDB is active in registering and auditing local manufacturers, the great majority of manufacturers do not have documented adherence to WHO GMP standards. Continued strengthening of the FDB capacity will help address these regulatory issues.

Progress During the Last 12 Months

PMI has supported quantification of antimalarials at regional and district levels, and overall logistics strengthening especially around distribution and quantification at both the regional and district levels. Support was provided to two RMS and eight facilities, in collaboration with the Pharmacy Unit and GHS, to identify strengths and weaknesses in the supply chain distribution system. In Year 2, this assistance will extend coverage to all ten RMS. Ghana's CMS facilities operate in accordance with validated standard operating procedures but a PMI–funded project has begun a pilot training with all CMS staff on adherence to updated standard operating procedures. This training will be replicated with staff from the RMS, ultimately covering 350 people. The training will also include communication between CMS to the RMS and how to prevent lapses in this flow of information, especially considering the delay in the LMIS implementation at the central level. As part of overall logistics strengthening, PMI also helped begin 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 and move away from emergency procurements to routine procurements based on quantifiable needs over time. Of note, a national quantification took place in mid-2009 with technical support from PMI partners.

Activities in drug quality improvement during Year 1 included the development and implementation of a monitoring program in five sentinel sites: Accra, Ho, Tarkwa, Kumasi and Bolgatanga, intended to document the penetration of substandard products in the system. A PMI–supported assessment of national laboratory facilities and capabilities provided both technical assistance and training to select staff at the National Quality Control Laboratory (NQCL) in Ghana. This enabled the NQCL to become directly involved in confirmatory analytical testing of suspect products obtained from sentinel sites. Activities in FY 2010 will build on this platform.

Proposed Year 3 activities: ($1,100,000)

As PMI investments scale up and Global Fund Round 8 and RCC grants are rolled out, the need for a robust pharmaceutical management system capable of handling the influx of three first-line ACTs, RDTs and other malaria commodities will be greater than ever. Given the problem with Ghana's supply chain management system, PMI has prioritized improving pharmaceutical management in Year 3 in the following ways:

1. Strengthen the capacity of pharmaceutical management systems ($900,000)
   Support activities to strengthen public sector procurement and logistics systems for malaria drugs and laboratory supplies from CMS to end user. In Ghana, the USG is the lead partner in this area. PMI will make a significant investment in pharmaceutical management systems, in concert with USG aid programs in family planning and HIV/AIDS. At the national level, work with GHS to address the critical and persistent bottlenecks in finance, management, forecasting, and transportation, which have hindered the distribution of malaria medications. At the regional level, take advantage of the new focus region framework for USG–Ghana cooperation in HSS, by concentrating additional resources for maximum impact in the Western, Central and Greater Accra regions. Activities will focus on malaria commodities but will complement investments being made by family planning, HIV, maternal/child health, and other programs.

   Activities will target both the public and private sectors, and will include the following: (a) provision of technical assistance for estimation of drug needs and gaps; (b) supporting the development and implementation of a comprehensive drug logistics information system; (c) strengthening drug transportation, warehousing and storage, with an emphasis on regional and district levels; (d) provision of technical assistance to support community level ACT distribution to be coordinated with Global Fund activities especially as HBMF focus increases; and (e) support better integration of the NHIS in pharmaceutical financing.

2. Strengthen drug quality monitoring capacity: ($150,000)
   Provide continued support for strengthening drug quality monitoring capacity in collaboration with the FDB by collecting data on antimalarial drug quality. Activities will build on investment in Year 1 and Year 2, with a focus on strengthening FDB enforcement capacity.

3. *In vivo* drug efficacy monitoring: ($50,000)
   Support bi-annual *in vivo* drug efficacy monitoring at a minimum of three sites. Activities will be carried out in collaboration with the NMIMR, which has been the lead local institution for such work, and is already engaged in complementary surveillance activities.

4. Provide technical assistance for strengthening pharmaceutical management: ($0)
   Provide technical assistance by USAID experts for implementation of antimalarial guidelines and training strategies. (Funded from core program, not PMI/Ghana.)

HIV/AIDS and MALARIA

Background

Ghana has an overall HIV prevalence estimated at 1.9% (UNAIDS, 2008). HIV infection rates are highest in 35- to 49-year-old women (4.1%) and 40- to 44-year-old men (4.7%). Women

account for 51% of Ghana's population, yet 65% of the country's HIV infections occur in women. Evidence suggests a downward trend of HIV infection in the general population, yet HIV infection appears to be increasing in at-risk populations. In addition there are 1 million orphans and vulnerable children in Ghana, with approximately 17% due to HIV (Children on the Brink 2004).

USAID has long provided leadership in fighting the HIV epidemic in Ghana, especially in programs targeting most-at-risk populations. Under President's Emergency Plan for AIDS Relief (PEPFAR) II, the USG plans to greatly increase funding to Ghana programs, through USAID, CDC, the Department of Defense and other agencies under a "Partnership Framework," beginning in late 2009 and extending five years or more. The preliminary objectives of the Partnership Framework are to assist the Government of Ghana in reducing the number of new HIV infections by 30% to 60%, increase the number receiving non-antiretroviral therapy (non–ART) clinical care by 200% (90,000) as well as strengthen the health information system and community-based organization's capacity. The Ghana Armed Forces will be supported to implement comprehensive HIV/AIDS activities and services, including laboratory services. CDC will support Ghana's efforts to improve disease surveillance and strengthen strategic information as well as the quality of laboratory services. This new development offers numerous opportunities for HIV–malaria collaboration across US and Ghanaian agencies.

There is presently limited, but growing, attention in Ghana for the links between AIDS and malaria. The leadership of the national HIV/AIDS and malaria control programs has publicly highlighted studies that have shown that malaria is common among those living with the virus and hampers their immune response. The revised national malaria control strategy now explicitly recognizes the HIV–malaria link, stating "HIV-infected adults are at greater risk of developing clinical malaria and more severe malaria [and] HIV reduces the effectiveness of antimalarial treatment. Pregnant women who are HIV positive have a higher risk of malaria and more complications. There is also transient increase in placental HIV viral load during malaria co-infection and this poses an increased risk for mother-to-child transmission of HIV." National authorities working on malaria and those working on HIV/AIDS are interested in integrating their activities, especially concerning promotion and distribution of LLINs through PLWHA organizations and networks.

Progress During Last 12 Months

During Year 1, PMI worked with the NMCP to incorporate HIV–malaria objectives in the national malaria control strategic plan for the first time. The national strategy now aims "to improve access to prompt and effective treatment of malaria among PLWHA by 2015," by promoting proper preventive measures and increasing access to prompt and appropriate management of malaria in PLWHA. Anti-retroviral therapy centers are to improve access to antimalarial medication and ITNs. Operationally, the plan is to:

- Promote advocacy at all levels;
- Promote collaboration between malaria and HIV stakeholders at all levels;
- Integrate malaria prevention strategies into voluntary counseling and testing (VCT) and ART services;
- Provide BCC on malaria prevention and case management targeting PLWHA; and
- Strengthen health system response to HIV–malaria co-infection.

