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 Two (FY09)

GHANA

TABLE OF CONTENTS

ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AGA	AngloGold Ashanti
ANC	Antenatal care
AS/AQ	Artesunate-amodiaquine
AL	Artemether-lumefantrine
ARV/ART	Anti-retroviral/anti-retroviral therapy
BCC	Behavior change communication
CCM	Country Coordinating Mechanism
CDC	Centers for Disease Control and Prevention
CHIM	Center for Health Information Management
CHPS	Community-based Health Planning Services
CHPS-TA	CHPS –Technical Assistance Project
CMS	Central medical stores
CRS	Catholic Relief Services
DDT	Dichloro-diphenyl-trichloroethane
DFID	Department for International Development, UK
DHS	Demographic and Health Survey
DMIS	District Management Information System
DOT	Direct observed therapy
DSS	Demographic surveillance site
EPI	Expanded program for Immunizations
FANC	Focused antenatal care
FBO	Faith-based organization
FDB	Food and Drugs Board
FSN	Foreign Service National
FY	Fiscal Year
GAC	Ghana AIDS Commission
GOG	Government of Ghana
GDHA	Ghana demographic health survey
Global Fund	The Global Fund to Fight AIDS, Tuberculosis and Malaria
GHS	Ghana Health Service
GSCP	Ghana Sustainable Change Project
HMIS	Health Management Information System
PLWHA	People living with HIV/AIDS
IDSR	Integrated disease surveillance and response system
IEC	Information, education and communication
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
JHIEPGO	Johns Hopkins Program for International Education in Gynecology and Obstetrics
LLIN	Long-lasting insecticide-treated bed net
M&E	Monitoring and evaluation
MDG	Millennium Development Goal

MICS	Multiple Indicator Cluster Survey
MIP	Malaria in pregnancy
MOH	Ministry of Health
NGO	Non-governmental organization
NMCP	National Malaria Control Program
NMIMR	Noguchi Memorial Institute of Medical Research
PEPFAR	President's Emergency Plan for AIDS Relief
PLWHA	People living with HIV/AIDS
PMI	President's Malaria Initiative
QHP	Quality Health Partners Project
RCC	Rolling Continuation Channel (Global Fund proposal type)
RBM	Roll Back Malaria
RCH	Reproductive and Child Health Unit
RDT	Rapid diagnostic test
RFA	Request for Applications (signifies a new project)
RTI	Research Triangle Institute
SP	Sulfadoxine-pyrimethamine
SPS	Strengthening Pharmaceutical Systems
TA	Technical assistance
USG	United States Government
USP	United States Pharmacopeia
UNICEF	United Nations Children's' Fund
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

In December 2006, President George W. 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.

Malaria is present throughout Ghana with year around transmission 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, and about 900,000 of these cases are children under five years of age. UNICEF has estimated that up to 20,000 children under five die of malaria each year in Ghana.

The baseline information for PMI on nationwide coverage of key malaria prevention and control measures in Ghana will come from the 2008 Demographic Health Survey (DHS), complementing data obtained in the Multiple Indicator Cluster Survey (MICS) completed in 2006. The MICS survey shows improvements in key indicators as compared to a previous 2003 DHS. The 2006 MICS reported that 19% of households owned at least one insecticide-treated net (ITN) as compared to only 3% reported by the 2003 DHS. The MICS survey also found that approximately 22% of children under five slept under an ITN the night prior to the survey as compared to 4% in the DHS. Implementation of intermittent preventive treatment for pregnant women (IPTp), which began in 2003 also showed significant progress with the MICS reporting nearly 28% of pregnant women having received at least two doses of sulfadoxine-pyramethamine (SP) during their last pregnancy. Although artemisinin-based combination therapies (ACTs) were introduced in 2004, according to the 2006 MICS, only 3% of children under five were provided an ACT within 24 hours of onset of fever.

Ghana has received funding for malaria control from several organizations including the development agencies of the United Kingdom and Japan, UNICEF, the World Bank and PMI. The Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) has provided two malaria grants, Round 2 and Round 4, totaling $47.7 million over five years. Since these grants are expiring, Ghana submitted a Rolling Continuation Channel (RCC) application to the Global Fund in July 2008, requesting funds to continue to scale up activities, especially IRS, from both previous rounds. Ghana has also submitted a Round 8 Global Fund proposal focusing on home-based management of malaria and indoor residual spraying (IRS).

The following table outlines the Year 1 targets and progress to date:

Proposed Year 1 Targets (PMI and partners)	**Expected Results after 1 Year of implementation (March 2009)**
More than 1 million long-lasting ITNs (LLINs) will have been distributed nationwide to vulnerable populations.	By March 2009, more than 2.3 million nets will have been distributed with 590,000 provided by PMI. Nets will be distributed through an integrated campaign, antenatal clinics and a voucher program.
More than 368,000 pregnant women will receive two or more doses of IPTp with SP.	As of March 2009, at least 360,000 pregnant women will have received at least two doses of

	IPTp, of which 167,500 will be in PMI-supported facilities.
Approximately 100,000 households targeted for IRS will have been sprayed, protecting more than 500,000 residents.	As of August 2008, 68,252 households have been sprayed with a residual insecticide, protecting more than 600,000 residents.
Approximately 1,208,000 ACTs will be available to treat at least 345,000 children under five for three episodes of fever and approximately 14,700,000 doses will be available to treat older children and adults diagnosed with malaria.	By March, 2009, 5,010,000 ACTs for children under five and 11,121,000 ACTs for older children and adults will be available with PMI contributing 1,750,000 ACT courses.

This PMI Year 2 Malaria Operational Plan (MOP) was based on progress in Year 1 and a planning exercise carried out in July 2008. The MOP was developed with the participation of the National Malaria Control Program (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 2 fit in well with the Ministry of Health (MOH) 2008-2015 National Strategic Plan for Malaria Control.

The following paragraphs briefly describe the progress to date and Year 2 plans for each of the major interventions. Further detail can be found in the body of the MOP document technical interventions sections that follow.

Insecticide-Treated Nets (ITNs): During Year 1, PMI is supporting Ghana's multi-pronged model for ITN distribution to pregnant women and children under five. PMI supported the scale-up of two existing programs of targeted subsidies, namely the expansion of a discount voucher scheme in five of the country's ten regions and the subsidized sale of nets at antenatal care (ANC) clinics in a sixth region. By March 2009, 812,000 subsidized nets will have been distributed with PMI Year 1 support. A Year 1 "jump-start activity" involved the free re-treatment of nearly 250,000 bed nets in four regions. PMI also provided support in Year 1 for campaign logistics for the November 2007 free LLIN distribution during the national integrated maternal/child health campaign in which 1.7 million LLINs were distributed. To promote high rates of LLIN demand and use, PMI has also invested in information, education, and communication (IEC) and behavior change communication (BCC) activities.

In Year 2, PMI will procure 170,000 ITNs for routine distributions targeting pregnant women, children under five, and people living with HIV/AIDS, in addition to 430,000 ITNs for the proposed 2009 nationwide integrated child health campaign. PMI will continue to support IEC/BCC activities reinforcing LLIN demand, ownership and use.

Indoor residual spraying (IRS): Ghana's national malaria control strategy calls for rapid scale up of IRS, building on the successful IRS program of AngloGold Ashanti mining company in the Obuasi District. In Year 1, PMI supported Ghana's first large-scale implementation of IRS in the public sector. Using a synthetic pyrethroid insecticide, PMI sprayed 68,252 houses in five northern districts, protecting a total population of over 600,000. In Year 2, PMI will support spraying in the same five districts and, if feasible, expand the geographic coverage to include

three additional districts, with the final determination made together with the NMCP. Year 2 activities will continue to include technical assistance, environmental compliance monitoring and support for insecticide resistance monitoring.

Intermittent preventive treatment in pregnant women (IPTp): Ghana adopted IPTp with three doses of SP as a policy in 2004. The drug is locally produced and is provided free of charge at ANC clinics. While the NMCP reports having adequate stocks for the next two years stock outs still occur, primarily due to the weakness of the supply chain. In Year 1, PMI is supporting training and supportive supervision of healthcare providers in malaria in pregnancy interventions including IPTp. PMI is also supporting IEC/BCC activities to promote early and frequent ANC attendance in order to increase uptake of IPTp by pregnant women. In Year 2, PMI will continue to support training of healthcare workers along with supporting equipment and supplies to ensure that IPTp can be administrated under direct observation.

Case management:

Diagnostics – In Year 1, PMI supported a national laboratory assessment to guide the development and implementation of a new national malaria diagnostic policy and the procurement of microscopes and microscopy supplies. In Year 2, PMI will support the implementation of the national malaria diagnostic policy through in-service training and supervision and support for diagnostic quality assurance activities. PMI will also procure additional microscopes, equipment, supplies, and rapid diagnostic tests in Year 2.

Treatment – In 2004, Ghana adopted artesunate-amodiaquine (AS/AQ) as the first-line treatment and artemether-lumefantrine (AL) as the second-line treatment of uncomplicated malaria in Ghana. Nationwide roll out of ACTs in 2006 to public sector facilities encountered many challenges some of which persist to the present day. Funding for training of health care workers in effective case management of malaria with ACTs, and support to IEC/BCC for promoting proper management and use of ACTs were also a part of the Year 1 program.

Although Year 1 planning was based on information that AS/AQ stocks would be sufficient through the end of 2009, a PMI-supported quantification exercise subsequently demonstrated that there would in fact be a shortage of ACTs before the end of 2008. As a result, PMI has initiated an emergency procurement of $2.2 million in ACTs, $1.0 million of which will come from Year 2 resources; this will treat roughly 1.8 million cases of malaria. Year 2 will also support procurement of artesunate suppositories for pre-referral treatment of severe malaria, training of public and private-sector health care workers, and scaling up of home-based management of malaria. Technical assistance in such areas as curriculum development and supportive supervision will be focused on further scaling up the use of ACTs and promoting their rational use.

Pharmaceutical management – To address the logistical problems inherent in the Ghana health system, PMI supported an assessment of the pharmaceutical supply chain, which resulted in a plan of action. Activities in Year 2 will concentrate on implementing that plan, strengthening the pharmaceutical management and supply chain systems, strengthening drug quality monitoring capacity and assisting with the development of a national pharmacovigilance program.

HIV/AIDS and malaria: In Year 1, PMI/Ghana staff is working with the NMCP, the Ghana AIDS Commission, the USG HIV/AIDS advisor and various implementing partners to review current national standards for malaria prevention and control among People Living with HIV/AIDS (PLWHA). In Year 2, PMI will support activities aimed at integrating malaria prevention and treatment for PLWHA into malaria care and treatment efforts already underway in Ghana. These activities will focus on advocacy for increased national attention to HIV-malaria issues, outreach to PLWHAs, procuring and promoting the use of ITNs, and addressing the needs related to malaria case detection and treatment among PLWHAs.

Capacity building and collaboration with non-governmental organizations: In order to extend the reach of malaria interventions to the community level, PMI in Year 1 is strengthening and improving the capacity of indigenous non-governmental and faith-based organizations (NGOs, FBOs) to undertake malaria prevention and control activities under the leadership of the NMCP. This is being accomplished through the establishment of a program that provides sub-grants to NGOs, supplemented by training and other capacity-building activities. In Year 2, PMI will continue to support these NGO activities.

Monitoring and Evaluation (M&E): The NMCP has established a strong foundation for malaria M&E but the system remains fragmented. In Year 1, PMI is supporting the development of a comprehensive national M&E plan for malaria control. PMI is also collaborating with the NMCP, WHO and other stakeholders to establish five sentinel sites at which routine data on malaria morbidity and mortality will be collected. Year 1 PMI funding is also supporting the 2008 (DHS), which will include a malaria module and provide an important update on malaria indicators. In Year 2, PMI will continue to support the sentinel sites for malaria mortality and morbidity and will assist the NMCP in its efforts to implement the new malaria M&E plan.

The proposed fiscal year (FY) 2009 PMI budget for Ghana is $17.3 million. Of this amount, 33% will be for the procurement of ACTs and improved case management, 28% will support procurement and distribution of ITNs, 21% is for IRS, 3% for malaria in pregnancy activities, 2% for monitoring and evaluation, and a total of 7% for the other areas of NGO collaboration, capacity building and HIV/AIDS malaria collaboration. A total of 50% will be spent on commodities.

PRESIDENT'S MALARIA INITIATIVE

In late 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% after three years of full implementation in each country. This will be achieved by reaching 85% coverage of the most vulnerable groups – children under five years of age, pregnant women, and people living with HIV/AIDS – with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated bednets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS).

The President's Malaria Initiative (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 the 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 FY09, and is expected to reach $500 million in 15 countries by FY 2010.

In implementing PMI, the U.S. Government 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 National Malaria Control Program (NMCP) and other partners.

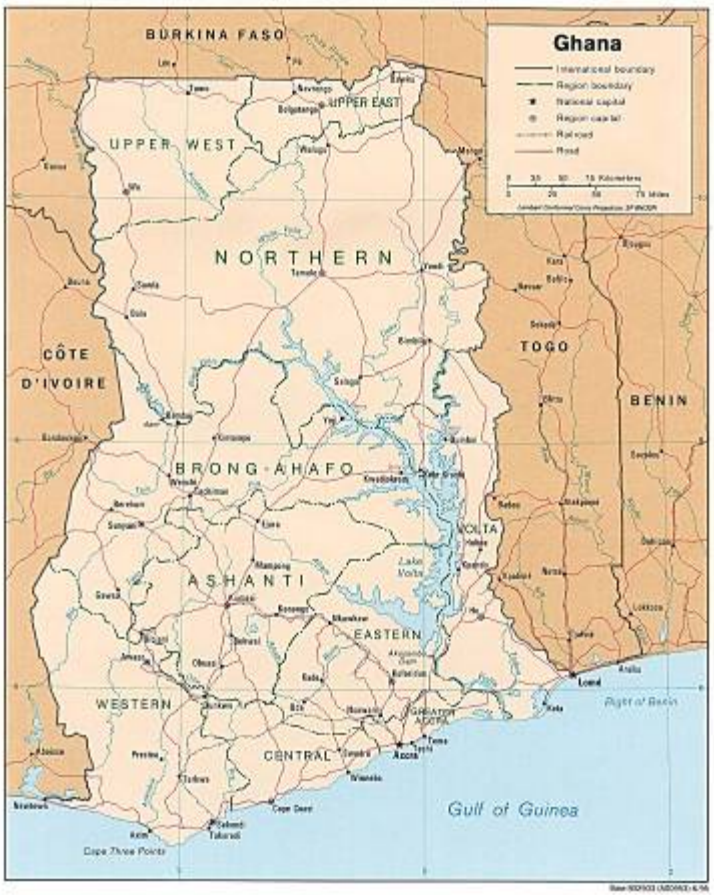
This document presents a detailed one-year implementation plan for the second year of PMI in Ghana. This detailed plan briefly reviews the current status of malaria control and prevention policies and interventions, identifies the progress to date and provides a description of planned Year 2 activities under PMI. The implementation plan was developed in close consultation with the National Malaria Control Program (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 (FY08). The total amount of PMI funding requested for Ghana is $17.3 million for Year 2 (FY09).