In Year 1, PMI collaborated with USAID Ghana programs to develop malaria training modules for PLWHA. A donation of 4,000 ITNs was made to USAID–supported NGOs for distribution to PLWHA.

In Year 2, PMI is providing technical assistance for advocacy and outreach to integrate BCC for malaria into existing HIV/AIDS prevention and care activities including promoting increased ITN ownership and use among PLWHA. Approximately 10,000 ITNs are being procured and are targeted for distribution to PLWHA through NGOs and networks serving this population. PMI also supported the training of peer educators, counsellors, and leaders of PLWHA associations to facilitate the integration of malaria prevention messages into interpersonal communication activities with PLWHA. Malaria prevention messages included emphasis on correct and regular use of LLINs and early health seeking behaviour for fever. Also, in Year 2 assistance was provided to advocate with the NMCP and the GHS to address needs related to case detection and treatment of malaria among PLWHA.

Proposed Year 3 Activities ($100,000)
The HIV-specific activities funded under PMI Year 3 (and described below) will focus on implementation of the new national policy to better integrate malaria prevention activities into HIV/AIDS prevention, care, and treatment programs, as outlined below.

More broadly, PMI will seek to take advantage of the increased opportunities for HIV–malaria program collaboration, which are presented by the expansion of PEPFAR and Global Fund activities in HIV/AIDS for Ghana. For example, PMI and PEPFAR investments in laboratory systems will be harmonized through coordination of microscope procurements and joint planning of laboratory technician training and supervision. The ANC platform will be strengthened through coordinated investment in pre-natal counseling for disease prevention. Similarly, expansion of PEPFAR and Global Fund support for NGOs working with PLWHA presents increased vehicles for ITN distribution and malaria BCC targeting PLWHA.

1. Support integration of malaria prevention activities into HIV/AIDS prevention, care, and treatment programs: ($100,000)
   Support the national strategy to integrate malaria prevention activities into HIV/AIDS prevention, care, and treatment programs. Building on Year 2 activities, focus on providing technical assistance for integration of BCC for malaria into existing HIV/AIDS prevention and care activities, including promoting increased ITN ownership and use among PLWHA. Provide supportive supervision to the peer educators, counsellors, and leaders of PLWHA associations trained in Year 2 and procure approximately 15,000 LLINs to be distributed to PLWHA through NGOs and networks serving this population (funded from the ITN budget). All of these activities will be designed and implemented in close collaboration with the programs that receive PEPFAR and Global Fund support.

NGO and FBO COLLABORATION

Background
The NMCP has established successful partnerships with NGOs that are using their existing networks and community-based volunteers to extend the reach of malaria prevention and control activities. In 2005, the NMCP began to partner directly with NGOs to extend the reach of malaria prevention and control activities. Currently there are approximately 50 NGOs active in

50 districts in nine regions. The Global Fund RCC grant is expected to support an expanded group of 70 NGOs annually.

Civil society organizations in Ghana generally have limited institutional capacity and facilitation skills. This poses a risk to program management and achieving behavior change at the community level. There is an ongoing need to strengthen the capacity of NGOs and networks engaged in malaria prevention and control activities, and to expand their number and geographical reach. The limited number and capacity of local NGOs operating in northern Ghana is of particular concern.

Progress During Last 12 Months

In Year 1, PMI funding was programmed to establish partnerships with local NGOs/FBOs and their networks, so as to strengthen malaria prevention and control activities at the community level. In collaboration with the NMCP, a capacity building workshop for local NGOs was held in February 2009, focusing on program design and management. Although NGO enthusiasm for further engagement with the NMCP and PMI was keen, their approach to social mobilization and facilitation was found to be especially weak, thus highlighting an area for targeted technical assistance.

By the end of Year 1, a program of subgrants to local NGO was expected to be operational, in spite of initial delays in setting up the management structure for the program. During the start-up phase, in order to maximize impact and create synergies, the subgrants program concentrated on geographic areas where other USAID health programs (such as maternal/child health, family planning, and nutrition) were focused. These included Western, Central and Greater Accra region, and the IRS zone in Northern Region. As the number of grantees increases, it is anticipated that the geographic scope will expand nationwide. Year 2 funding will permit sustained support to NGO grantees, as well as permitting continued capacity building.

Proposed Year 3 Activities: ($1,800,000)

The strategy for Year 3 will be to scale up the NGO subgrants program for maximum impact. It is anticipated that both the number of grantees and the geographic reach will be increased, commensurate with the overall increase in the Year 3 budget. NGO capacity that was built in Years 1 and 2 will be used to good advantage. NGO activities at the community level will be coordinated closely with PMI–supported BCC campaigns at the facility, district, regional and national levels. The NMCP has extensive experience in subgrants to NGOs under Global Fund grants, and will be closely involved in setting selection criteria and providing technical direction. The Global Fund program will support approximately 70 NGOs, leaving many gaps in geographic coverage. Low ITN ownership and use rates from the 2008 DHS highlight the need for more work at the community level to promote regular ITN use. Much community level work is needed to improve coverage of ACTs as well.

1. Strengthen capacity of indigenous NGOs to implement community-based malaria prevention and control activities: ($600,000)
   Provide administrative support to operate a program of NGO subgrants, under the technical guidance of the NMCP, including financial management of the grants. Also provide technical assistance to indigenous NGOs that have received PMI and/or Global Fund grants, in order to build their capacity to manage grants and budgets; comply with grant requirements; mobilize communities; and implement project activities, etc. Illustrative activities for capacity building include workshops, training in participatory and facilitation

skills, supportive supervision in the field, coaching/mentoring, and assistance in work planning.

2. Support indigenous NGOs to implement community-based malaria prevention and control activities: ($1,200,000)
   Fund subgrants to NGOs and NGO networks to implement ITN, IPTp, IPTi and ACT promotion and BCC/ activities. Specifically, PMI will provide support to NGOs/FBOs to:
   (a.) promote ITN ownership and correct and consistent ITN use; illustrative activities would include community mobilizations and hang-up ITN campaigns;
   (b.) in IRS target areas, collaborate with other partners to promote community acceptance of and preparedness for spraying activities;
   (c.) promote early and regular ANC attendance by pregnant women to increase proportion of pregnant women receiving at least two doses of IPTp; illustrative complimentary activities would include BCC targeting mother support groups to improve malaria prevention and treatment during pregnancy;
   (d.) increase early and appropriate health seeking behavior for fever and treatment adherence; illustrative activities would include training and support for community based agents for HBMF;
   (e.) Build the capacity of civil society organizations involved in implementing community-based malaria control in participatory methodologies; and
   (f.) Facilitate the development of community action plans to address problems of malaria control at the community level.

   The total budget of $1,200,000 is to be allocated to the subgrants program grants. Of this, a minimum of $10,000 should be set aside as funding for the U.S. Peace Corps small grants program, through which Peace Corps volunteers will receive targeted funding for malaria-focused activities in the rural communities they serve. The funding for LLIN procurement is accounted for in the ITN section. In all cases, the intended purpose is to extend the reach of malaria prevention and control activities at the community level.

CAPACITY BUILDING WITHIN THE NATIONAL MALARIA CONTROL PROGRAM

Background

The NMCP's role is to formulate policy and strategies, translate these into interventions, and coordinate, supervise, and monitor malaria control activities in the country. As delineated in the National Strategic Plan, the NMCP operates at the national and zonal levels. There are no NMCP staff at the regional or district levels. The NMCP provides regional and district staff with guidelines, but it is ultimately up to the regional and district health teams to carry out programs as they see fit. Each region does appoint a GHS officer with other primary duties as a "malaria focal person," who liaises with the NMCP; their potential has yet to be fully tapped by the NMCP and its partners.

The NMCP is directed by a public health physician. Her staff includes three program officers with a pharmacy background, one entomologist, three technical officers, and three data managers. The NMCP staff and leadership are chronically overstretched. Each of the three Zonal Offices (southern, middle, and northern) has a program officer, technical officer and a data manager. These malaria program staff offer support to the regional, district, and facility staff who are the main implementers of planned malaria control activities. In addition, the technical

staff are responsible for conducting routine program M&E activities. As mentioned, a GHS focal person at the regional level has general oversight responsibility for malaria-related activities. The focal person is usually a biologist who also has additional responsibilities across other public health programs. The structure at the district level is similar. The district level malaria focal person is usually a technical officer with training in disease control who has responsibility for several public health programs.

The award of the Global Fund RCC and Round 8 grants have given the NMCP a wider scope of work and a wider geographical area of active implementation, as well as fostering even wider engagement with a network of partners such as international and bilateral agencies, NGOs, and private companies. Even though the Global Fund grants provide resources for the NMCP to undertake the management of malaria control in Ghana, these are not enough to meet the growing needs of the NMCP at this stage of scaling up for impact.

A significant new development is the government's recent 50% cut to operational budgets in public health. Although the NMCP is relatively insulated, this budget cut is expected to greatly reduce the ability of regional and district level GHS staff to supervise and support malaria activities.

Progress During Last 12 Months

The PMI/Ghana team and its implementing partners continue to enjoy a close working relationship with the NMCP. In Year 1 and 2, PMI provided funds to support the transport and per diem costs of program staff to facilitate routine supervisory field visits. In Year 2, PMI continues to provide operational support to strengthen information technology capability; for example, PMI plans to support the installation of computer hardware and software, and assist with the establishment and maintenance of an NMCP webpage. In Year 2, PMI also provides support for professional development of key NMCP staff as well as monitoring and supervision of malaria control activities.

Proposed Year 3 Activities: $300,000

Given the expanding program resources and activities resulting from the two Global Fund malaria grants and PMI–supported activities, strong and effective supervision at all levels of the program will continue to be critical to the success of malaria control efforts in Ghana. PMI will provide support to the NMCP to undertake coordination and supervision of the national program at all levels through capacity building to enhance the operational efficiency and effectiveness of the program.

1. General capacity building at NMCP: ($200,000)

   Continue operational support including data management and information technology infrastructure development. Provide support for professional development of key NMCP staff, including support for two years of graduate-level entomology training of at least one NMCP program officer, thereby addressing a key deficiency. Also provide funding for NMCP staff to be trained in strategic planning at both the regional and district levels to enhance the implementation of the program. Such training will enable NMCP to provide technical support in the area of participatory skills to its regional and district implementing partners as well as to conduct effective participatory M&E of community mobilization and behavior change activities in communities.

2. Support for monitoring and supervision of malaria control activities by NMCP and other MOH/GHS staff: ($100,000)
   Support supervisory visits and monitoring activities by public health officials including NMCP and MOH/GHS staff in support of NMCP efforts to strengthen overall malaria program management. This approach recognizes that responsibility for technical and programmatic supervision of malaria control is not solely the responsibility of the NMCP. District and regional GHS staff, such as disease control officers and regional focal persons, are responsible for promoting and monitoring malaria control interventions in the periphery. They are not employed by the NCMP, and typically lack capacity. Through training and logistical support PMI will help to increase the effectiveness of these district- and regional-level staff.

COMMUNICATION AND COORDINATION

Coordination and communication among partners involved in malaria in Ghana has functioned fairly well over the past years, although more can always be done in this area. PMI has been one of the catalysts in Ghana bringing the various groups together in stakeholder meetings and other forums to work with the NMCP to streamline development activities.

Progress During the Last 12 Months
PMI and other key partners worked closely together with the NMCP and other organizations to prepare the successful Global Fund Round 8 submission that resulted in a major new focus on IRS, HBMF, and HSS. The submission leveraged good coordination among several members of the malaria community in Ghana including the private sector. PMI has also facilitated the formation of the National Communications Coordinating Committee with initial meetings scheduled for June, 2009. A national oversight committee for integrated vector control was also formed, which among other main activities will guide the national scale up of IRS and promote insecticide resistance management. USAID and UNICEF also have a strong working relationship in maternal and child health and malaria programs that harmonize strategies and contributions in M&E efforts, ITN distributions and IPTi. PMI is a member of the RBM national committee.

NEGLECTED TROPICAL DISEASES AND MALARIA

Ghana is endemic for all seven diseases targeted for mass drug administration under the neglected tropical disease (NTD) programs: lymphatic filariasis (LF), onchocerciasis, schistosomiasis, soil transmitted helminthes (three intestinal parasites) and trachoma. The USAID NTD program, based on community-directed interventions, is being implemented in Ghana in a total of 60 districts, which comprise all of the districts in five of the endemic regions: Upper East, Upper West, Northern, Central and Western. The program has delivered early success against trachoma, which is now limited to just five districts of the 60 districts targeted. Forty-five of the 60 are targeted for distribution of praziquantel, the treatment for schistosomiasis. All 60 districts are targeted to receive ivermectin alone, the treatment for onchocerciasis, or ivermectin in combination with albendazole, the treatment for lymphatic filariasis.

PMI and the NTD implementing partners are investigating mutually beneficial collaboration. Because LF and malaria are both transmitted by some of the same Anopheles mosquitoes, one

obvious area of collaboration is distribution of LLINs. However, since all age groups are susceptible to LF disease, LLIN coverage needs to reach all households and all individuals to be truly effective. PMI and NTD advocates will work with the MOH to discuss the strategy of universal LLIN coverage in areas where LF is highly endemic. Co-opting the NTD community health workers to assist with delivery of malaria interventions, including delivery of ACTs for home-based management of malaria, is another potential area of collaboration that will be investigated. The community workers engaged by the NTD program are often the same agents used for other community-based health interventions. An advantage the NTD community-based workers have is that each has been trained and equipped to keep a register of all family members in households that they serve. This is clearly a valuable resource that other interventions might be able to exploit.