MALARIA SITUATION IN GHANA

Country Background

Ghana occupies a land area of about 92,000 square miles (238,500 square kilometers). It is bordered on the northwest and north by Burkina Faso, on the east by Togo, on the south by the Atlantic Ocean, and on the west by Côte d'Ivoire. The population is estimated at 23 million and the capital city, Accra, has a population of 3-4 million. Administratively, the country is divided into 10 regions and 138 districts (an ongoing revision of district reorganization will increase that number to upwards of 160 districts).

There are two rather distinct climatic regions in Ghana, the savannahs of the north and the forested hills of the south. In the north the rainy season is from May-June to September with a



peak in August. The annual rainfall in the north is 45-50 inches. A prolonged dry season stretches from September-November through March-April. The southern part of the country has two rainy seasons (April-June and September-November) and two relatively dry periods that occur December-February and in August. The Accra Plains are unusually dry for the coast, with a climate resembling that of the north. Temperatures vary relatively little throughout the country, with a mean annual temperature from 78° to 84° F (26° to 29° C). Average relative humidity ranges from nearly 100 percent in the south to 65 percent in the north.

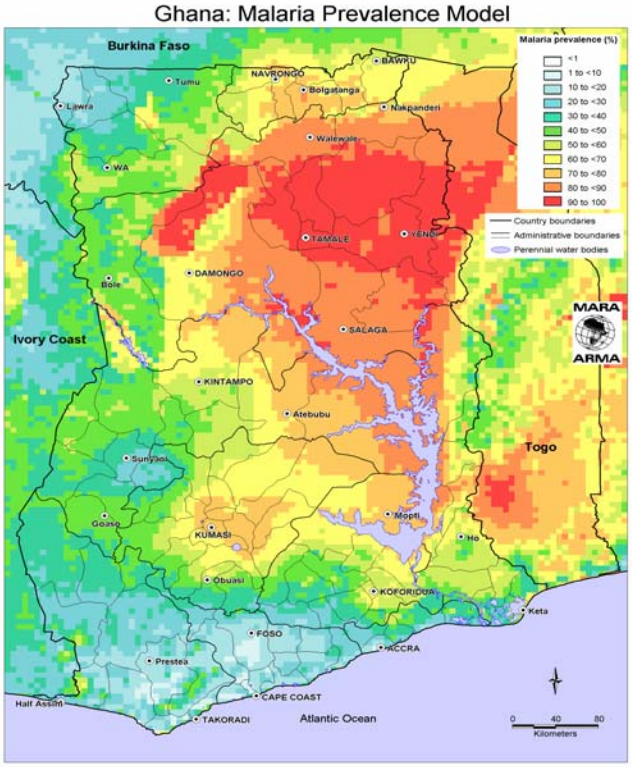
Ghana's key development trends from the United Nations Development Program's Human Development Report (2007/2008) are generally positive: the poverty incidence is 32%, a reduction from over 50% in the early 1990s. Life expectancy is estimated at 59 years and HIV/AIDS overall adult prevalence remains under 3%. Despite these positive trends, the nation still faces a major development challenge, ranking 135 out of 177 countries on the 2007/2008 United Nation's Human Development Index, which measures life expectancy, adult literacy, and per capita income. The infant mortality rate at (68/1000) and the under five mortality rate at (112/1000) are unacceptably high, reflecting insufficient progress toward achieving Millennium Development Goal Four. According to the 2003 DHS, women continue to have more children than they desire, primarily due to lack of access to contraceptive services and commodities. The

population is expected to grow at a moderate rate of 1.9% per annum over the next 10 years and over three quarters (79%) of the population is living on less than $2.00 per day.

Malaria Situation

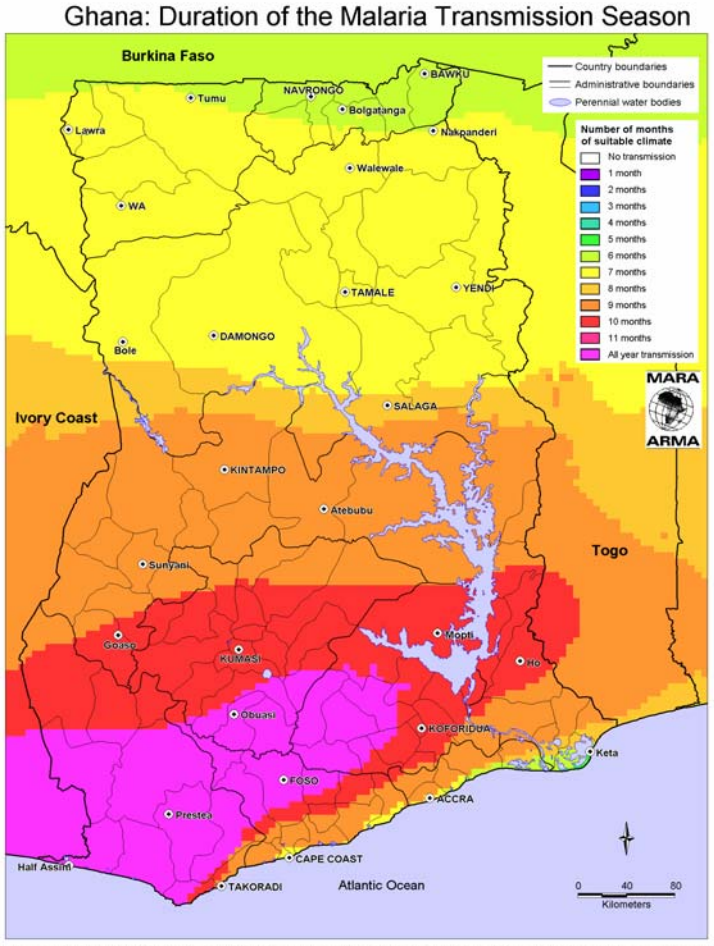
Malaria is hyperendemic in all parts of the country, with the entire population of 23 million at risk. Transmission occurs all year round with seasonal variations during the rainy seasons. According to the NMCP, malaria is the number one cause of morbidity in Ghana accounting for about 38% of all outpatient illnesses, 36% of all admissions, and 33% of all deaths in children under five years. A 2008 PMI-supported health facility survey found that this percentage of malaria cases burden of all malaria cases was somewhat lower, ranging between 20% and 30% throughout one calendar year. Of all malaria cases seen at the 60 facilities surveyed, approximately 25% were in children under five. 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. UNICEF estimates that up to 20,000 children under five die from malaria in Ghana each year.

The country 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 are highly anthropophilic, 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.



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

Although malaria is hyperendemic in Ghana with year-round transmission, in the northern part of the country, which has a prolonged dry season from September to April, there is a perceptible seasonal variation. The normal duration of the intense malaria transmission season in the northern part of the country is around seven months beginning in April/May and lasting through to September. 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%.



This map is a product of the MARA/ARMA collaboration (http://www.mara.org.za). July 2001, 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 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 Ghana Health Service (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, monitoring and evaluation 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 Service System (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 was enrolled resulting in increased attendance at health facilities.

National Approach to Malaria Control

The National Malaria Control Program (NMCP) falls under GHS and enjoys strong leadership. The NMCP in recent years has successfully partnered with the Global Fund, World Bank, UNICEF, PMI and other donors to mobilize resources and rapidly scale-up malaria control interventions. 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 are tasked to work closely with the NMCP at the central level.

In June 2008 the NMCP led the development of a revised National Strategic Plan for 2008-2015. A new plan was needed to reflect the changing technical and political environments (e.g., the increasing prominence of ACTs, IRS, and Ghana's revised Poverty Reduction Strategy). The National Strategic Plan calls for a reduction in malaria disease burden (morbidity and mortality) of 75% by the year 2015 (using 2006 as the baseline). To achieve this goal, the country has developed a comprehensive and integrated strategy. The primary interventions under the strategies include provision of early diagnosis with prompt and effective treatment of malaria using ACTs, scaling-up vector control measures with considerable emphasis on universal LLIN coverage, targeted indoor IRS application in selected areas, and IPTp.

In the area of vector control, the NMCP aims for a comprehensive approach, using ITNs and IRS in combination. Greater emphasis may be placed on one or the other in various districts, depending upon the epidemiological setting and funds available. The NMCP supports the use of complementary methods such as larviciding and environmental management, although in practice there has been less emphasis on these methods, partly because international donors have not favored them. Mass larviciding or outdoor residual spraying are not considered cost-effective or feasible in a hyperendemic country like Ghana, except in well defined and targeted areas.

Other key elements of the National Strategic Plan are to strengthen monitoring and evaluation and operational research, strengthen the health systems that deliver malaria services at all levels, create and sustain partnerships for malaria control, create awareness among the community as well as the health workforce on malaria control and prevention activities, and forge functional partnerships and mechanisms between departments and programs within and outside the health sector. The table below highlights key differences between the previous plan and the current revised draft.

Comparison of strategic objectives from Ghana's previous and current National Malaria Control Strategic Plans (2000 vs. 2008 Editions)

INTERVENTION AREA	FORMER STRATEGIC OBJECTIVES (2000-2010)	REVISED STRATEGIC OBJECTIVES (2008-2015)
Insecticide-Treated Bednet Use in Children Under Five Years	• Increase the number of children under five years sleeping under an adequately treated net from about 4% to 70% by 2005.	• Increase the number of children under five years sleeping under long-lasting insecticide-treated nets (LLINs) to 85% by 2015.
Insecticide-Treated Bednet Use in Pregnant Women	• Increase the number of pregnant women sleeping under an adequately treated net from about 4% to 70% by 2005.	• Increase the number of pregnant women sleeping under a long lasting insecticide-treated net (LLIN) to 85% by 2015.
Malaria Prevention in Pregnancy	• Ensure at least 60% pregnant women receive chloroquine as malaria prophylaxis by 2005.	• All pregnant women (100%) shall be on appropriate Intermittent Preventive Treatment (receiving at least 2 or more doses of sulfadoxine/pyrimethamine under DOT) by 2015.
Malaria Case Management	• Improve access to prompt treatment using chloroquine for 60% of uncomplicated malaria by 2006.	• 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	• Not practiced, though part of national strategy.	• Rapid scale up to cover one third of the country and ensure 90% of all structures in targeted districts are covered.

Source: Adapted from Ghana CCM, Rolling Continuation Channel Proposal, section 4.3.2, July 2008.

Current Status of Global Fund Malaria Grants

While Ghana Health Service covers most NMCP personnel and operating costs, virtually all NMCP programming is funded through Global Fund grants. 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. Two malaria grants are currently in operation, Rounds 2 and 4. The Round 2 grant ($8.9 million) is due to expire in September 2008 and has been implemented in 20 districts with a focus on IPTp, ITNs, anti-malarial drug policy, and the promotion of home-based care. The Round 4 grant ($38.8 million) will expire in March of 2009 and has focused on scaling up the activities in Round 2 to cover the population 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 and focuses on three major interventions: scaling up provision of prompt and effective treatment of malaria at health facilities, provision of intermittent preventative treatment of malaria (IPTp) to all pregnant women, and targeted provision of insecticide-treated nets (ITNs/LLINs) to pregnant women and children under five. Whereas the Round 2 and 4 grants aimed at achieving coverages of 75% for IPTp and 60% for ITNs, this 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, $34 million for ITNs, $4.1 million for monitoring and evaluation, $690,000 for monitoring drug resistance and $5.3 million for Behavior Change Communication (BCC) community outreach.

In early July 2008 Ghana also submitted an ambitious Round 8 proposal, focused on IRS, home-based management of malaria, and health system strengthening. The home-based management component targets children under five and it proposes 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 proposes to scale up the current IRS pilot programs from 6 districts to 45 districts. The health system strengthening component aims to strengthen monitoring and evaluation, operational research and human resource capacity. The Round 8 proposal would also invest in improved awareness of malaria prevention and control at the national and community levels.

CURRENT STATUS OF MALARIA INDICATORS

The recently published *Ghana Impact Evaluation Study* (Macro: June 2008), which was carried out for the five-year Global Fund evaluation plan, 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." The most reliable household level indicator data is obtained in the periodic DHS exercises, the last of which was carried out in July-October 2003. The next DHS will take place in September-October 2008 and will provide baseline data for key PMI indicators.

During the interim between the 2003 and 2008 DHS surveys, UNICEF conducted a Multiple Indicator Cluster Survey (MICS) in August-October 2006. Less nationally representative data

are also available from the NMCP surveys conducted in 2007, which were weighted toward the districts and regions that received focused support from the Round 2 and Round 4 Global Fund grants. Continued scale up of interventions has occurred following the DHS 2003 and MICS 2006 nationwide population- based surveys, and thus current national coverage rates are likely to have increased, although perhaps not to the extent suggested by the more limited NMCP 2007 survey data.

Trends in Malaria Control Invention Indicators

The proportion of households owning one or more ITN increased from 3.2% in the 2003 Demographic Health Survey (DHS) to 18.7% in the 2006 MICS. The proportion of children reported to have slept under an ITN the night before the survey was 3.5% in the 2003 DHS, increasing to 21.8% in the 2006 MICS. 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 women reported to have slept under an ITN the night before the survey was 2.2% in 2003 (DHS) and there are no comparable data from the 2006 MICS data. Implementation of IPTp with sulfadoxine-pyrimethamine (SP) began in 2003. IPTp coverage rose from 2% in the 2003 DHS to 28% for at least two doses of IPTp with SP in the 2006 MICS.

In the area of case management, the proportion of children receiving anti-malaria treatment within 24 hours of fever onset increased from 44% in 2003 (DHS) to 48% in 2006 (MICS). ACTs were introduced in 2004, and according to the 2006 MICS, of children with fever only 3.4% received an ACT. However, several positive trends in malaria management at the health facility level were documented by the USAID-supported Quality Health Partners project (QHP) in their 30 focus districts. Almost all facilities (96.7%) 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 1.0% at baseline to 56.7% three years later.