SURVEILLANCE, MONITORING AND EVALUATION (M&E)

Background

The NMCP has established a functional system for malaria M&E at various levels of the public health system. 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 surveillance system. The GHS has recently implemented a district health information management system (DHIMS) that will serve as the foundation for the country's Health Management Information System (HMIS). Individual programs have been encouraged to discontinue developing vertical M&E systems. The DIMS software has been developed and piloted; however, national implementation has been hampered by hardware and software problems at the health facility and district levels. The NMCP compiles an annual report encompassing data from health facilities and studies conducted in Ghana. Routine analyses to inform programmatic implementation are limited and need strengthening.

Routine information on malaria is collected through a variety of surveillance systems in Ghana:

1. 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 IDRS strategy. 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.

2. The CHIM receives monthly reports on malaria cases and deaths from all public health facilities and some NGO clinics. 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. As mentioned, the center has recently developed a database, called the Disease Health Information Management System. With support from other partners, this system has been piloted in 20 districts. The plan for national roll out has been hampered by a lack of funding.

3. Data on IPTp coverage, ITN distribution, malaria cases and deaths and other aspects of Global Fund implementation are collected through a parallel 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 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. The support of Global Fund Round 2 and 4 grants helped the NMCP establish three zonal offices to coordinate the implementation of Global Fund M&E activities. District Health Information Officers have been trained on malaria M&E and help with compilation of the additional malaria data.

The most recent DHS, conducted during the July–October rainy season of 2008 incorporated a malaria module, which included ITN and ACT coverage indicators, and anemia and verbal autopsy evaluations, among other measures. These data will provide baseline estimates for all coverage indicators for use in PMI. Similarly, the UNICEF 2006 MICS also included a malaria module. Other household surveys include those conducted in 2005, 2006 and 2008 by the NMCP with local consultants, as required by the Global Fund; and a NetMark end-of-project survey that was conducted in 2008 in five regions. Both of these surveys included questions on ITN ownership and use by children under five and pregnant women, IPTp, and knowledge of malaria prevention practices.

The National Strategic Plan included two M&E objectives: (1) to improve upon timeliness, completeness and accuracy of data collected, as its analysis and interpretation, so as to more effectively guide policy decisions, monitor progress, and assess outcomes of malaria control interventions and (2) to establish and maintain effective data sharing at all levels using appropriate media. The plan outlines the following strategies/activities to help meet these objectives:

- Complete the process of consolidating the national M&E Plan;
- Build capacity in data management processes at the districts and national level;
- Develop, print and distribute M&E operational hand book and other policy documents to address problems on data entry, verification, missing data, etc.;
- Provide logistics support for connectivity;
- Establish a functional website for documentation and sharing malaria data/information, which is updated and accessible nationally;
- Support the Ghana DHS in 2008 and 2013 to help evaluate malaria control activities for the period; and
- Provision for inclusion of a system to capture data related to IRS, M&E activities of the various malaria control initiatives, such as the Global Fund, RBM, and PMI etc., harmonized.

Progress During Last 12 Months

During Year 1, PMI provided support for the 2008 DHS. The survey was completed and preliminary data are available. These data will provide baseline estimates for all coverage indicators for use in PMI and will also include verbal autopsy and anemia.

Sentinel site surveillance has been implemented in five health facilities to collect routine facility-based data on malaria mortality and morbidity among in-patients and outpatients. The five selected sites are listed below. Several factors were used to select these sites (zonal representation; plus at least one demographic surveillance site (DSS), one urban site, and one IRS district site), which are:

- Apam Catholic Hospital (coastal site);
- Maamobi Polyclinic (urban site);
- Mampong District Hospital (forest region — central);
- Kintampo District Hospital and DSS (forest region —northern); and
- Gushiegu District Hospital (savannah — north).

Data collection began in September 2008 in all five sites. Patient-level and aggregate data from the last quarter 2008 and the first quarter 2009 have been submitted to USAID and CDC. In Year 1, 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 has been drafted; the penultimate draft is currently being reviewed by WHO. The final version is expected to be published in July 2009. In Year 2, PMI is continuing to support the sentinel site program. Expansion of the program to seven sites is planned for Year 2 as part of reprogrammed funding. PMI is supporting implementation of the newly drafted M&E plan through a variety of capacity building activities.

Proposed Year 3 Activities: ($2,474,200)
During Year 3, PMI will work with the NMCP to implement a comprehensive M&E strategy. Specific activities are as follows:

1. Malaria Indicator Survey: ($1,300,000)
   Support an MIS in 2011 to obtain data on coverage of key PMI interventions and assess possible impact on febrile illness and under-five mortality. Collect household level data on malaria indicators after three years of PMI implementation. This major exercise will provide data comparable to the 2008 DHS malaria module, including anemia and verbal autopsy findings. Data analysis would also compare MIS findings to the MICS 2006 and 2007 surveys.

2. Sentinel Site Surveillance: ($250,000)
   Ghana has produced a successful sentinel site program, with data reported since October 2008. The NMCP is supportive of the program and has included it in their National Malaria M&E plan. These funds will build on this early progress and continue to support the 7 sites in order to collect routine facility-based data on malaria cases among children in order to better document the impact of malaria control interventions.

3. Strengthen Routine M&E Systems: ($600,000)
   Support the GHS/NMCP to strengthen routine systems for malaria M&E. Implementation activities will include: completion of unified data collection formats; collection of key indicators; training NMCP staff on data collection, analysis and reporting. Support will included limited investments in computer hardware and software to fill gaps. The implementation process will be linked to the ongoing review and updating of the National Strategic Plan and will involve broad participation of donors and Ghana RBM partners, including the Global Fund. Half of the support will be invested in strengthening data capture at the district level, focused on scale-up of the promising new District Management Information System (DMIS) system nationwide ($300,000). The other half of this support will consist of technical assistance to strengthen malaria M&E in USAID Ghana's three focus regions (Greater Accra, Central, and Western regions). From 2009 to 2014, USAID will be partnering with these regional health directorates in a comprehensive program of

improved health system management. This will provide a cost-effective platform upon which to invest in system strengthening for malaria-focused M&E.

4. Anemia and Parasitemia Survey: ($150,000)
   Support for an anemia and parasitemia survey in two IRS districts. The purpose will be (1) to meet NMCP expectations for documentation of public health impact by IRS programs in the country; (2) to compare the effectiveness of the PMI–funded program with other IRS programs in Ghana, including the AGA program in Obuasi district and the (future) Global Fund supported program in adjacent districts of Upper East and Northern Regions; and (3) to help assess the adequacy of one spray round per year. Findings would complement the entomologic monitoring data and will direct future IRS investments and operations. The methodology will allow comparability with the other IRS programs. The Global Fund program intends to conduct annual "epidemiologic and parasitological cross-sectional surveys among schoolchildren and communities…as proxies for monitoring the impact of interventions on malaria transmission." Illustrative data for PMI activity would similarly include ITN ownership and usage, history of febrile illness and promptness and effectiveness of treatment in children less than five years of age, household socioeconomic markers, and anemia and parasitemia biomarkers for children.

5. WHO HMIS DHIMS Collaboration: ($50,000)
   Support a WHO M&E technical advisor to collaborate with NMCP, CDC and USAID on assessment and implementation of the DHIMS. This will help strengthen the collection of routine malaria data at the health facility level and assess district-level systems and capacity.

6. End-User Verification Survey: ($100,000)
   Implement the newly developed, standard PMI protocol to verify end-user receipt of commodities. This tool is being adopted across PMI countries to provide rapid, real-time assessments of the availability of antimalarial drugs at the facility level.

7. Technical Assistance: ($24,200)
   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 sentinel site surveillance activities including collection of healthcare utilization data via a DSS in one sentinel site catchment area and assistance in developing the above mentioned net distribution evaluation.

BEHAVIOR CHANGE COMMUNICATION (BCC)

Background

Ghana has a relatively well developed media infrastructure. There are five television stations, one of which has a national reach. Radio stations are widespread and can be found in almost all districts in the country, with maximum concentration in the most urbanized areas of the country. On the contrary, print media is not as well developed and only a few news publications are national in character and the adult literacy rate is only 62%.

Behavior Change Communications is an integral part of the national malaria strategy, receiving financial support from the Global Fund and technical support from PMI the Voices Project (Johns Hopkins University Center for Communications Programs), and other partners. The

NMCP developed a national strategy for malaria communication in November 2005, focusing on evidence-based BCC targeting health workers, chemical sellers, pregnant women, mothers, fathers and communities as priority audiences. The NMCP's BCC goals mirror overall malaria control objectives, namely, increasing awareness of, and use of, effective malaria control tools such as ITNs, IPTp, IRS, and ACTs. In the national malaria control strategy for 2008–2015, the specific communications objectives are as follows:

- Generate demand for ITNs among the population;
- Increase awareness among the general population of ACTs for the treatment of malaria;
- Increase demand among the general population for the new treatment for malaria (ACTs);
- Increase knowledge on the need for full drug compliance among the general population;
- Create awareness of IPTp among pregnant women;
- Create awareness about the benefits of IRS in preventing and controlling malaria.
- Create demand among the population for IRS; and
- Stimulate dialogue about malaria control among members of the community.

Ghana's newly formed Malaria Communications Committee is mandated to revise the BCC strategy and to invigorate and harmonize malaria BCC efforts in the country. The NMCP has identified the following BCC gaps and challenges:

- The NMCP 2007 Survey indicates that, while a large majority of people can state the role of mosquitoes in malaria transmission, many still hold additional and conflicting notions.
- There is a need to reinforce understanding that may lead to acceptance of malaria interventions — for example reluctance to use ACTs (especially AS/AQ).
- The longevity of ITNs is undermined by poor bed net maintenance practices, such as washing too often with harsh detergents and hanging to dry in direct sunlight.
- There is a special need to educate private providers, including the chemical sellers, on the correct malaria medicines.
- More attention is needed to prepare mothers for home management of malaria responsibilities.
- In IRS campaigns, it is well known that a key determinant of success is community and household acceptance of the spray operations.

Progress During the Last 12 Months

In Year 1 and Year 2, PMI supported radio and television communications, the development of BCC materials, and training in 30 focus districts. Malaria messages have been incorporated into a popular public health radio drama, radio and television buys have reached at least 75% of the target audiences, and 1,316 people have been trained in malaria at the district, sub-district and zonal levels. Approximately 4,920,000 people have been reached with malaria messages to promote ITN use, ACT use and management (including informing the general public about the Ghana's new malaria drug policy), and IRS compliance. However, early feedback from PMI implementing partners indicated lower community interest in the malaria campaigns as compared with other public health BCC campaigns. Consequently, PMI–supported programs have given greater emphasis to community theatre and other innovative approaches.

Proposed Year 3 Activities:

BCC activities cut across all PMI–supported interventions. Thus, BCC activity descriptions and proposed budgets are covered under the respective interventions (ITNs, IRS, IPTp, ACT etc.). The total investment in BCC in PMI Ghana Year 3 amounts to $3.72 million. While these investments in Year 3 are substantial, their increase is proportionate to the overall growth in PMI

funding in Year 3 as compared to Year 2. PMI–funded activities will build upon the historical comparative advantage of USAID projects in supporting the design and implementation of BCC in public health in Ghana. The NMCP and other partners look to PMI to support an aggressive BCC program to help move the lagging ITN and ACTs indicators in a positive direction. As mentioned, in May 2009 a National Malaria Communications Committee was formed to coordinate partner activities and ensure optimal impact of BCC investments.

To summarize, the main Year 3 BCC activities will consist of the following:

- Support the Malaria Communications Committee to revise the BCC strategy, develop implementation plans; and to invigorate and harmonize malaria BCC efforts across partners, including the GHS, Global Fund, PMI, UNICEF, professional societies, civil society organizations and the media;
- Develop and/or refine the malaria BCC campaign and messaging to increase interest and uptake of preventive behaviors and compliance with treatment;
- Promote and provide BCC support for national integrated campaigns that include LLIN distribution;
- Increase community mobilization to improve uptake of key behaviors, e.g. "hang-up campaigns" to increase LLIN use, etc.;
- Provide BCC in support of compliance with IRS;
- Promote early presentation at ANC to increase full adherence with IPTp;
- Promote HBMF through BCC;
- Target healthcare workers and the general public to promote correct and consistent use of ACTs;
- Integrate BCC for ITN ownership and use among PLWHA; and
- Support local NGOs to engage communities with innovative approaches to increase compliance with all four malaria interventions.

PRIVATE SECTOR PARTNERSHIPS

The NMCP has established strong private sector partnerships. Examples include collaboration with the Ghana Chamber of Mines and the "Ghana Club 100," as well as the convening of a business forum in April 2007. There are two major instances of public–private partnership in which PMI is closely involved:

- Since 2003, USAID has been supporting the creation of sustainable delivery of ITNs by the commercial sector. Implemented by the NetMark project, the supported activities have included advocacy for tax and tariff reduction, generic advertising campaigns, training of sales forces and healthcare workers, assistance with business plans, and technical assistance for the ITN voucher scheme (through which targeted populations purchase nets as a subsidized rate from commercial vendors). Six major ITN vendors have established themselves in Ghana since 2003, with combined sales of 618,000 nets and 200,000 retreatment kits in 2007.

- The NMCP collaborates with AGA in the implementation of IRS. Results to date in Obuasi shows over 74% reduction in malaria cases following two years of operation. AGA is willing and able to provide valuable support to public sector partners in IRS in the areas of BCC, training of spray operators and supervisors, logistics and other forms of technical assistance. This is described further under the IRS section, above.

The new USAID health program design (2009–2014) will facilitate PMI collaboration with the private sector in the three focus regions. USAID plans systematically to engage with corporations to promote a range of public health interests, including malaria control. Opportunities are greatest in the Western Region, whose economy is based on oil companies, mining interests, cocoa growers, tourist resorts and rubber plantations. The Global Business Coalition on HIV/AIDS, TB and Malaria will organize a malaria-focused regional workshop in Accra in October 2009, which is expected to foster increased public–private cooperation.