Trends in Malaria Disease Burden Indicators

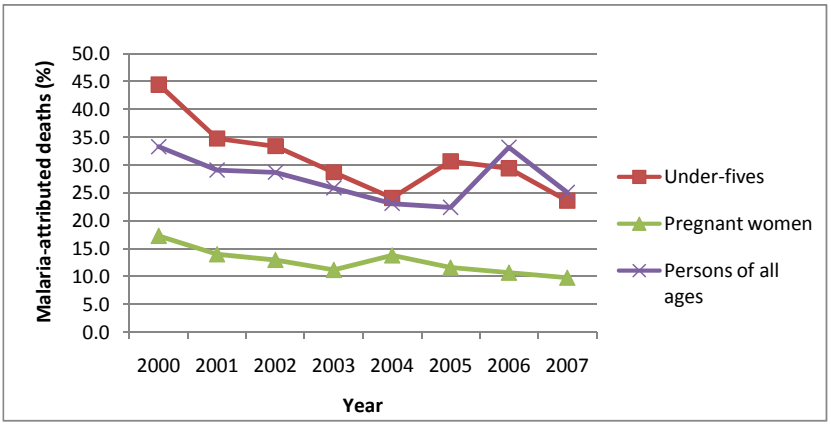
Due to the dearth of population-based data on the incidence of malaria in Ghana, statistics generated by health facilities have been used to provide an indication of malaria incidence. However these data must be interpreted with caution due to confounding variables such as the recent rapid expansion of the National Health Insurance Scheme, which has promoted increased use of health facilities.

The total number of reported clinical cases of malaria at health facilities fell sharply from approximately 5 million in 2000 to about 3.1 million in 2002 and then rose again to 3.8 million in 2005. By 2007 it decreased to 3.3 million cases. The number of reported clinical cases consequently decreased from 256 cases per 1,000 mid-year population in 2000 to 136 cases per 1,000 mid-year population in 2007. 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 incidence of severe malaria in children under five decreased consistently from 2004 to 2007; pregnant women however, rose from 2004 to 2006 and only dropped in 2007.

Recent Estimates of Malaria Indicators: 2003 Ghana DHS; 2006 Ghana MICS		
Indicator	**2003 DHS**	**2006 MICS**
Proportion of households with one or more ITN	3%	18.7%
Proportion of children under five years old who slept under an ITN the previous night	3.5%	21.8%
Proportion of pregnant women who slept under an ITN the previous night	2.7%	NA
Proportion of targeted houses adequately sprayed with a residual insecticide in the last 12 months	NA	NA
Proportion of women who received two or more doses of IPTp during their last pregnancy in the last two years	0.8%††	27.5%
Proportion of children under five years old with fever in the last two weeks who received treatment with an anti-malarial according to national policy within 24 hours of onset of fever	44.2%	48.2%
Proportion of children under five years old with fever in the last two weeks who received treatment with ACTs	N/A††	3.4%

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

Malaria-attributed deaths as a percent of all deaths reported in health facilities, Ghana (2000-2007)



Source: NMCP data, as presented in the *Ghana Impact Evaluation Study* (Macro: June 2008).

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. By the end of 2010, 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 an ACT within 24 hours of onset of their symptoms.

Baseline coverage figures for PMI/Ghana will come from the 2008 DHS data. In the interim, data from the 2006 MICS survey has provided an early indicative baseline for planning purposes.

EXPECTED RESULTS – YEAR 2

Prevention:

- More than 1.5 million LLINs (of which PMI will contribute at least 580,000) will have been distributed nationwide to vulnerable populations by PMI and other partners. This is expected to bring household ownership of one or more ITNs to 80% nationwide;
- At least 70,000 houses targeted for IRS in at least 5 districts will have been sprayed, protecting 525,000 residents; and
- More than 530,000 pregnant women will receive two or more doses of IPTp with SP. PMI's contribution will be to train antenatal care staff and procure water filters and other equipment.

Treatment:

- At least 2.2 million ACT treatments will be procured and distributed and available to treat children under five, older children and adults; and
- Laboratory equipment and supplies will be procured and distributed and training, quality control, and supervision will have been completed for all public health laboratories, nationwide.

Other:

- Five sentinel sites representing all of Ghana's epidemiological zones will collect high quality data on malaria disease burden; one site will also implement a complimentary cross sectional survey to collect community level data.

INTERVENTIONS – PREVENTION

Insecticide-treated nets

Current Status

Historically, the MOH/GHS policy had been to target the most vulnerable groups with ITNs, namely pregnant women and children under five. The NMCP's Malaria Strategic Plan 2008-2015 calls for universal coverage for all population groups. The aim of this shift is to reduce overall community-level malaria burden by reducing community-level parasite rates. The specific national targets for 2015 are to increase ITN ownership to 100%, 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 has deliberately pursued a multi-pronged ITN distribution strategy. This approach took shape around 2000, was reinforced by the April 2007 National Vector Control Policy, and was confirmed in the June 2008 national malaria control strategy. The NMCP and its partners have actively promoted all of the following distribution channels:

1. Subsidized targeted distribution at health facilities/ANCs;
2. Subsidized targeted voucher programs;
3. Commercial sales to the general public at full cost;
4. Intermittent mass free distributions integrated with maternal/child health campaigns;
5. Free or subsidized nets distributed through individual NGO programs;
6. Workplace net distributions by large employers; and
7. Other mechanisms as conditions warrant.

A salient feature of the Ghana mixed model is that various partners in malaria control can support one or more distribution methods according to their comparative advantage. For example, commercial and NGO sectors are unusually vibrant in Ghana, which allow the voucher program and NGO distributions to flourish. Mass scale up of ITN distribution began in 2005-06 with support from the Global Fund, USAID, UNICEF, the World Bank, DfID, and NGOs. Taxes and tariffs for ITNs were permanently removed. 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 integrated campaign. In the commercial sector, six vendors provide nets for purchase by the general population at a cost of approximately $6-10 each depending on size, type and color. Informal sales of locally stitched nets remain common.

A variety of targeted subsidy programs have made nets available at a reduced price. For example, since 2003, USAID's NetMark project has piloted a voucher scheme which relies upon commercial distributors to provide subsidized nets to vulnerable groups. The end price to the consumer varies from 50 cents to $4, depending on patient preference. The typical amount paid is $1.00-1.50, and the payment for a standard size net is $1.50. PMI has funded NetMark to expand the scheme into the Central Region and increase the value of the subsidy nationally. The Global Fund has funded voucher schemes in four southern regions, with technical assistance provided by NetMark. The Global Fund also subsidizes direct ITN sales at ANCs and child

welfare clinics in all 10 regions of Ghana. The latter is a MOH program which has historically charged $2 per net. NetMark's and Global Fund's consistently high voucher redemption rates of 85-90% and more suggest that these co-payments are not viewed as too high.

The Global Fund also supports ITN distributions by 50 local NGOs. The pending RCC proposal to the Global Fund requests more than $35 million over six years to scale up the ITN distributions, which were began under the expiring Round 2 and 4 grants. In addition, Global Fund support has been requested to monitor the effectiveness of the pyrethroids used for net treatment. Meanwhile UNICEF has taken the lead in distributing free or subsidized nets (at a cost of approximately $0.50) in the northern regions. The World Bank has plans to distribute 900,000 nets in the coming year during national child survival campaigns, targeting children under one and pregnant women; this is to be complemented by intensive BCC/IEC activities on malaria control targeting the Northern Region.

Net retreatment programs have been supported due to the large number of locally sewn nets (currently estimated at 25-30% of all nets owned in Ghana). Approximately 2,000 re-treatment centers throughout the country have been supported by the NMCP, NetMark, the Malaria Consortium, and other NGOs. However, the NMCP is now placing increased emphasis on procurement of new LLINs, and is gradually moving away from bundled ITNs and retreating locally sewn nets. The NMCP does not procure untreated nets.

As shown in the "Current Status of Malaria Indicators" section, net ownership and use rates have increased significantly in the past several years. ITN ownership grew from 3% in 2003 to 19% in 2006. ITN use in children under five years is now estimated at nearly 22%. However, ITN use in children under five varied significantly by region, with the northern regions reporting higher ITN use (22-39%) compared to the Western region (11.5%) and Greater Accra region (16.3%).

Among the challenges to ITN scale up, ensuring sustainable net supplies to all health facilities has been a persistent problem. Procurement delays have hampered many ITN programs, including the Global Fund distributions and the 2007 integrated health campaign. The voucher scheme and direct ITN distribution from MOH antenatal and MCH clinics run parallel in five regions; anecdotal reports suggest a degree of competition and confusion at the community level resulting from inconsistent harmonization of these various methods. Among net owners, resistance to regular bed net usage is a major challenge for BCC/IEC. At the national level, it has been difficult to track the different ITN procurement streams and to prevent leakage into the informal commercial sector. The RCC proposal has outlined a program in which four regions would be funded for subsidized sales at health facilities, while in other regions the nets would 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 funds presumably dependant on the results.

Progress to Date

One of PMI Ghana's first activities was to support the logistics of ITN distribution in the November 2007 maternal/child health campaign, which distributed 1.5 million nets to pregnant women and children under one. PMI provided technical assistance and funded the transportation of nets from the port of Tema to four regional distribution hubs. A major challenge was the delay in procurement of half the nets by the MOH, requiring a mop-up campaign to be conducted

in targeted regions in February-March 2008. PMI is supporting an evaluation of net distribution during the campaign.

During Year 1, PMI is supporting a free net retreatment campaign in the Central, Volta and Western Regions, retreating 244,253 nets with K-O Tab 1-2-3. As a part of these activities, 1,905 health and community-based volunteers have been trained in net retreatment and promotion of consistent use of LLINs. Consistent with PMI policy and the long term national strategy, PMI/Ghana will discontinue support for the re-treatment program in favor of replacing untreated nets with LLINs.

During Year 1, PMI is supporting the expansion of the ITN targeted subsidies voucher program into the Central region. This includes support for an increase in the face value of the voucher subsidy from 4 to 6 cedis, reducing consumer costs per net to 2 cedis ($2.00 USD) for all five regions where the program is operating. More than 460,000 LLINs will be distributed through the targeted subsidy voucher program as a result of Year 1 PMI support.

PMI is supporting procurement of approximately 350,000 LLINs for subsidized distribution to pregnant women and children under five at health facilities and ANCs, at a cost of approximately $2 per net. The Western Region is targeted for this activity due to its relatively underserved status (no voucher scheme, no UNICEF net programs). Finally, during Year 1, PMI is supporting and providing technical assistance to the NMCP to develop a database system to track ITN distributions through all channels in Ghana.

Insecticide-Treated Nets in Ghana: Calculation of Needs

Parameter	**2006**	**2007**	**2008**	**Cumulative**	**2009**
Population	21,300,000	21,875,100	22,465,728		22,825,179
Children <5					
Children <5 at 20%	4,260,000	4,375,020	4,493,146		4,565,036
Target coverage	22%	55%	60%		85%
Target children<5	937,200	2,406,261	2,695,887		3,880,280
Yearly target children <5	937,200	1,469,061	289,626		1,184,393
# of nets needed (1 net per 2 children)	468,600	734,531	144,813		592,197
# of nets needed to maintain coverage (5% loss)		23,430	36,727		7,241
Replacement nets @ 3 yrs					401,203
Total needed	468,600	757,961	181,540	1,408,100	1,000,640
Pregnant women					
Pregnant women at 4%	852,000	875,004	898,629		913,007
Target coverage	25%	40%	60%		85%
Target pregnant women	213,000	350,002	539,177		776,056
Yearly target	213,000	137,002	189,176		236,879
# of nets needed	213,000	137,002	189,176		236,879
# of nets needed to maintain coverage (5% loss)		10,650	6,850		9,459
Replacement nets @ 3 yrs					186,041
Total needed	213,000	147,652	196,026	556,678	432,379
Grand total needed	**681,600**	**905,612**	**377,566**	**1,964,778**	**1,433,019**

ITN Gap Analysis

The number of ITNs needed to achieve and maintain coverage of the target population was determined by conducting a gap analysis, based primarily on the analysis submitted with the RCC proposal in July, 2008. The analysis took into account the estimated population of children under five and pregnant women, the number of nets needed for 85% coverage, the need for replacement nets, and an accounting for lost or damaged nets.

The total number of nets currently in-country is estimated to be 4,487,048. Adjusting this number to account for needed retreatment or replacement, leakage and non-use of delivered nets, and the use of nets outside the vulnerable target group, resulted in an estimated number of

useable nets in-country of about 1,250,000. A net gap of about 200,000 (1,433,019 – 1,250,000) could be assumed based on these calculation.

As experience from other countries shows, the above gap analysis may not capture the true situation on the ground. Household-based surveys provide more reliable data. It is anticipated that the upcoming 2008 DHS will provide a more solid basis for planning (results expected in January 2009). The World Bank is planning to procure 900,000 nets for 2009 and this along with planned contributions of other donors and consultation with the MOH/NMCP will be required to confirm the net gap calculations and determine the level of PMI support indicated.

Proposed Year 2 Activities: ($4,800,000)

1. Support procurement of LLINs for 2009 nationwide integrated campaign: ($2,800,000)

   Procure at least 430,000 LLINs for free distribution to targeted groups during the planned 2009 ITN and National Maternal/Child Health Integrated Campaign. 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 this campaign. Provision would be made to cover the two-year cohort of children born in the interim since the last mass campaign, which occurred in November 2007.

2. Support routine ITN distribution through voucher schemes in 5 regions: ($700,000)

   PMI will maintain its support to the voucher scheme in Central Region, which began implementation under USAID in FY07 and was expanded under PMI in FY08. As in previous years, this support will include coverage of the subsidy. It will also include the training and other technical assistance (TA) necessary to enable the Ghana Health Service staff, commercial distributors, and community volunteers to implement the scheme. PMI will support the distribution of at least 100,000 LLINs nets targeting pregnant women and children under five. To reach these populations, vouchers will be made available at public health facilities, including ANC and child welfare clinics, and also at the community level. PMI will also continue to support training and other TA to the Global Fund voucher schemes in an additional four regions (Brong-Ahafo, Ashanti, Eastern, and Volta regions).

3. Procure LLINs for distribution via the MOH subsidized sales program and PLWHA: ($400,000)

   The Western Region has been underserved by ITN programs and remains a priority concern for the NMCP. Building on the experience of the FY08 distribution to Western Region, PMI will support procurement of at least 50,000 LLINs for distribution to pregnant women and children under five through the MOH subsidized sales program. Recognizing that the MOH policy may be in flux during 2009-10, these nets will be provided either at a low co-pay rate or free of charge, consistent with whichever MOH policy is in effect at the time of distribution. In addition, at least 10,000 LLINs will be procured for distribution to people living with HIV/AIDS (PLWHA) in targeted high burden districts nationwide. The distributions will be carried out in collaboration with the National AIDS/STI Control Program (NACP) and suitable NGO partners.

4. Improve ITN delivery and logistics systems: ($200,000)

   Support in the form of technical assistance will be provided to strengthen and enhance the sustainability of net distribution and logistics systems. The technical assistance will address bottlenecks and needs in both the public and commercial ITN sectors. A portion of the supported activities will build upon the PMI investments in ITN data management that were made in Year 1.

5. Technical assistance for planning and implementation of the planned 2009 integrated campaign: ($200,000)

   Provide technical assistance to the NMCP and other partners for ITN distribution in the 2009 integrated ITN and maternal/child health campaign. This will include support for campaign planning; support for campaign implementation including transport and other logistics; and funding of a post-campaign evaluation. The importance of these activities was demonstrated in the 2007 campaign, during which procurement delays and planning difficulties compromised the distribution of 750,000 nets to targeted groups.

6. Support IEC/BCC activities related to ITNs at the national level: ($500,000)

   Provide support for IEC/BCC activities at the national level utilizing mass media to promote increased ITN ownership and especially use. These activities will complement the community level IEC/BCC efforts that are being funded by PMI, the Global Fund, and international NGOs, among other donors. Specifically, these IEC/BCC activities will be to reinforce the large-scale PMI-supported NGO capacity building activities that are described in a later section. Innovative approaches, such as door-to-door "hang up campaigns," will be supported wherever appropriate.

Indoor Residual Spraying

Current Status

In recent years, Ghana has moved vigorously to adopt IRS as one of the major interventions in their 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 three years several major developments have taken place that 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 the AngloGold Ashanti (AGA) mining company, 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.

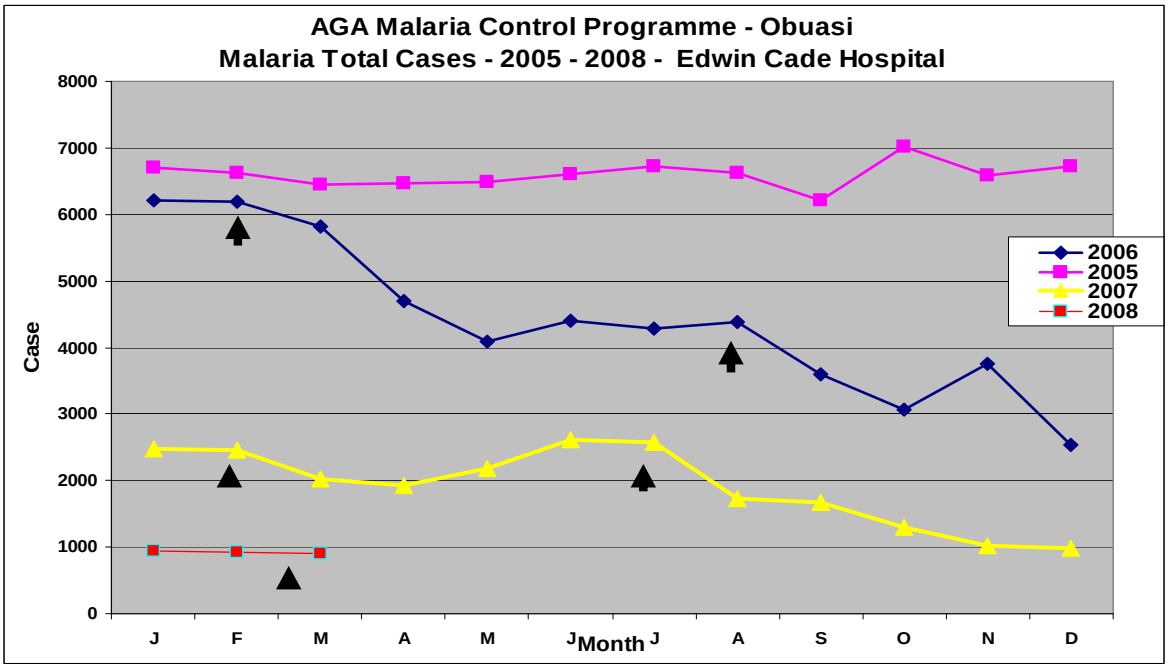
The momentum continued to build in the first half of 2008, as PMI supported the first large-scale implementation of IRS in the public sector (in a 5-district pilot in Northern Region), and as the new National Malaria Strategic Plan called for scaling up IRS rapidly to protect "at least one third of Ghana's districts by the end of 2015." In June 2008, the Ministry of Health and AngloGold Ashanti were named as joint Principal Recipients in a $162 million Round 8 Global Fund proposal, which, if successful, could permit this ambitious goal to be realized. The Global Fund IRS grant would cover 1.7 million households in 33 districts by 2010 and 2.0 million

households in 40 districts by 2013 (using the 2000 National Census average of 5.2 persons/household).

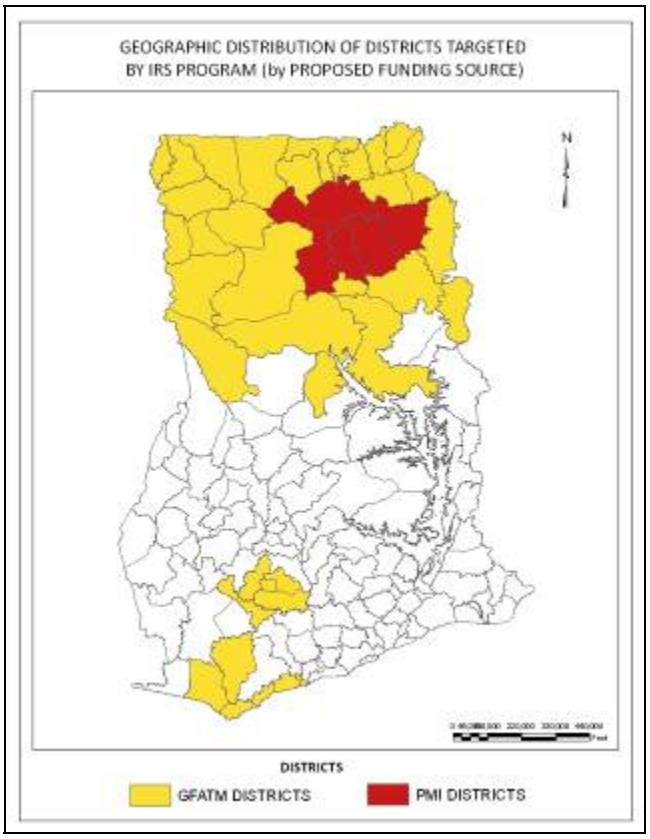
AngloGold Ashanti's "Obuasi Model" and Proposed Scale-Up

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 partly urban target area is socially complex, with company employees in the minority. A strong community relations component in their malaria control program was reflected in a more than 98% acceptance rate for the IRS operations. The company's main health facility reported a remarkable and sustained 75% decrease in malaria cases between 2005 and 2008 (see figure).

The Ghana Global Fund Round 8 malaria proposal is requesting more than $124 million for IRS programming over 5 years with a plan to cover 40 districts with IRS on a phased basis, adhering fairly closely to the "Obuasi model" operationally. Districts identified in the proposal were selected based on criteria including 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.



Source: AngloGold Ashanti Malaria Control Program, June 2008.



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

Insecticide Resistance Issues

Insecticide resistance presents a major challenge for IRS operations in Ghana. Two groups have conducted insecticide resistance monitoring in Ghana. One group from the University of Witwatersrand in South Africa is providing support to the AngloGold Ashanti IRS operations in Obuasi. The other group is the Noguchi Memorial Institute for Medical Research (NMIMR), which supports the NMCP. 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 resistant to DDT and other pesticides has been attributed to agriculture use spanning decades, e.g. on cocoa farms. With support from PMI Ghana, the Noguchi Institute has been conducting insecticide resistance studies in Northern Region to support the IRS operations. Although final results are not yet available, susceptibility to pyrethroids was high.

All IRS implementers recognize the need for developing a robust insect resistance monitoring and mitigation plan. Yet, as IRS operations are scaled up, it is anticipated that existing local capacities may rapidly be overwhelmed. To address these challenges, PMI/Ghana, the PMI Integrated Vector Management Project, AngloGold Ashanti, and the Ghana Global Fund Round 8 malaria proposal all make substantial investments in entomologic monitoring. Further to this, the NMCP plans to convene an IRS technical oversight committee, with the inaugural meeting scheduled for mid-2008.

Progress to date

In the first half of 2008, in collaboration with the Ghana Health Service, PMI implemented IRS operations in five districts in the Northern Region (savannah zone, see map). 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 the Noguchi Institute (NMIMR). The approach differed somewhat from the "Obuasi model" in that it targeted no major urban areas and employed spray teams on a seasonal basis only. And importantly, its field operations relied heavily on the existing systems of the Ghana Health Service, both in terms of physical structures (e.g., for storage and office space), human resources for training and supervision (e.g., the NCMP officers and regional and district disease control officers); and community mobilization (e.g., the network of community health volunteers). The PMI-supported operations benefited greatly from AngloGold Ashanti assistance and collaboration, particularly in the areas of community sensitization, training of trainers, and training of spray operators.

Planning, surveillance, logistical preparations, and training took place in late 2007 and early 2008. An office was opened in Tamale, and 16 operational sites were established. Over 330 spray operators and 138 community volunteers were trained and deployed. Spray operations commenced in May 2008. By the close of operations in August, the program exceeded its targets of covering at least 85% of sprayable rooms 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, 304,217 rooms in 68,252 houses were sprayed, and the total population protected was over 601,973. Of these, over 108,000 were children under the age of five and 14,000 were pregnant women.

Proposed Year 2 Activities: ($3,557,100)

The first spray round of PMI-supported IRS is nearing its conclusion in the five targeted districts in the Northern Region. The post-spray entomologic monitoring planned in the coming months will inform the choice of Year 2 pesticide, among other planning decisions. The assumption for Year 2 is that PMI will support a similar IRS operation, in at least the same 5 districts in the Northern Region, and expanding to 8 if feasible. The NMCP has indicated it would be desirable for PMI to expand its geographic coverage if possible.

The assumption for PMI planning purposes has been that just one spray round will be conducted in 2009, 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. The area has one of the shortest peak malaria transmission seasons in Ghana, reflective of the relatively brief rainy season (May-Sept) and pronounced dry season (Nov-March). Spraying is timed for the beginning of the rainy season, when mosquito populations surge. 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 final status of Ghana's Round 8 Global Fund proposal is expected to be known in October 2008. If the large (at least $124 million) IRS component of that proposal is successful, it will be critical for PMI-supported activities to be well harmonized with Global Fund-supported spraying. 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.

In Year 2, PMI in collaboration with the NMCP, district health teams and other partners, will support IRS and entomological monitoring in at least the same five districts as in Year 1.

1. Support for IRS program implementation: ($3,340,000)

   In collaboration with GHS and with a focus on building local capacity, support the implementation of entomological assessment, spray operations, data collection, IEC/BCC activities including community mobilization, and logistics support to cover at least 525,000 persons in at least six districts and no more than 8 districts. This will include continued support for program offices in Accra and Tamale, procurement of insecticide, and procurement of IRS equipment as needed to complement Year 1 stocks. The Year 2 IRS program will expand upon Year 1 activities in one of two ways, either: (a) by increasing the number of districts beyond the 5 initially covered, or (b.) increasing the frequency of spraying to twice per year, if entomologic and cost-effectiveness assessments indicate that this is indicated. The final selection of districts and spray schedules will be made in consultation with the NMCP.

2. Technical assistance for IRS implementation including entomologic monitoring: ($12,100)

   Provide technical assistance to the IRS activities by a CDC entomologist.

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 Ghana Environmental Protection Agency, the NMCP, and appropriate U.S. government officials at the Ghana USAID Mission and PMI headquarters level. Environmental compliance will be assessed against appropriate international and national yard sticks, including the Environmental Assessment and Pesticide Safer Use Action Plan that were developed at the commencement of PMI supported IRS operations in early 2008.

4. Support for insecticide resistance and entomological monitoring: ($175,000)

   Support ongoing entomological assessments in the existing target districts, in collaboration with the Noguchi Institute and other local partners as appropriate. The assessments will be to provide timely and accurate data to support IRS operational decision making. If additional districts are covered, baseline assessments will be conducted for them. Provide support to strengthen the national capacity for entomological support of IRS operations.

Intermittent Preventive Treatment in Pregnant Women

National Strategy on Prevention of Malaria in Pregnancy

Improving maternal and child health is a national priority in Ghana, particularly in light of growing concern that Ghana's Millennium Development Goals (MDGs) for maternal health may not be met. The antenatal period is a critical time to reach women with effective malaria prevention and treatment messages, services, and products. Most women in Ghana make at least one antenatal visit to a health facility, although a majority present late in pregnancy.

Ghana adopted IPTp with SP as a policy in 2003, and the policy reserves SP for IPTp only. IPTp is free of charge. In 2003, only 20 selected districts were benefiting from this strategy, but in 2005, it was scaled up nationwide to all 138 districts. The strategic objective for IPTp in the revised National Malaria Strategy is to reach 100% of all pregnant women in Ghana with IPTp by 2015. The current estimated annual number of pregnant women is 896,000 (4% of the country population).

The program recommends three doses of SP to be administered to HIV-negative pregnant women starting after quickening (16 weeks or thereafter) with each dose administered at least one month apart. The last dose of SP should be administered at least one month before delivery. All doses are to be administered under direct observation (DOT). 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 cotrimoxazole. Quinine is Ghana's drug of choice for the treatment of complicated malaria at any time during pregnancy and for uncomplicated malaria in the first trimester. ACTs are reserved for uncomplicated malaria in the second or third trimester.

Current Status and Challenges

IPTp is being implemented by the Ghana Heath Service (GHS) Reproductive Health Division in collaboration with the NMCP in public health facilities in all regions, including those managed by missions and faith-based organizations (FBOs). However, not all health facilities are currently capable of delivering IPTp. The NMCP has made improvements in coverage with IPTp2 and IPTp3 a priority. According to the 2006 MICS, the use of any drug to prevent malaria during pregnancy is 66.9%. However, in that household-level survey, only 27.5% of pregnant women had taken two or more doses of SP, the recommended WHO IPTp regimen. In 2008 PMI-supported health facility survey found that 62% of pregnant women who visited health facilities were documented to have received IPTp1, 38.1% IPTp2, and 36.3 % IPTp3. This survey showed that IPTp is offered in 94.1% of facilities, however SP stock outs had occurred in 27% of health facilities in the previous six months. These stock outs are likely related to challenges in supply chain management programs rather than a drug shortage at the central warehouses.

Challenges to full implementation of IPTp policy include inadequate human, technical, and financial resources. SP is produced locally and the NMCP states that they have an adequate supply to cover the anticipated needs over the next two years. Anecdotal reports by zonal malaria coordinators suggest that low uptake of IPT2 and IPT3 is due, at least in part, to inaccurate reporting by health facilities at the district level and negative attitudes of healthcare workers, especially toward pregnant women who report late for prenatal care. In-service training for healthcare workers is needed as well as behavioral change messages targeting the general population to encourage pregnant women to initiate prenatal attendance in the first trimester. In addition, infrastructure at health facility level, such as availability of water filters and reusable cups, should be improved, so that IPTp can be delivered as DOT. Indeed, the unavailability of clean water at health facilities is commonly a cited obstacle to DOT.