STAFFING AND ADMINISTRATION

PMI staff includes two PMI resident advisors, one representing CDC and one representing USAID and one Foreign Service National (FSN) malaria technical specialist and one FSN malaria program assistant. The two PMI resident advisors and FSN technical specialist will 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 two PMI resident advisors and FSN malaria technical specialist will work together to oversee all technical and administrative aspects of PMI in Ghana, including finalizing details of the project design, implementing malaria prevention and treatment activities, M&E of outcomes and impact, and reporting of results. The PMI resident advisors will report to the USAID Mission Director or his/her designee. The CDC staff person will be supervised by CDC, both technically and administratively. 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.

Activities within the MOP will be implemented through a combination of centrally funded and bilateral agreements. In the FY08, FY09, and FY10 MOPs a number of activities have been consolidated under the bilateral project, Promoting Malaria Treatment and Prevention (PROMPT) awarded to University Research Co., LLC (URC) to maximize management efficiency. Reducing the number of PMI implementing partners addresses a persistent concern of and point of confusion for the NMCP. As a Mission managed project, the PROMPT project will be closely monitored through weekly meetings between the USAID Agreement Officer's Technical Representative (AOTR) and project Chief of Party and through close supervision and regular site visits by the AOTR and PMI team.

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

<u>Proposed Year 3 Activities: ($1,337,700)</u>

1. These funds will be used for coordination and management of all in-country PMI activities including support for salaries and benefits for two resident advisors and FSN technical support staff, office equipment and supplies, and routine expenses.

Table 1

President's Malaria Initiative – Ghana
Year 3 (FY10) Timeline of Major Activities

ACTIVITY	2010					2011											
	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Routine ITN distributions via targeted subsidy/voucher programs																	
Free ITN distribution via integrated campaign in Nov. 2010 & 2011																	
Procure LLINs																	
IRS implementation in targeted districts																	
Procure laboratory equipment, supplies, & RDTs																	
Strengthen malaria diagnostic skills via training & supportive supervision																	
Procure & distribute ACT and severe malaria drugs																	
Strengthen case management via training & supportive supervision																	
Strengthen MIP via training & supportive supervision																	
Planning, training & supervision for home-management of malaria																	
Strengthen anti-malarial drug & ITN supply chain systems																	
Strengthen NGOs' capacity to promote malaria control																	
BCC & community mobilization to increase ITN use, MIP uptake, ACT treatment & PLWHA prevention																	
Support 7 sentinel sites to collect routine facility-based malaria data																	

Notes: The implementation time frame for FY09-funded and FY10 funded activities will overlap in many cases.
The implementation of FY10 funded activities will extend into calendar year 2011 in most cases.

Table 2
President's Malaria Initiative — Ghana
Year 3 (FY 2010) Estimated Budget Breakdown by Intervention

Activity	Mechanism	Budget ($)		Geographic Area	Description
		Total	Commodities		
INTERVENTIONS — PREVENTATIVE ACTIVITIES					
ITNs					
1. Procure LLINs for distribution through campaign(s)	DELIVER	6,600,000	6,600,000	TBD	Procure 1,200,000 LLINs for free distributions to vulnerable groups in a campaign format. Geographical targeting will depend on previous campaign results and MOH guidance. Planning and funding will be coordinated in partnership with MOH, UNICEF and other interested partners.
2. Support logistics of ITN distribution in campaign(s)	DELIVER	650,000	0	TBD (same as #1)	Support GHS/NMCP and local systems for logistics management of ITN s during the campaign(s) to improve ITNs distribution to end users.
3. Support planning, BCC, and evaluation for ITN distribution in campaign(s)	Promoting malaria prevention and control in Ghana (PROMPT)	725,000	0	TBD (same as #1)	Provide technical assistance to GHS and other partners to improve planning, operations, BCC, and post-campaign evaluation for the campaign(s). This will focus on improving ITN uptake and use by households. BCC activities will include community mobilization, hang-up activities, IEC, mass media, etc.

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
4. Procure LLINs for distribution through routine channels	DELIVER	1,925,000	1,925,000	Western, Central, Greater Accra, & Northern Regions	Procure 350,000 LLINs to fill gaps in existing routine distributions in four focus regions, targeting vulnerable groups at GHS ANC and child welfare clinics and during community mobilizations. Up to 15,000 LLINs may be distributed to PLWHA.
5. TA to improve ITN distribution to vulnerable groups, planning, operations, logistics, etc.	Focus Region Project	300,000	0	Western, Central & Greater Accra Regions	Provide technical assistance to systems and facilities to improve planning, logistic management, and operations for routine ITN distribution mechanisms. The support will target vulnerable groups in three focus regions and be integrated with MCH activities.
6. Support for ITN voucher scheme targeting vulnerable groups	PROMPT	800,000	550,000	Central Region	Maintain PMI support to the voucher scheme in Central Region for distribution of at least 100,000 LLINs. Includes vouchers plus technical assistance to target pregnant women and children <5 through clinics and community mobilization.
7. Document best practices in ITN use	WHO	50,000	0	Nationwide	WHO country office to conduct an assessment of ITN distribution channels in Ghana, documenting best practices to guide future programming.

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
8. Support BCC activities at the national level to promote ITN use	PROMPT ($800,000) and BCS ($600,000)	1,400,000	0	Nationwide	Support BCC activities at all levels utilizing mass media, IEC, and community mobilization to promote ITN use. The PROMPT partner will focus on community level efforts aimed at promoting increased ITN use. The BCS will focus on integrating malaria content into national maternal/child health messaging.
SUBTOTAL — ITNs		**12,450,000**	**9,075,000**		
INTERVENTIONS — PREVENTATIVE ACTIVITIES					
IRS					
1. IRS implementation activities, include procurements and technical assistance	IRS IQC Global Task Order	6,600,000	2,200,000	Northern Region	In collaboration with GHS and with a focus on building local capacity, support implementation of entomological assessment and monitoring; procurement of IRS supplies, equipment, insecticide; spray operations; data collection; BCC activities including IEC and community mobilization; and logistics. Operations will cover at least 900,000 people in 8 districts (maintaining coverage to the 6 districts covered in 2009 and adding 2 new districts). Budgeted to cover 1.5 spray rounds.
2. Technical assistance to support entomological monitoring for IRS	CDC inter-agency agreement (IAA)	34,000	0	Nationwide	CDC entomologist to provide technical assistance for entomologic M&E of IRS, including pesticide resistance testing. Budget to cover 2 country visits and support reagents and other laboratory diagnostic materials.

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
3. External environmental compliance monitoring for IRS	EMCAB	30,000	0	Northern Region	Provide an independent evaluation of environmental compliance with respect to PMI–supported IRS operations. This will supplement the routine internal environmental monitoring that is performed by the main implementing partners (Research Triangle Institute [RTI], GHS, and the Ghanaian EPA).
4. Technical assistance for IRS implementation	USAID	0	0	Nationwide	USAID expert(s) to provide technical assistance to strengthen IRS management. Budget is core funded.
SUBTOTAL — IRS		**6,664,000**	**2,200,000**		
INTERVENTIONS — PREVENTATIVE ACTIVITIES					
IPTp & IPTi					
1. Strengthen FANC to deliver a package of malaria prevention and care services to pregnant women	PROMPT ($400,000) & Focus Region Project ($250,000)	650,000	0	80 targeted districts	Support the GHS to improve FANC services to enhance malaria prevention and care in pregnant women, including ITN use, IPTp, and BCC on case management. Improve health worker capacity by supporting training, supervision, and quality assurance at the national and facility level. Procure limited amounts of equipment and supplies. Target at least 80 districts and focus on gaps not filled with FY 09 PMI support.

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
2. Strengthen MIP interventions at the community level	PROMPT	(NGO capacity building activities below)	0	Nationwide	Support NGOs and NGO networks to extend the reach of MIP interventions: in particular, to increase attendance to ANC and use of IPTp early in the pregnancy; to promote use of ITNs by pregnant women; and to promote the prompt recognition and treatment of malaria in pregnant women.
3. Support BCC to increase full adherence to IPTp	BCS	400,000	0	Nationwide	Support BCC activities focused on vulnerable groups to improve early presentation at ANC and increase full compliance with IPTp. Combined with case management BCC activities.
4. Support GHS to implement IPTi	PROMPT	200,000	0	Targeted districts, TBD	Provide support the GHS to implement IPTi, consistent with the (pending) 2009 WHO recommendations. Provide technical assistance to NMCP to build capacity and quality assurance for IPTi, and if needed to revise national IPTi guidelines and strategy.
SUBTOTAL — IPTp/i		**1,250,000**	**0**		
INTERVENTIONS — CASE MANAGEMENT					
Diagnosis					
1. Procure microscopy equipment (microscopes & microscopy kits)	DELIVER	150,000	150,000	Nationwide	Procure microscopes and microscopy kits (reagents, slides, lancets, etc) to further improve laboratory capacity. This funding level will be able to procure approximately 60 microscopes and/or microscopy kits (each kit sufficient for 10,000 tests).

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
2. Procure RDTs	DELIVER	450,000	450,000	Up to 4 regions	Procure approximately 600,000 RDTs to support national scale-up in 3 focus regions. Procurements to be coordinated with Global Fund RDT purchases nationwide.
3. Build capacity for microscopy and RDT and support implementation of diagnostic policy. (Higher levels.)	Improving Malaria Diagnosis (IMAD)	225,000	0	Nationwide	Support implementation of the malaria laboratory policy, focusing on the appropriate use of microscopy and RDTs at the health facility level.
4. Build capacity for RDT and support implementation of diagnostic policy. (Lower levels.)	PROMPT	274,900	0	Up to 4 regions	Assist the GHS to provide supportive supervision and training of health care workers in malaria diagnostics, with a focus on the appropriate use of RDTs at the health center and community level.
5. Provide technical assistance in diagnostics	CDC IAA	12,100	0	Nationwide	CDC laboratory specialist to provide technical assistance in the implementation of the 2009 laboratory diagnosis policy.
SUBTOTAL — Case Management and Diagnosis		**1,112,000**	**600,000**		
Treatment					
1. Procure ACTs and severe malaria medication	DELIVER	3,400,000	3,400,000	Nationwide	Procure ACTs, rectal artesunate, and severe malaria treatment and supplies, as needed, to fill supply gaps at the national and/or regional level.

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
2. Support the private sector, including LCS, to improve malaria treatment	Focus Region Project	500,000	0	Western, Central, Greater Accra	Support improved malaria case management in the private sector. This will include working with LCS. Illustrative activities include BCC, training, supportive supervision or other methods to increase compliance with malaria treatment guidelines and improve the safety and quality of services provided.
3. Support in-service training and supervision to strengthen malaria case management	PROMPT	500,000	0	Nationwide	Support in-service training and supportive supervision to increase health care worker compliance/adherence to treatment guidelines for ACTs. To target a range of health care workers, including physician, nurses, pharmacists and chemical sellers in the private and public sectors, focusing on groups missed in Year 1 and 2. Procure limited quantities of commodities, such as weighing scales, to allow for the correct ACT dosing.
4. Support home-based management of malaria	PROMPT	500,000	0	Western, Central, Greater Accra & Northern Regions	Support the national strategy of mass scale up of home-based management of malaria by assisting in training of large numbers of CBAs in targeted regions and supportive supervision of volunteers, among other activities.
5. Support BCC to improve care/treatment seeking behavior	BCS	500,000	0	Nationwide	Support BCC activities focused on vulnerable groups to improve care seeking behavior and adherence to appropriate treatment. Combined with IPTp BCC activities

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
6. Provide technical assistance in case management	CDC IAA	12,100	0	Nationwide	CDC medical epidemiologist to provide technical assistance in malaria case management, focused on implementation of the 2009 revised case management guidelines.
SUBTOTAL — Case Management and Treatment		**5,412,100**	**3,400,000**		
Pharmaceutical Management					
1. Strengthen capacity of pharmaceutical management systems, including financial, supply chain management, and logistic systems	DELIVER ($600,000) and Focus Region ($300,000)	900,000	0	Nationwide	Support activities to strengthen public sector procurement and logistics systems with respect to malaria drugs from CMS to end user. Work with GHS to address the critical and persistent bottlenecks in finance, management, forecasting, and transportation, which have hindered the efficient and equitable distribution of malaria medications. The Focus Region Project will focus on Western, Central and Greater Accra regions, complementing its program of HSS activities. DELIVER will address needs nationally.
2. Strengthen drug quality monitoring capacity	United States Pharmacopeia DQI	150,000	0	Nationwide	Provide support for strengthening national drug quality monitoring and enforcement capacity in collaboration with FDB.
3. *In vivo* clinical efficacy monitoring	CDC/TBD	50,000	0	Nationwide	Support bi-annual *in vivo* clinical efficacy monitoring at a minimum of three sites. Activities to be carried out in collaboration with the NMIMR.

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
4. Technical assistance in pharmaceutical management.	USAID	0	0	Nationwide	Provide technical assistance by USAID experts for implementation of antimalarial guidelines and training strategies. (Core funded.)
SUBTOTAL — Pharmaceutical Management		**1,100,000**	**0**		
HIV & MALARIA					
1. Promote malaria prevention among PLWHA	PROMPT	100,000	0	Nationwide	Support integration of malaria prevention activities into HIV/AIDS prevention, care and treatment programs, including distributing the 15,000 LLINs specified above for PLWHA and promoting ITN use.
SUBTOTAL —HIV and Malaria		**100,000**	**0**		
NGO COLLABORATION & NMCP CAPACITY BUILDING					
1. Strengthen capacity of indigenous NGOs to implement community-based malaria prevention and control activities	PROMPT	600,000	0	Nationwide	Provide technical assistance to indigenous NGOs, which have received PMI and/or Global Fund grants, in order to build their capacity to manage grants and budgets and implement project activities. Illustrative activities include training in participatory and facilitation skills; supportive supervision in the field; coaching/mentoring; and assistance in work planning.