The NMCP is looking for innovative strategies, such as house-to-house visits and use of community agents, to improve coverage of interventions related to maternal and child health, including IPTp. In addition, the NMCP and RCH have collaboratively been involved in training healthcare workers on focused antenatal care (FANC). FANC consists of a comprehensive and integrated package of interventions that is delivered through routine ANC visits. Training

materials and job aides were developed as a part of the FANC efforts and antenatal cards have been modified to record IPTp use. Training has been conducted in all public and Christian Health Association private facilities but there are not sufficient quantities of job aides available for use by all facilities.

Progress to Date

PMI in Year 1 has been supporting Malaria in Pregnancy (MIP) interventions, including updating the healthcare worker training curriculum on MIP, training of 650 health workers to improve coverage, and IEC/BCC activities to promote the use of IPTp and ITNs. Facility-level work in Year 1 has focused on 40 deprived districts in southern Ghana, building on recent USAID programming. A May 2008 quantification exercise supported by PMI forecasted no stock outs of SP, and therefore no plans for procuring these drugs using PMI funds are currently being advocated.

Proposed Year 2 Activities: ($500,000)

1. Strengthen malaria prevention during antenatal care, with emphasis on IPTp: ($500,000)

   Strengthen the overall antenatal care in Ghana by supporting training of healthcare workers in the delivery of focused antenatal care (FANC), with a special focus on IPTp, counseling on use of ITNs, and other effective anti-malaria interventions. Building on results in the 40 districts that were targeted in Year 1, PMI support in Year 2 will be scaled up for nationwide impact. National level support will include at a minimum the development and printing of training materials and the training of health workers to effectively deliver a package of malaria prevention and care services. Facility level support will target at least 80 districts and will include supportive supervision and purchasing a limited quantity of equipment and supplies, such as filter canisters for clean water and reusable cups, so that IPTp can be implemented under direct observation. These efforts will allow the provision of a quality, comprehensive, and integrated antenatal care to pregnant women.

2. Strengthen malaria in pregnancy (MIP) interventions at the community level: *(no additional cost under this activity; funded as part of the strengthening of indigenous NGOs activity, see below)*

   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. PMI will also work with NMCP to design and pilot innovative strategies to deliver malaria in pregnancy interventions, such as working with community agents and performing house-to-house visits, to increase awareness of the risks of malaria in pregnancy and promote use of related interventions.

3. Provide pre- and in-service training on case management of malaria during pregnancy: *(no additional cost; covered as part of the case management activities, below.*)

   Support training of healthcare workers at pre and in-service levels, to improve the clinical management of malaria in pregnant women. This activity is part of a comprehensive malaria

in-service training activity to improve healthcare worker performance. This activity will be carried out together with general malaria case management pre and in-service training.

INTERVENTIONS – CASE MANAGEMENT

The Ghanaian NMCP and the PMI team view early diagnosis and prompt treatment of malaria with safe and efficacious medicines as a priority strategy for malaria control in Ghana. The focal issues in case management have been ensuring access to prompt diagnosis and effective treatment, improving the quality of health care, improving referral systems, and conducting operational research (drug quality monitoring, efficacy monitoring, and pharmacovigilance).

Malaria Diagnosis

Current Status and Challenges

The NMCP has indicated that improving laboratory capacity for malaria diagnosis is a priority, particularly with the change from relatively inexpensive chloroquine, as first-line malaria treatment, to ACTs, which are significantly more expensive. Although not yet documented in GHS policy guidelines, the NMCP recommends the use of laboratory tests, either microscopy or rapid diagnostic tests (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. According to the NMCP, regional hospitals, district hospitals, and some health centers at the sub-district level should have capacity for microscopy.

The majority of malaria diagnoses in health facilities are made based on clinical symptoms and signs. There is a lack of a written recommendation on the use of RDTs and only 10–20% of malaria diagnoses are based on microscopy. In addition, it is generally recognized that laboratory services in the public sector are weak, with inadequate infrastructure, insufficient numbers 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 resources constraints at all levels. The preliminary report of a 2008 PMI-supported nationwide malaria laboratory assessment stated that only 63% of health facilities routinely performed thick and thin slide preparations. This assessment also showed that only 46% of health facilities have quality assurance programs in place.

A 2008 health facility survey, also supported by PMI, collected data on malaria diagnosis. The preliminary report states that children under five who have should have been diagnosed with malaria presumptively were correctly diagnosed in 80% of observations. However, approximately 40% of clinical presumptive cases of malaria in the over five population were not diagnosed as such, suggesting that many cases are being missed and not referred for treatment. The specificity of malaria diagnosis in children under five was low, with only 58% of cases that were not malaria being diagnosed in that way. This may mean that other diagnoses for children are often being missed in favor of a malaria diagnosis. Specificity for those over five was higher, at 81%. Unfortunately, this survey was not able to compare the clinical case used with a laboratory-confirmed patient. Overall 37% of facilities surveyed had a laboratory. All teaching hospitals, regional and district hospitals surveyed had lab facility. 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).

The NMCP is interested in improving microscopy, and proceeding cautiously with RDTs for the case management of malaria, since the former is considered the gold standard for malaria diagnosis and questions remain on the clinical utility of RDTs in field conditions. The role of RDTs is yet to be fully clarified, although their use will be prioritized at the sub-district level, i.e. at health centers, CHPS compounds, and other health facilities that lack microscopy. In addition, the NMCP has proposed a nationwide program in which community agents would provide anti-malarial treatment based on clinical diagnosis only, targeting children under five. With PMI support, a technical working group has been charged with producing an updated malaria diagnosis policy, which is expected to be completed in late 2008. This document will outline the role and use of both microscopy and RDTs for diagnosis of malaria in Ghana and provide a framework for its implementation.

Progress to Date

During Year 1, PMI supported the NMCP, working with GHS Institutional Care Division and the Public Reference Laboratories, to make significant progress in the diagnostics field. The previously mentioned national laboratory and health facility survey assessments were completed in 2008 and provide valuable information to guide efforts to strengthen malaria laboratory diagnosis. The evaluations showed that access to microscopy is variable in Ghana and there is need for improvement in equipment, supplies, infrastructure, and training for laboratories to work properly. The final reports from these surveys are expected to be disseminated in late 2008. In addition, a national laboratory working group was convened in May 2008 and is currently working, with PMI support, on updating the national policy on diagnostics in Ghana. Plans for training of laboratory technicians are currently being developed and are soon to be implemented. Finally, recently obligated FY08 PMI funds will be used to purchase microscopes and microscopy supplies to help fill the gap in equipment.

Proposed Year 2 Activities: ($762,100)

1. Support the implementation of malaria laboratory diagnostic policy in Ghana: ($250,000)

   Support the implementation of the new microscopy and RDT policy that was developed with PMI Year 1 support. This will include in-service training and on the job training, updating of guidelines, and distribution of job aids. In addition, funds will be used to ensure compliance with laboratory test requirements in malaria case management at the regional, district, and sub-district level.

2. Implement a quality assurance program for laboratory diagnosis: ($200,000)

   Support the implementation of a quality assurance program for the new diagnostic policy by fostering dialogue among the NMCP, Institutional Care Division, Public Reference Laboratory, and other programs at MOH/GHS. Improved linkages will be fostered between these national institutions and clinical facilities at every level (including teaching hospitals, regional, district and sub-district health facilities). Funding will support the institutionalization of such measures as regular supervisory visits and systematic reviews of a predetermined percentage of positive and negative blood films.

3. Procure laboratory equipment and laboratory supplies: ($300,000)

Procure additional microscopes, microscopy kits (reagents, slides, lancets, etc), and RDTs to improve the laboratory capacity in Ghana. The laboratory assessment evaluation is expected to help identify gaps in terms of laboratory equipment and needs, such as microscopes and RDTs, which will guide this procurement.

4. Strengthen diagnostics services: ($12,100)

Provide technical assistance from experts from the Centers for Disease Control and Prevention to support laboratory training and supervision.

Malaria Treatment

National Malaria Treatment Policy: Recent Changes and Current Challenges

In 2004, Ghana changed its anti-malarial drug policy to embrace ACTs as first-line therapy, after studies had shown increasing treatment failure to the first-line drug in use at the time, chloroquine. Following the launch of the new first-line ACT, local pharmaceutical companies began producing amodiaquine 600 mg and artesunate 150 mg in co-blistered packets for sale in local markets. However, reports of serious adverse events, likely due to the relatively high doses of amodiaquine, were recorded. Highly publicized in the local media, this resulted in an overall negative public opinion of the new drug combination, which was subsequently removed from the private markets by the MOH. Unfortunately, the negative reaction by the public to this ACT has translated into significant challenges in regaining public confidence in new malaria treatments.

Through 2007 and 2008, the NMCP and its partners have worked to revise the malaria treatment policy and move it through a laborious, cabinet-level approval process. Key provisions of the new policy include reclassification of ACTs as over-the-counter medications, prohibition of malaria monotherapies, and an official endorsement of AL as the second-line ACT. Policy approval had become a bottleneck that was hindering the widespread adoption of ACTs. Fortunately, the focus has recently shifted towards policy roll out and implementation.

For *uncomplicated malaria*, a co-blistered artesunate-amodiaquine (AS/AQ) combination and the fixed-dose combination artemether-lumefantrine (AL) therapies are the government's first- and second-line treatments. The AL is to be reserved in theory for patients who do not tolerate amodiaquine. According to standard international practice, this would imply that AS/AQ and AL should be stocked in roughly a 95%-to-5% or 90%-to-10% ratio. 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, as in effect an alternative first-line ACT. Because AL is generally the better tolerated drug in terms of side effects, there is concern that demand for AL will be difficult to control. Complicating matters is the fact that the approval process for the new malaria treatment drug policy has not reached conclusion after 2 years. In the meantime, it appears that AL is being procured in increasing quantities by peripheral public health facilities through private channels. Although the NMCP conducted training for public sector healthcare workers and pharmacists during the ACT roll-out in 2004-2005, follow-up refresher training has not been widespread to date, nor has the teaching curriculum for pre-service training institutions been updated to reflect current malaria case management protocols.

In an attempt to gain greater control over this challenging situation, the NMCP has reconvened a case management working group and is moving forward on the release of updated training materials and technical guidelines. Throughout 2007 and 2008 the NMCP and GHS have been in dialogue with PMI, the Global Fund, and other regarding ACT policy. It is PMI and Global Fund practice to support only one first-line ACT for management of uncomplicated malaria.

Pricing policies influence the uptake of AS/AQ, naturally. All pregnant women receive free medications. The National Health Insurance Scheme, which now covers 50% of the population, provides malaria treatment free of charge. Free medicines are also provided for those with "pauper" status. Until mid-2008, patients seen in public facilities but not falling in any of those categories were generally expected to make co-payments of less than 40 cents for a full adult or pediatric course of AS/AQ. Co-payments were not seen as a major barrier to access. (Stock outs were far more of a barrier.) However, a recent released GHS directive mandates a co-pay of $3.50 per course. As of September 2008, the co-pay was being applied inconsistently, with reports of a 33-cent co-pay in Northern and Volta regions, $1.70 in parts of Western Region, and $3.50 in Accra and Kumasi. This evolving situation is fluid and complex, but it has raised important concerns regarding equity, access to ACTs for uninsured patients, and accountability for the funds recouped by facilities. These recouped funds are meant to be used to support service delivery at peripheral health facilities, and this is understood to largely be the case. However, tracking the funds from sale of donor-subsidized health commodities is a well recognized problem, going far beyond malaria, which is frequently raised by international donors and by NHIS. As health sector lead this year, USAID is advocating for a revamping of tracking procedures and a review of pricing policies to assure equity and access.

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, the administration of rectal artesunate is the recommended pre-referral treatment.

The National Malaria Control Strategy, revised in July 2008, endorses measures to ensure that symptoms and signs of malaria in the general population are recognized early and appropriate management is provided promptly at individual, family, community and facility levels. The national strategy seeks to ensure that caretakers/parents will be able to recognize symptoms and signs of malaria and respond appropriately and promptly within twenty-four hours of onset of fever. Specific objectives, to be achieved by December 2015, are as follows:

- All health facilities will provide prompt and effective treatment using ACTs;
- 90% of all patients with uncomplicated malaria will be correctly managed at public and private health facilities using ACTs;
- All communities will have access to community-based treatment for uncomplicated malaria;
- 90% of caretakers and parents will be able to recognize early symptoms and signs of malaria;
- 90% of children under five years of age with fever will receive an appropriate ACT within 24 hours of fever onset; and
- All clinically diagnosed malaria cases will have access to laboratory testing by 2015.

As mentioned, Ghana is seeking major support for these objectives from the Global Fund Round 8 grant (which would fund a nationwide home-based care program) and a Global Fund RCC grant (which would strengthen case management at the facility level). Although home based-care (HBC) has been successfully piloted in the three northern regions, national policy and a national implementation plan for HBC have yet to be formulated. Key policy revisions, such as allowing community agents to prescribe ACTs, are in process.

Current Status of Malaria Case Management

Scaling up appropriate malaria treatment remains one of the greatest challenges in Ghana. According to the 2006 MICS, just 3% of children with fever were provided an ACT. The proportion of children receiving any malaria treatment within 24 hours of fever onset had barely improved from 44% in 2003 (DHS) to 48% in 2006 (MICS).

In the *public sector*, progress is clearly being made, in spite of the policy challenges just cited. A survey conducted by a USAID-supported health project in targeted southern districts in early 2008 demonstrated that almost all public facilities (96%) 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 nationally representative survey recorded that 93% of public sector clinicians were prescribing AS/AQ. Overall, 91.4% of public facilities were using AS/AQ in their outpatient dispensaries.

In the *private sector*, provider adherence to national malaria treatment policy is considerably worse. In Ghana, the private sector is comprised of faith-based organizations (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 (SPS, 2008). This commonly accepted figure highlights the central role that front-line private sectors providers must play if Ghana is to reach the NMCP and PMI treatment goals. The 2008 health facility survey found that just 33% of private sector providers were prescribing AS/AQ, and only 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. (In the public sector, the rate was 59%.) Ghana's private sector is rife with multiple ACTs and artemisinin monotherapies. Poor public acceptance of AS/AQ discourages patients from purchasing AS/AQ therapy. Consumers tend to prefer AS monotherapy, SP monotherapy, 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 relative to their older chloroquine and SP counterparts.