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
2. Support indigenous NGOs to implement community-based malaria prevention and control activities	PROMPT	1,200,000	0	Nationwide	Provide subgrants to NGOs and NGO networks to implement ITN, IPTp, IPTi and ACT promotion and BCC activities (e.g. community mobilization, IEC, etc.) to extend the reach of malaria prevention and control activities at the community level. The total budget of $1,200,000 is to be allocated to the subgrants program. Of this, a minimum of $10,000 should be set aside as funding for the U.S. Peace Corps/Ghana small grants program. The funding for ITN procurement is accounted for in the ITN section.
3. General capacity building at NMCP	PROMPT	200,000	0	Nationwide	Provide support for professional development of key NMCP staff including training of at least one entomologist to support vector control activities. Continue operational support including data management and information technology infrastructure development.
4. Support for monitoring and supervision of malaria control activities by NMCP and other MOH/GHS staff	PROMPT	100,000	0	Nationwide	Provide support for supervisory visits and monitoring activities 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 — NGO & Capacity Building		**2,100,000**	**0**		

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
MONITORING & EVALUATION					
1. Malaria Indicator Survey (MIS)	Measure Evaluation	1,300,000	0	Nationwide	Collect household level data on malaria indicators after 3 years of PMI implementation. This major exercise will provide data comparable to the 2008 DHS malaria module, including anemia and parasitemia measurements.
2. Sentinel site surveillance	PROMPT	250,000	0	7 sites	Continue to support seven sentinel sites to collect routine facility-based data on malaria cases among children.
3. Support GHS/NMCP to strengthen M&E capacity at district and subdistrict levels	PROMPT ($300,000) & Focus Region ($300,000)	600,000	0	Nationwide	Support the GHS/NMCP to strengthen routine systems for malaria M&E, including unified data collection formats; collection of key indicators; training on data collection, analysis and reporting; and limited procurement of IT hardware and software. Half of the support will focus on scale-up of the promising new DMIS system nationwide ($300,000), and the other half on malaria M&E in Greater Accra, Central, and Western Regions ($300,000).

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
4. Anemia and parasitemia survey, to demonstrate IRS impact	PROMPT	150,000	0	2 new IRS districts in Northern Region	Support an anemia and parasitemia survey in two IRS districts. Data to be collected includes ITN ownership and usage, history of febrile illness and promptness and effectiveness of treatment in children less than five years of age, household socioeconomic markers, and anemia and parasitemia biomarkers for children 6–30 months of age. The purpose will be to demonstrate the impact of public sector IRS in Ghana after one year of spraying and the effectiveness of a one spray vs. a two spray program. Findings will direct future IRS investments and operations.
5. Support for strengthening routine malaria data at district level	WHO	50,000	0	Nationwide	Support a WHO M&E technical advisor to collaborate with GHS/NMCP, CDC and USAID on assessment and implementation of the DHIMS. This will assess district-level systems and capacity, and will help strengthen the collection of routine malaria data at the health facility level.
6. Commodity end use verification	DELIVER	100,000	0	Nationwide	Implement the PMI standard protocol (LQAS) sampling technique) to verify end user receipt of malaria commodities through an end user verification tool
7. Technical assistance in malaria M&E	CDC IAA	24,200	0	TBD	Support for two technical assistance trips for Sentinel Site Surveillance activity and M&E activities.
SUBTOTAL — M&E		**2,474,200**	**0**		

Activity	Mechanism	Budget		Geographic Area	Description
		Total	Commodities		
IN-COUNTRY STAFFING AND ADMINISTRATION					
1. In-country staff and administrative expenses	USAID / CDC IAA	1,337,700	0	Nationwide	Support for coordination and management of all in-country PMI activities including support for salaries and benefits for 2 resident advisors and FSN technical and support staff, office equipment and supplies, and routine expenses such as annual stakeholder's forum during MOP planning.
SUBTOTAL — In-Country Staffing		**1,337,700**	**0**		
GRAND TOTAL		**34,000,000**	**15,275,000**	***Commodities represent 45% of total budget.***	

Table 3
President's Malaria Initiative — Ghana
Year 3 (FY 2010) Estimated Budget Breakdown by Intervention

Area	Commodities ($)	%	Non-commodities ($)	%	Total	%
ITNs	9,075,000	73	3,375,000	27	12,450,000	37
IRS	2,200,000	33	4,464,000	67	6,664,000	20
IPTp	0	0	1,250,000	100	1,250,000	4
Case Management Diagnosis	600,000	54	512,000	46	1,112,000	3
Case Management Treatment	3,400,000	63	2,012,100	37	5,412,100	16
Case Management Pharma mgt	0	0	1,100,000	100	1,100,000	3
HIV & Malaria	0	0	100,000	100	100,000	0
NGO & Capacity Building	0	0	2,100,000	100	2,100,000	6
M&E	0	0	2,474,200	100	2,474,200	7
In-Country staff	0	0	1,337,700	100	1,337,700	4
GRAND TOTAL	**15,275,000**	**45**	**18,725,000**	**55**	**34,000,000**	**100%**

Table 4
Year 3 (FY 2010) *Budget Breakdown by Partner

Partner Organization	Geographic Area	Activity	Budget ($)
DELIVER	Nationwide	Procure LLINs for routine distribution and mass campaigns; procure antimalarial medications and laboratory equipment; strengthen logistics and supply chain systems	13,875,000
PROMPT	Nationwide	Support ITN distributions, strengthen malaria case management, support FANC and MIP, implement sentinel site surveillance and support the national M&E strategy; implement comprehensive BCC strategy, strengthen NGO capacity and support NMCP management and supervision	7,099,900
RTI	Targeted Districts in Northern Region	Provide technical assistance and procure pesticides in support of IRS implementation, including entomologic monitoring.	6,600,000
Focus Region Project	Western, Central and Greater Accra Regions	Provide technical assistance to improve systems and facilities; improve planning and logistic management; improve case management in the private sector; support M&E, and address bottlenecks in financial management	1,650,000
BCS	Nationwide	Support malaria BCC activities	1,500,000

		focused on vulnerable groups	
Measure Evaluation	Nationwide	Conduct an MIS	1,300,000
IMaD	Nationwide	Support implementation of the malaria laboratory policy	225,000
USP	Nationwide	Support for national drug quality monitoring and enforcement	150,000
WHO	Nationwide	Conduct an assessment of ITN distribution channels to include documenting best practices; support assessment and implementation of district level systems to collect routine malaria data	100,000
CDC IAA	Nationwide	Provide technical assistance for entomologic monitoring for case management including laboratory diagnosis; and for malaria M&E. Support in vivo efficacy monitoring of antimalarials	132,400
EMCAB	Northern Region	Provide independent evaluation of IRS environmental compliance	30,000
Total			**32,662,300**

**Note: In-country staffing and administration of $1,337,700 is not included above*