Progress to Date

In Year 1, PMI is supporting implementation of ACTs in the public sector in Ghana. These included the above-mentioned national laboratory assessment and health facility survey, as well as funding to develop plans for and begin implementation of the new laboratory and case management policies. Complementing these steps, PMI is directing its case management funds towards procurement of drugs and training of healthcare workers.

In Year 1, PMI also supported dialogue among NMCP and its partners to develop treatment guidelines and implement the new treatment policy. This task is expected to be concluded by the

end of calendar year 2008. Due to the possibility of a stock out of ACTs in Ghana, PMI funds (FY08 and advanced FY09) will be used to purchase large quantities of AS/AQ, as detailed below. PMI is supporting the implementation of new malaria treatment policy through support for BCC/IEC activities, including district-level educational campaigns. Finally, in Year 1 PMI is supporting pre-service and on-the-job training of health workers.

Gap Analysis

In April, 2008, PMI supported a national anti-malarial quantification exercise to assist the MOH and the NMCP in forecasting and planning. Low stock levels for most malaria medications were revealed. Most concerning was the finding that the first line ACT would stock out by the end of 2008 unless urgent action was taken. Previously, it had been thought that supplies would be adequate through 2009, and PMI funding priorities in Year 1 had been planned accordingly.

A meeting of stakeholders was held in June 2008 to reconfirm the commodity requirements and to identify potential partners to support funding gaps. A startling $10-12 million shortfall was identified for the period May 2008-May 2010. In response to a follow-up request from the

Anti-Malaria Medications for Public Facilities in Ghana: Modified Gap Analysis

Assumptions: Malaria Cases to Treat in Public Facilities						
Age group	**2008 population**	**Fever episodes/yr**	**% treated in public facilities**	**Of those, % treated for malaria**	**Malaria cases** *(uncomp.)*	**Severe cases** *(3% children 1% adults)*
Children <1	900,000	900,000	30	100	270,000	8,100
Children 1-6	4,044,000	10,110,000	30	90	2,729,700	81,891
Children 7-13	2,314,000	2,314,000	30	70	485,940	14,578
Ages >13	15,209,000	15,209,000	35	70	3,726,205	37,260
Totals	22,467,000	28,533,000	--	--	7,211,845	141,829

Medication Courses Needed in Public Facilities (round figures)				
Medication	**Uncomplicated malaria**	**Severe malaria**	**Total courses**	**Estimated cost**
AS/AQ	6,779,134 (94%)	--	6,918,400	8,367,337
AL (2nd line)	288,474 (4%)	--	294,400	400,427
Quinine Preps.	Pregnancy: 144,237 (2%)	127,646	271,883	270,000
IV artemether	0	14,183	14,360	35,000
Rectal artesunate	--	[96,000]	96,000	35,520
Totals	7,211,845	141,829	7,594,043	9,108,284

Pipeline Assessment	
Medication	**Analysis as of June 2008**
AS/AQ	Nationwide stockouts predicted for November 2008. GOG and PMI procuring urgently.
AL	Nationwide stockouts in mid 2008. Small GOG procurement slated for Aug 2008.
Quinine preparations	Minimal amts in stock, but readily available on local market.
IV arthemeter	Ample stocks for 1.5 years.
Rectal artesunate	Not yet stocked in quantity.
DHAP	Large donation languishing in CMS x 2 years, expiring Jan 2009.

Funding Available for Public Sector Procurement Through CMS			
Source	**May 08-Apr 09**	**May 09-Apr 10**	**Comment**
Govt. Ghana/CMS	$490,094	$500,000	Commitments to central procurements through CMS. Does not include NHIS or internally generated revenue.
Global Fund	$0	TBD	$2.3 million per year requested in RCC proposal.
UNITAID	$1,074,150	0	One time procurement in 2008.
PMI Year 1 Commitment	$2,056,000	0	Includes $1.2m of PMI FY08 funds for AS/AQ. $1m in FY09 funds advanced emergently. Overhead subtracted.
Total Committed	$3,620,244	$500,000	Note that the '09-'10 estimate does not include PMI and GF.
Estimated Cost	9,108,284	9,108,284	From estimates of medication needed in the above table.
Funding Gap	5,488,040	8,608,284	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.)

Sources: (i.) DELIVER/USAID May 2008, "Ghana: Antimalarial Drug Quantification and Supply Planning (April 2008-April 2010) and unpublished supporting documents; (ii.) Ghana CCM, "GFATM Round 8 Malaria Proposal" (June 2008).

Minister of Health, PMI/Ghana committed its entire Year 1 medication budget of $1.2 million to urgent procurement of AS/AQ. PMI also agreed to forward fund $1 million from Year 2 to provide additional support for AS/AQ procurement.

Also in June 2008, CCM consultants and NMCP prepared a gap analysis for the Round 8 and RCC Global Fund malaria proposals. Based on the all of the foregoing assessments of national needs, the above modified gap analysis was developed for PMI Year 2 planning purposes. (See table.) It shows a funding gap of $5.5 million in PMI Year 1, after FY08 PMI commitments have been taken into account. In Year 2, the calculated funding gap before any PMI commitment is $8.6 million. This analysis assumes that only a fraction of malaria cases will be treated in public health facilities, but that each of those cases will be managed appropriately, including use of AS/AQ to AL at 95% to 5% proportion. The calculated funding gap takes in to account known commitments to centrally procured anti-malarials. Major unknowns include possible Global Fund procurement in Year 2 and facility-level procurements funded with insurance monies and patient fees. A fully detailed gap analysis that captures such data is not possible at the present time. What this modified gap analysis makes clear, however, is that funding needs for ACTs are acute and substantial.

Proposed Year 2 Activities: ($4,262,100)

The top priority for Year 2 is to assist the MOH to implement a coherent ACT policy, consistent with international standards, while helping to prevent dangerous stock outs of ACTs and other essential medications. PMI/Ghana will continue to make clear its intention to fund only the first line ACT (AS/AQ) until stock outs are no longer a major threat. Further, it would be difficult to justify support for AL procurement until the ACT medication policy has been clarified and approved, and until training and other aspects of policy implementation for AL has been completed. USAID/Ghana is the health sector lead in 2008-09 and will use that position to coordinate donor influence to rationalize medication policy, including drug subsidy and co-

payment tracking policies. While the public sector will be the main focus of PMI support in Year 2, the crucial role of front-line private sector providers will also be recognized.

1. Procure first-line ACTs, rectal artesunate, and severe malaria drugs: ($3,400,000)

   Procure first-line ACTs, rectal artesunate, and severe malaria drugs in quantities to be determined. A portion of this funding has already been forwarded, on an emergency basis, to address a looming AS/AQ stock out in late 2008. The primary aim of the remaining Year 2 procurements will be to help prevent stock-outs of antimalarial medications in the public sector in calendar years 2009 and 2010. If conditions are suitable, limited procurement of the second-line ACT would be considered.

2. Provide pre- and in-service training of healthcare workers: ($300,000)

   Support pre- and in-service training and supervision of healthcare workers in the public sector. PMI will also support the NMCP in the development and implementation of a strategy to improve case management of malaria by private chemical sellers. These activities will be carried out in close coordination with the national implementation plan for the new malaria treatment policy.

3. Support the implementation of home-based management of malaria: ($250,000)

   Support the NMCP's goal of mass scale up of home-based care for malaria by assisting in (1) updating its policy on administration of ACTs by community agents, and (2) training of large numbers of community agents in targeted regions, among other activities. If the Global Fund Round 8 proposal is approved, home-based management of malaria will be implemented in large scale in Ghana and PMI sees this as an opportunity to contribute to the success of malaria case management. If the Round 8 proposal does not succeed, the role of PMI will be to support and refine the existing home-based management pilots in the country, expanding its reach where feasible. Coordination with the NMCP, UNICEF, WHO, national HBC experts and other stakeholders will be essential.

4. IEC/BCC to promote proper management and use of ACTs: ($300,000)

   Support BCC/IEC strategies targeting healthcare workers and the general public to promote correct and consistent use of ACTs. This activity is part of a comprehensive BCC/IEC 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 HBC 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.

5. Provide technical assistance for strengthening case management: ($12,100)

   Provide technical assistance from the Centers for Disease Control and Prevention experts to work on the implementation of new anti-malarial guidelines and training strategies.

Pharmaceutical Management

Current status

The anti-malarial drug management system in Ghana is weak, especially regarding logistics and generally may be characterized with an insufficiently robust drug selection, sometimes inaccurate quantification, poor coordination of procurements, and a weak distribution. In the short term, the system faces potential stock outs, drug expiry, improper drug utilization and ineffective management information systems. In the long term, suboptimal functioning of the malaria pharmaceutical management system can contribute to increased malaria-related morbidity and mortality and even contribute to the selection for and development of anti-malarial drug resistance.

Pharmaceutical Management

Using Global Fund support, the NMCP procures ACTs approved under the WHO prequalification program for distribution in the public sector health facilities. Three distinct presentations of co-blistered AS/AQ are available in 25- or 50-mg artesunate and 75- or 150-mg amodiaquine packaging, depending on pediatric, adolescent, and adult dosages. In the pediatric and adolescent presentations, tablets have to be divided to conform to weight dosage requirements for specific patients. In the private sector unregistered, non-WHO prequalified products of questionable quality are commonplace. Many health facilities obtain uncertified ACTs on the local market, many of them locally manufactured or imported from India, China, or elsewhere in West Africa. Among the factors driving this is a weakened procurement system, in which peripheral facilities have accumulated large debts to the Central Medical Stores. Stock outs of approved medications, pricing distortions, and provide noncompliance with national treatment policies also play a role.

Ghana's drug storage and distribution services operate as a three-tiered system that includes the Central Medical Stores (CMS), regional medical stores, and the peripheral service delivery points (i.e., district hospitals, sub-district hospitals, health centers, and health posts). Problems exist in distribution of drugs from the CMS through the regional medical stores down to the point-of-service health facility. The information flow regarding inventory and stock is paper-based at the health facility level although CMS and some regional medical store facilities do have a computerized inventory system for logistics management. Unfortunately, insufficient staff is trained in this system. Distribution is a combination of push and pull with an initial push from CMS for ACTs and other anti-malarials (based on data from a quarterly requisition form) down to the regional medical stores and then a pull from the RMS to the health facilities on a monthly basis. Based on this system, there are sometimes gaps or stock outs at the regional medical stores and/or health facilities. According to the 2008 PMI-supported heath facility survey, 12.4% of facilities had a stock out of AS/AQ in the last 6 months prior to the survey whereas 23% reported stock out on the day of survey. Availability of AS/AQ on the day of the survey varied from 60% in private facilities to 100% in higher level public health facilities. In terms of availability of Malaria Treatment Protocols in the OPD, 73% of facilities had the Standard Treatment Guidelines, 36% had the Anti-Malaria Drug Policy, 41% had the IMCI Chart booklet, and 76 % had the malaria treatment chart in the OPD.

Despite the establishment of the Food and Drugs Board, which has the mandate to ensure that only drugs that meet an established quality are permitted on the market, substandard drugs

continue to circulate. There is a need to strengthen the capacity of the Food and Drugs Board to ensure that only good quality, safe, and effective anti-malarial drugs are available.

Progress to date

In January 2008, PMI supported an assessment of pharmaceutical supply chain needs and gaps, convening a broad range of public and private sector stakeholders. System wide weaknesses were identified and a plan of action was proposed. Since that time, PMI partners have begun a number of activities to strengthen the supply chain and promote rational use, including: supporting guideline development and training programs for pharmacists, logisticians, and licensed chemical sellers; providing technical support for the logistics management information systems in the public and private sectors; and developing curricular and on-the-job training programs to strengthen quantification capacity at the regional and district levels.

Proposed Year 2 activities: ($650,000)

The main thrust of PMI/Ghana investments will be in the public sector. However, as with case management activities, it is important to recognize that the private sector is the first line of treatment for 60% of malaria cases. Therefore, targeted investments will be made to support key aspects of private sector drug management. Goals include discouraging missed dosing, discouraging the use of monotherapies, improving public acceptance of the first-line ACT (AS/AQ), and increasing the appropriate use of ACTs.

1. Strengthen pharmaceutical management system capacity, including rational use: ($300,000)

Strengthen pharmaceutical management capacity, including reinforcing rational use of ACTs and other malaria treatments, targeting both the public and private sectors. Provide technical assistance for estimation of drug needs and gaps, and support the development and implementation of a comprehensive drug logistics information system. Building on the training and guideline development activities carried out with Year 1 PMI resources, the focus in Year 2 will be on supporting MOH/GHS to effectively implement the new malaria treatment policy for maximum public health impact.

2. Strengthen logistics and supply chain systems: ($200,000)

Support activities to strengthen the public sector logistics and supply chain management system with respect to malaria drugs and related commodities. This will include support to strengthen drug warehousing and storage with an emphasis on regional and district levels to mitigate logistical bottlenecks that prevent mass scale-up of ACT use at the national, regional, district levels. Technical assistance to support community level ACT distribution would be coordinated with Global Fund activities, assuming that the HBC component of the pending RCC proposal is successful. It is anticipated that the resulting improvement in logistical systems would bring synergistic benefits across multiple healthcare delivery areas (e.g. HIV and family planning); however, the focus of PMI funded activities will be on improving the malaria supply chain specifically.

3. Strengthen drug quality monitoring capacity: ($100,000)

Provide continued support for strengthening drug quality monitoring capacity in collaboration with the Food and Drug Board. Specifically, provide technical support to strengthen the procedure for drug registration, assist the board to review its drug registration regulations, establish and implement quality control standards for anti-malarial drugs, strengthen the quality testing of anti-malarial drugs, and conduct training and refresher training for the laboratory staff.

4. Assist in development of national pharmacovigilance program: ($50,000)

Support the ongoing development and implementation of a pharmacovigilance system including surveillance for adverse drug reactions and rapid response to reports/rumors of severe reactions in direct collaboration with the Food and Drug Board. This activity will build directly on similar activities funded in PMI Year 1. Pharmaceutical and supply chain strengthening activities will also include end-use verification/monitoring of availability of key anti-malarial commodities at the facility level. Specifically, this will entail regular supervisory/monitoring visits to a random sampling of health facilities and regional warehouses to detect and trigger further action on the following critical areas: ACT (or other drug) stock outs; expiration dates of ACTs at health facilities; leakage; anomalies in ACT use; and verification of quantification/consumption assumptions.

HIV/AIDS and MALARIA

Current Status

Ghana has an HIV prevalence estimated at 1.9% (UNAIDS, 2008). HIV prevalence rates are not uniform across the country. HIV transmission in Ghana is substantially concentrated among persons who engage in high risk behaviors, particularly commercial sex workers, their clients, men who have sex with men, and prisoners. Sexual transmission accounts for over 80% of new infections. HIV infection rates are highest in 35-49 year-old women (4.1%) and 40-44 year-old men (4.7%). Women account for 51% of Ghana's population, yet 65% of the country's HIV infections occur in women. The relatively low rate of HIV infection among men (incidence of 1.5%) is likely to be partly attributed to a 95% rate of male circumcision (DHS 2003). Evidence suggests a downward trend of HIV infection in the general population, yet HIV infection appears to be increasing in at-risk populations. There are an estimated 280,000 people living with HIV/AIDS (PLWHAs) (UNAIDS 2008) and 1 million orphans and vulnerable children, with approximately 17% due to HIV (Children on the Brink 2004).

Although Ghana is not one of the 15 PEPFAR focus countries, it receives the next level of priority and attention from the U.S. Government's Office of the Global AIDS Coordinator, with an annual HIV/AIDS budget of between 5 and 10 million dollars.

At of the end of 2007, an estimated 13,000 PLWHAs were on anti-retroviral therapy. USG-Ghana's key strategic priorities are the prevention of HIV in persons engaged in high risk behaviors, protecting the general population by reducing HIV transmission from high risk persons to the general population, and providing comprehensive prevention, care and treatment for those infected, their partners and families. A five-year USG HIV/AIDS Strategic Plan for Ghana was approved in 2006 by the U.S. Office of the Global AIDS Coordinator. USG-Ghana's HIV program concentrates its efforts in 27 of Ghana's 138 districts, which were selected through mapping techniques based on seroprevalence, concentration of most-at-risk groups, and the presence of other donor activities.

In 2000, the Ghana AIDS Commission was established to respond to Ghana's HIV/AIDS epidemic. In line with the recommended "Three Ones" principle (one plan, one coordinating authority, one M&E plan), the AIDS Commission is a multi-sectoral body that leads the national response in-line with Ghana's five-year strategic framework and national M&E plan. The AIDS Commission supports several hundred NGOs to implement HIV/AIDS activities. All districts and municipalities and all GOG ministries, agencies and departments have HIV action plans and receive funds from pooled resources. Selected ministries and all 138 districts have a part-time person responsible for HIV/AIDS. The Global Fund represents the largest donor investment in HIV in Ghana with a $97 million, five-year Round 5 grant focusing on nationwide scale up of HIV/AIDS care and treatment services. Ghana submitted an HIV proposal to the Global Fund Round 8 call for proposals in July 2008.

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. Initial discussions have shown that national authorities working on malaria and those working on HIV/AIDS are enthusiastic about integrating their activities, especially concerning promotion and distribution of LLINs through PLWHA organizations and networks.

Progress to Date

During Year 1, PMI, directly through its in-country team, with the NMCP, the Ghana AIDS Commission, and USG HIV/AIDS advisor and implementing partners to review current standards for malaria prevention and control among PLWHAs. These activities included revising standards as necessary and developing a plan for systematic collaboration between governmental and non governmental partners working to prevent and control the two diseases.

Proposed Year 2 Activities: ($100,000)

In FY09, activities are aimed at integration of malaria prevention and treatment within HIV/AIDS prevention, care and treatment efforts already underway in Ghana.

1. Support integration of malaria prevention activities into HIV/AIDS prevention, care, and treatment programs: ($100,000)

   Provide technical assistance for advocacy and outreach to integrate IEC/BCC for malaria into existing HIV/AIDS prevention and care activities including promoting increased ITN ownership and use among PLWHAs. Approximately 10,000 ITNs procured with PMI support in Year 2 will be targeted for distribution to PLWHAs through NGOs and networks serving this population (funded from the ITN budget). PMI will also support 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 will include emphasis on correct and regular use of LLINs and early health seeking behaviour for fever. Also, in Year 2 assistance will be provided to advocate with the NMCP and the GHS to address needs related to case detection and treatment of malaria among PLWHAs. Finally, support will be provided to complete the review begun in Year 1 of national standards for prevention of malaria among PLWHAs, for

the revision of these standards as necessary, and for the development of a plan for support to strengthen prevention and treatment of malaria in PLWHAs.

NGO and FBO COLLABORATION

Current Status

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. Beginning 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 proposal envisions an expanded group of 70 NGOs. 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, in order to move closer to reaching all 136 districts in the ten regions with community-based malaria activities.

Progress to Date

In Year 1 of PMI in Ghana, support is being provided to expand partnerships with NGOs/FBOs and their networks, in number and geographic coverage, to extend the reach of malaria prevention and control activities at the community level. This will be done through subgrants to NGOs that will be operational in early FY 2009. A training program for qualified NGOs is being organized to prepare for the subgrant proposals.

1. Proposed Year 2 Activities: ($700,000)

Strengthen the capacity of indigenous NGOs to implement community-based malaria prevention and control activities. Provide subgrants to NGOs and NGO networks to implement ITN, IPTp and ACT promotion and IEC activities in order to extend the reach of malaria prevention and control activities at the community level. Specifically, provide support to NGOs/FBOs to:

(a.) promote ITN ownership and correct and consistent ITN use;
(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; and
(d.) increase early and appropriate health seeking behavior for fever and treatment adherence. NGO activities at the community level will be coordinated closely with PMI-supported BCC/IEC campaigns at the facility, district, regional and national levels. The NMCP has extensive experience in sub-grants to NGOs under Global Fund grants, and will be closely involved in setting selection criteria and providing technical direction.

CAPACITY BUILDING WITHIN THE NATIONAL MALARIA CONTROL PROGRAM

Current Status

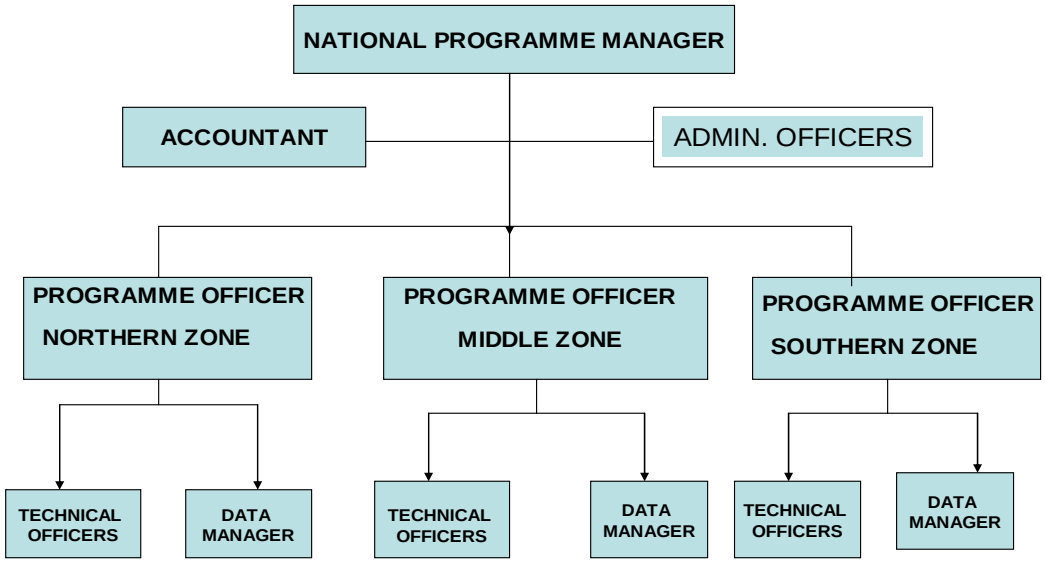
The NMCP's role is to formulate policy and strategies, translate these into interventions, and coordinate, supervise, and monitor intervention. As delineated in the National Strategic Plan, the NMCP operates at the national and zonal level as there are no dedicated malaria-specific disease

control officers at regional or district levels. This is in keeping with the national desire to provide integrated health services. 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.

The NMCP is directed by a public health physician and has a staff including three program officers with pharmacy background, an entomologist, three technical officers, and three data managers. The NMCP staff and leadership are chronically overstretched, even with the relatively recent decentralization of staff from the central level to three zonal offices. 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. At the regional level, a malaria focal person 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.

Although the pre-PMI needs assessment in 2007 found that GHS/NMCP resources for program supervision were adequate, it has become clear that this is not longer the case. The winding down of two Global Fund grants and the increase management demands of PMI-supported activities has created a deficit in GHS/NMCP resources for supervision that could undermine effective NMCP-PMI collaboration in Year 2.

ORGANOGRAM FOR NATIONAL MALARIA CONTROL PROGRAMME



Progress to Date
The PMI/Ghana team and its implementing partners enjoy a close working relationship with NMCP. In Year 1, PMI provided funds to support the transport and per diem costs of program staff to facilitate routine supervision visits to the peripheral levels. PMI also provided support to strengthen information technology capability by installing information technology infrastructure and assisting with the establishment and maintenance of an NMCP webpage.

Proposed Year 2 Activities: ($225,000)

Given the expanding program resources and activities resulting from the two Global Fund malaria grants and PMI, strong and effective supervision at all levels of the program will continue to be critical to the success of malaria control efforts in Ghana. In order to strengthen the human capacity, PMI proposes the following activities:

1. General capacity building at NMCP: ($125,000)

Provide support for professional development of key NMCP staff including supporting no more than five South-to-South exchanges in Year 2, such as visits to other PMI countries to learn about aspects of malaria control strategy and implementation. Continue operational support begun in Year 1 including data management and information technology infrastructure development. Supported activities may include attendance at selected international conference and training events, and other activities to foster professional development of NMCP staff.

2. Support for monitoring and supervision of malaria control activities by NMCP and other MOH/GHS staff: ($100,000)

Provide direct funding to the NMCP to conduct 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 the responsibility of the NMCP alone.

MONITORING AND EVALUATION PLAN

Current Status
The NMCP has established a functional albeit fragmented system for malaria monitoring and evaluation (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. Information for evaluation comes from the MICS, DHS, and Demographic Surveillance Sites. With the increased investment in malaria control, there is a need to harmonize all these sources of information to avoid duplication and increase efficiency and availability. The GHS is moving towards a national integrated approach to surveillance. Individual programs have been encouraged to discontinue developing vertical M&E systems. NMCP has joined forces with the Expanded Program for Immunizations (EPI) and Family Health Programs in the development of a semi-integrated M&E data system. The software has been developed and piloted; however,

national implementation is pending final program approvals. 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 to be strengthened.

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 aims to improve the availability and quality of information related to 23 priority diseases, one of which is malaria. 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 Center for Health Information Management receives monthly reports on malaria cases and deaths from all public health facilities and some NGO clinics in the 138 districts. 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 very inefficient and this limits the timeliness and completeness of data. With support from other partners, the Center has developed an Access database, called the Disease Health Information Management System that 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 reporting to the Global Fund to monitor performance. These data are collected from the sub-district levels 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. Each zone has a program officer, technical officer and data manager who collect district-level data and compile quarterly Global Fund reports. Supervision of district-level malaria activities is conducted by the zonal officers. District Health Information Officers have been trained on malaria M&E and help with compilation of the additional malaria data.

The most recent DHS was conducted during the July-October rainy season of 2003 and included a malaria module. The next DHS is planned for 2008 and these data will provide baseline estimates for PMI coverage indicators. The 2006 MICS included the malaria module. Other household surveys include the annual Global Fund surveys conducted in 2005 and 2006, which compared the 20 Global Fund districts with 12 non-Global Fund districts and included questions on ITN possession and use by children under five and pregnant women, IPTp, and knowledge of malaria prevention practices.

The Strategic Plan for Malaria Control in Ghana (2008 – 2015) 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 (ICT) for connectivity;
- Establish a functional website for documentation and sharing malaria data/information that is updated and accessible nationally;
- Support the Ghana Demographic Health Surveys (GDHS) in 2008 and 2013 to help evaluate malaria control activities for the period;
- Provide for the inclusion of a system to capture data related to IRS; and
- Harmonize M&E activities of the various malaria control initiatives, such as the Global Fund, RBM, and PMI etc.

Progress to Date

During Year 1, PMI provided support for the 2008 DHS. The survey was piloted in July 2008 and data collection began in August 2008. These data will provide baseline estimates for all PMI coverage indicators and will also include verbal autopsy and anemia.

Sentinel sites in various regions of the country have been selected to collect routine facility-based data on malaria mortality and morbidity for children under five years of age and greater than five years of age. The five selected sites are listed below. Several factors were used to select these sites (zonal representation; plus at least one DSS site, one urban site, and one IRS district sought), which are:

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

The data collection protocol and instruments have been developed. Training for data collection at the sentinel sites began in August 2008, with data collection to begin September. In Year 1, PMI is also supporting 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.

Proposed Year 2 Activities: ($429,200)

During Year 2, PMI will work with the NMCP to finalize a comprehensive M&E strategy. Specific activities are as follows:

1. Sentinel Site Surveillance: ($200,000)

Continue to support five sentinel sites to collect routine facility-based data on malaria cases among children. In one of the sites, the routine malaria burden data will be complemented by a cross sectional survey in collaboration with a DSS to collect community level data to track healthcare utilization. The primary objective for including a DSS in one of the sentinel sites is to determine what proportion of people with signs/symptoms of malaria sought care in the facility.

2. Support for Implementation of M&E plan: ($150,000)

   Support the NMCP to implement a unified M&E plan. This Year 2 activity will build on the MEEST workshop that is slated to occur in Year 1. Implementation activities will include completion of unified data collection formats, collection of key indicators, and training NMCP staff on data collection, analysis, and reporting. The implementation process will be linked to the ongoing review and updating of the national Malaria Strategic Plan and will involve broad participation of donors and Ghana RBM partners.

3. Net Distribution Evaluation: ($55,000)

   Support an evaluation of Ghana's routine net distribution strategies, including assessment of the effectiveness of the MOH's ITN distribution through health facilities/antenatal care clinics and the voucher scheme. The evaluation will compare the programmatic effectiveness of two ITN distribution methods in the Central Region for pregnant women and children under five. The evaluation will provide a better understanding of the complexities of running parallel ITN distribution strategies and determine if these strategies complement one another or create confusion for patients and healthcare workers. Currently, limited anecdotal information is available. The evaluation will be external, timely, and conducted in collaboration with the NMCP, CCM, the USAID/NetMark project, PMI, and other stakeholders. The exact methodology, scope, and mechanism is to be determined in consultation with the NMCP and the PMI team. The results of the evaluation will inform current and future PMI funding decisions, program modifications at the facility level, and NMCP policy development.

4. 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.

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:

- USAID since 2003 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 AngloGold Ashanti in the implementation of IRS. The AngloGold Ashanti Mining Company has been implementing an IRS program in the Obuasi mining community since 2005. Results to date in Obuasi shows over 74% reduction in malaria cases following two years of operation. AngloGold Ashanti is willing and able to provide valuable support to public sector partners in IRS in the areas of IEC, training of spay operators and supervisors, logistics and other forms of technical assistance.

STAFFING AND ADMINISTRATION

One PMI resident advisor has been hired to oversee implementation of PMI in Ghana. A second resident advisor is in the process of being hired. Both advisors, one representing CDC and one representing USAID, will work collaboratively to oversee and manage all aspects of day-to-day PMI implementation in Ghana. In addition, one Foreign Service Nationals (FSN) has been hired to support the PMI team in the role of PMI program assistant. A second FSN will be hired in the role of malaria technical specialist. Both FSNs will work under the leadership and direction of the two PMI advisors and as members of the overall USAID/Ghana health team.

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 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, monitoring and evaluation of outcomes and impact, and reporting of results. Both staff members 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.

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.

Proposed Year 2 Activities: ($1,314,500)

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.

ANNEX 1

Tables

Table 1

President's Malaria Initiative – Ghana
Year 2 (FY09) Timeline of Major Activities

ACTIVITY	2008					2009											
	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Routine ITN distributions via targeted subsidy programs																	
Free ITN distribution via 2009 integrated campaign, incl. planning																	
IRS implementation in targeted districts																	
Strengthening of IPTp delivery at public health facilities																	
Procurement of laboratory equipment and supplies																	
Malaria laboratory policy development and implementation																	
ACT and severe malaria drug procurement and distribution																	
Strengthening of case management through training and supervision																	
Strengthening of anti-malarial drug management systems																	
Advocacy and implementation of HIV/Malaria activities																	
Strengthening of NGOs' capacity to promote malaria control																	
Development and implementation of unified malaria M&E plan																	
Support 5 sentinel sites to collect routine facility-based malaria data																	

Notes: The implementation time frame for FY08-funded and FY09 funded activities will overlap in many cases.
The implementation of FY09 funded activities will extend into calendar year 2010 in most cases.

Table 2

President's Malaria Initiative – Ghana
Planned Obligations for FY09

					Page Number
INTERVENTIONS - PREVENTIVE ACTIVITIES					
ITNs					
1. Support mass ITN distribution in 2009 maternal & child health integrated campaign	DELIVER	2,800,000 *(2,800,000)*	Nationwide	Procure at least 430,000 ITNs for the nationwide integrated maternal child health/ITN distribution campaign. Advocate for support from other donors for procurement of nets to meet the estimated campaign need.	23
2. Procure LLINs for distribution to vulnerable groups	DELIVER	400,000 *(400,000)*	Targeted regions	Procure at least 50,000 LLINs for the public sector subsidized net distribution through ANC and child welfare clinics (Western Region). Procure at least an additional 10,000 nets for distribution to PLWHA in collaboration with NACP and NGO partners (nationwide).	23
3. Support ITN distribution through voucher schemes	New RFA	700,000 *(600,000)*	5 Regions	Maintain PMI support to the voucher scheme in Central Region for distribution of at least 100,000 nets. Provide training and other TA to the Global Fund voucher schemes in an additional 4 regions.	23
4. Improve ITN delivery and	New RFA	200,000	Nationwide	Enhance the sustainability of net distribution and logistics systems. Address bottlenecks and needs in public and commercial ITN sectors. Build upon the PMI Year 1 investments in ITN data	24

					Page Number
logistics systems				management.	
5. Support for 2009 campaign planning, operations, evaluation	New RFA	200,000	Nationwide	Provide technical assistance to the NMCP and other partners for ITN distribution in the 2009 integrated maternal/child health campaign. To include support for planning; for implementation including transport and other logistics; and for a post-campaign evaluation.	24
6. Support IEC/BCC activities at the national level to promote ITN use	New RFA	500,000	Nationwide	Support IEC/BCC activities at the national level utilizing mass media to promote ITN use. Activities will reinforce community level efforts also aimed at promoting increased ITN use.	24
7. Evaluation of ITN distribution methods	TBD	0 (See M&E Activity #3)	Nationwide	(See M&E Activity #3)	48
Subtotal: ITNs		**4,800,000 (3,800,000)**			
IRS					
1. Support IRS implementation activities	RTI	3,340,000 *(1,100,000)*	Targeted districts (Northern Region)	In collaboration with GHS and with a focus on building local capacity, support implementation of entomological assessment; procurement of IRS supplies, equipment and insecticide; spray operations; data collection; IEC/BCC activities including community mobilization; and logistical support to cover at least 525,000 persons in at least 6 and no more than 8 districts.	28
2. Entomological monitoring for IRS	CDC	12,100	Targeted districts	TA for one visit by a CDC entomologist to provide entomological /vector control program monitoring and support.	28

					Page Number
3. Environmental compliance monitoring for IRS	IRS Environ-mental Compliance Partner TBD	30,000	Targeted districts	Independent evaluation of environmental compliance with respect to PMI-supported IRS operations.	28
4. Capacity building and entomological monitoring, including resistance monitoring.	RTI	175,000	Nationwide	Building on existing strengths for resistance and entomology monitoring, provide support for implementation of entomological monitoring including resistance monitoring. To be carried out collaboratively with Noguchi and other partners as appropriate.	28
Subtotal: IRS		**3,557,100** ***(1,100,000)***			
Intermittent Preventive Treatment in Pregnant Women (IPTp)					
1. Strengthen FANC to deliver a package of malaria prevention and care services to pregnant women	New RFA	500,000	Nationwide	Support the provision of quality, comprehensive and integrated FANC services to enhance pregnant women's use of an LLIN, to complete IPTp and to receive adequate education on malaria. National level support will include the development and printing of training materials and the training of health workers to effectively deliver a package of malaria prevention and care services. Facility level support will include supportive supervision and purchasing of limited quantity of equipment and supplies (water filters and cups), targeting at least 80 districts.	30

					Page Number
2. Strengthen malaria in pregnancy (MIP) interventions at the community level	New RFA	0 (See NGO Capacity Building Activity #1 below)	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.	43
3. Provide pre- and in-service training on case management of malaria during pregnancy	New RFA	0 (See Case Management Activity – Treatment #2)	Nationwide	Support training of healthcare workers at pre and in-service levels, to improve the clinical management of malaria in pregnant women.	38
Subtotal: IPTp		**500,000**			
SUBTOTAL: Preventive		**8,857,100 (4,900,000)**			
INTERVENTIONS – CASE MANAGEMENT					
Diagnostics					
1. Implementation of the new micro-scopy and RDT policy	IMaD	250,000	Nationwide	Support implementation of the new laboratory policy, including updating of guidelines and training laboratory personnel and health care workers in the appropriate use of microscopy and RDTs.	32
2. Laboratory quality control and supervision	IMaD	200,000	Nationwide	Support the institutionalization of laboratory quality control. This will include such measures as regular supervisory visits and systematic reviews of malaria slides.	32
3. Procure laboratory equip-ment & supplies,	DELIVER	300,000 *(300,000)*	Nationwide	Procurement of equipment, reagents and supplies (microscopes, consumables, lamps and RDTs)	32

					Page Number
including micro-scopes & RDTs					
4. Technical assistance	CDC IAA	12,100	Nationwide	TA by a CDC laboratory specialist for laboratory diagnosis and policy development and implementation	33
Subtotal: Diagnostics		**762,100** ***(300,000)***			
Treatment					
1. Procure ACTs and severe malaria medication	DELIVER	3,400,000 *(3,400,000)*	Nationwide	Procurement of ACTs, additional rectal artesunate, and severe malaria treatment and supplies as needed.	38
2. Support training and supervision to strengthen malaria case management	New RFA	300,000	Nationwide	Support pre- and in-service training and supportive supervision to strengthen malaria case management including private chemical sellers as well as public sector. Emphasis will be placed on the improved clinical case management of vulnerable groups, including children under 5, pregnant women, and PLWHA.	38
3. Support home-based care of malaria/fever	New RFA	250,000	Nationwide	Support training and supervision for implementation and scale-up of home-based management of malaria activities.	38
4. Support IEC/ BCC for proper use of ACTs	New RFA	300,000	Nationwide	Support IEC/BCC activities at the national level to increase public acceptance of and demand for ACTs, including utilizing mass media, radio etc. channels	38
5. Technical assistance	CDC IAA	12,100	Nationwide	TA from CDC medical epidemiologist for case management to assist with implementation of the new anti-malarial guidelines	38
Subtotal: Treatment		**4,262,100** ***(3,400,000)***			

					Page Number
Malaria Pharmaceutical management					
1. Strengthen drug management system capacity, including rational use	SPS	300,000	Nationwide	Support activities to strengthen malaria drug management capacity including reinforcing rational use of ACTs and other malaria treatments. This will include training and monitoring activities, which target the front-line dispensing of medications in both the public and private sectors.	40
2. Strengthen logistics and supply chain systems	DELIVER	200,000	Nationwide	Support activities to strengthen public sector procurement and logistics systems with respect to malaria drugs and supplies.	40
3. Strengthen drug quality monitoring capacity	USP	100,000	Nationwide	Provide support for strengthening drug quality monitoring capacity in collaboration with Food and Drug Board.	40
4. Pharmaco-vigilance	WHO subgrants to sites locally	50,000	Nationwide	Support implementation of pharmacovigilance system including district level training and operational costs	41
Subtotal: Pharma management		**650,000**			
SUBTOTAL: Case Mgmt.		**5,674,200 (3,700,000)**			
INTERVENTIONS – HIV & MALARIA					
1. HIVAIDS & Malaria	New RFA	100,000	Nationwide	Support integration of malaria prevention activities into HIV/AIDS prevention, care and treatment programs, including distributing approximately 10,000 ITNs to PLWHAs and IEC/BCC to promote ITN use	42
SUBTOTAL: HIV & Malaria		**100,000**			

					Page Number
NGO COLLABORATION & CAPACITY BUILDING					
1. Strengthen capacity of indigenous NGOs to implement community-based malaria prevention and control activities	New RFA	700,000	Nationwide	Provide sub-grants to NGOs and NGO networks to implement ITN, IPTp and ACT promotion and IEC activities in order to extend the reach of malaria prevention and control activities at the community level.	43
2. General capacity building at NMCP	New RFA	125,000	Nationwide	Provide support for professional development of key NMCP staff including supporting South-to-South exchanges. Continue operational support begun in Year 1 including data management and IT infrastructure development.	45
3. Support for monitoring and supervision of malaria control activities by NMCP and other MOH/GHS staff	Direct funding to NMCP through a Strategic Objective Implementation Letter	100,000	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.	45
SUBTOTAL: NGO & CAPACITY BUILDING		**925,000**			
MONITORING AND EVALUATION					

					Page Number
1. Sentinel site surveillance	New RFA	200,000	5 Sites TBD	Support 5 sentinel sites to collect routine facility-based data on malaria cases for children < 5, and within one of the sites (DSS) implement a cross sectional survey to collect community level data to track health care utilization.	48
2. Support NMCP to implement M&E plan	New RFA	150,000	New RFA	Support NMCP in development of M&E implementation plan	48
3. Evaluate ITN distribution strategy	TBD	55,000	Nationwide	Support an external evaluation of Ghana's routine net distribution strategies, including assessment of the effectiveness of the voucher program.	48
4. Technical assistance	CDC IAA	24,200	TBD	Support for two technical assistance trips for Sentinel Site Surveillance activity and M&E activities.	48
SUBTOTAL: M&E		**429,200**			
IN-COUNTRY STAFFING AND ADMINISTRATION					
1. In-country staff and administrative expenses	USAID / CDC IAA	1,314,500	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.	50
SUBTOTAL: Mgmt. and Admin.		**1,314,500**			
GRAND TOTAL		**17,300,000 (8,600,000)**	***Commodities represent 50 % of total budget***		

Table 3
President's Malaria Initiative – Ghana

Year 2 (FY09) Estimated Budget Breakdown by Intervention

Area	Commodities (%)	Other (%)	Total
Insecticide-treated Nets	3,800,000 (79%)	1,000,000 (21%)	4,800,000 (28%)
Indoor Residual Spraying	1,100,000 (31%)	2,457,100 (69%)	3,557,100 (21%)
Malaria in Pregnancy - IPTp	-0-	500,000 (100%)	500,000 (3%)*
Case Management	3,700,000 (65%)	1,974,200 (35%)	5,674,200 (33%)
HIV & Malaria	-0-	100,000 (100%)	100,000 (1%)
NGO Collaboration & Capacity Building	-0-	925,000 (100%)	925,000 (5%)
Monitoring and Evaluation	-0-	429,200 (100%)	429,200 (2%)
Administration	-0-	1,314,500(100%)	1,314,500 (7%)
Total	**8,600,000 (50%)**	**8,700,000 (50%)**	**17,300,000 (100%)**

* Note: This MIP figure of 3% captures FANC support only. The true proportion of resources directed to pregnant women is far greater, since all PMI activities are designed to benefit pregnant women and/or children under five in some way.

Table 4

Year 2 (FY09) Budget Breakdown by Partner

Partner Organization	Geographic Area	Activity	Budget ($)
DELIVER	Nationwide	Procure LLINs for routine distribution and mass campaign; procure antimalarial medications and lab equipment; strengthen logistics and supply chain for anti-malarial medications.	7,100,000
New Malaria RFA	Nationwide	Support ITN distributions; strengthen malaria case management including home-based care; support FANC and malaria prevention in pregnancy; implement sentinel site surveillance and support national M&E strategy; implement comprehensive BCC/IEC strategy; strengthen NGO capacity in malaria control at community level; support NMCP management and supervision	4,225,000
Research Triangle Institute (RTI)	Target districts in Northern Region	IRS implementation, IRS entomological and environmental monitoring, capacity building.	3,515,000
Improving Malaria Diagnostics (IMaD)	Nationwide	Support implementation of new laboratory policy, including training; strengthen laboratory quality control	450,000
Strengthening Pharmaceutical Systems (SPS)	Nationwide	Strengthen drug management system capacity.	300,000
Strategic Objective Implementation Letter	Nationwide	Support NMCP operations and management	100,000

Partner Organization	Geographic Area	Activity	Budget ($)
United States Pharmacopeia (USP)	Nationwide	Strengthen drug quality monitoring capacity in collaboration with FDB.	100,000
CDC IAA	Nationwide	TA for entomologic monitoring, for laboratory policy implementation; for pharmacovigilance capacity building; and for implementation of malaria M&E plan.	60,500
TBD	Nationwide	Evaluate ITN distribution methods	55,000
WHO (*including subgrant to FDB*)	Nationwide	Provide support for pharmacovigilance system.	50,000
IRS Environmental Compliance RFP	IRS districts (Northern Region)	Evaluate environmental compliance of PMI-support IRS operations.	30,000
Total			15,985,500

Note: In-country staffing and administration of $1,314,500 not included above