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PRESIDENT'S MALARIA INITIATIVE

MALARIA OPERATIONAL PLAN (MOP)

**ETHIOPIA
FY2011**

TABLE OF CONTENTS

	ACRONYMS AND ABBREVIATIONS	3
A.	EXECUTIVE SUMMARY	5
B.	PRESIDENT’S MALARIA INITIATIVE	7
B.1.	Global Health Initiative	7
B.2.	President’s Malaria Initiative	7
C.	MALARIA SITUATION	8
C.1.	The Changing Ethiopia Context	8
C.2.	Health Infrastructure in Ethiopia and Oromia	9
C.3.	Malaria in Ethiopia and Oromia	11
C.4.	History and Current Status of Malaria Control in Ethiopia	13
C.5.	Rationale for Current Allocation of Control Interventions	14
D.	NATIONAL MALARIA CONTROL PLAN AND STRATEGY	15
E.	CURRENT STATUS OF MALARIA INDICATORS	16
E.1.	Malaria Indicator Survey 2007	16
F.	GOALS AND TARGETS OF THE PRESIDENT’S MALARIA INITIATIVE	18
G.	EXPECTED RESULTS – FY2011	18
H.	INTERVENTIONS: PREVENTION	19
H.1.	Insecticide-treated nets	19
H.2.	Indoor residual spraying	21
H.3.	IEC/BCC and support to community-based organizations	28
H.4.	Malaria in Pregnancy Including Intermittent Presumptive Treatment	29
I.	INTERVENTIONS: CASE MANAGEMENT	30
I.1.	Diagnosis	30
I.2.	Pharmaceutical Management	32
I.3.	Treatment	34
J.	INTERVENTIONS: EPIDEMIC SURVEILLANCE / MONITORING AND EVALUATION	36
J.1.	Epidemic Detection and Response	36
J.2.	Monitoring and Evaluation	38
K.	HIV/AIDS AND MALARIA	40
L.	NEGLECTED TROPICAL DISEASES AND MALARIA	41
M.	CAPACITY BUILDING WITHIN THE NATIONAL MALARIA CONTROL PROGRAM	42
N	COMMUNICATION AND COORDINATION OF IN-COUNTRY PARTNERS	43
O	STAFFING AND ADMINISTRATION	44
P	TABLES	45
	Table I: Timeline of Activities	46
	Table II: Planned Obligations FY2011	47
	Table III : Budget Breakdown by Intervention	53
	Table IV: Budget Breakdown by Partners	54
	Table V: Schedule for TDYs and TDYs for MOP FY2011	55

ACRONYMS AND ABBREVIATIONS

ACT	Artemisinin-based combination therapy
ANC	Antenatal care
CBO	Community-based organization
CDC	Centers for Disease Control and Prevention
CJTF-HOA	US Department of Defense “Combined Joint Task Force-Horn of Africa”
DACA	Drug Administration and Control Authority
DDT	Dichloro-diphenyl-trichloroethane
DHS	Demographic and Health Survey
EHNRI	Ethiopian Health and Nutrition Research Institute
ESR	Epidemic Surveillance and Response
FBO	Faith-based organization
FELTP	Field Epidemiology and Laboratory Training Program
FMOH	Federal Ministry of Health
FSN	Foreign Service National
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GIS	Geographic Information Systems
GoE	Government of Ethiopia
HEP	Health Extension Package
HEW	Health Extension Worker
HMIS	Health Management Information System
HSDP	Health Sector Development Plan
IEC/BCC	Information education communication / behavior change communication
IPTp	Intermittent preventive treatment of pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated bed net
IVM	Integrated vector management
LLIN	Long-lasting insecticidal net
MCST	Malaria Control Support Team
M&E	Monitoring and Evaluation
MIS	Malaria Indicator Survey
MOP	Malaria Operational Plan
NGO	Non-governmental organization
NMCP	National Malaria Control Program
ORHB	Oromia Regional Health Bureau
PEPFAR	President’s Emergency Plan for AIDS Relief
PFSA	Pharmaceutical Fund and Supply Agency
PLMP	Pharmaceutical Logistics Master Plan
PMI	President’s Malaria Initiative
PMTCT	Prevention of mother-to-child transmission
QA/QC	Quality assurance/quality control
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
RHB	Regional Health Bureau
SEA	Supplemental Environmental Assessment
SNNP	Southern Nations, Nationalities and People’s Regional State
TAC	Technical Advisory Committee
UNICEF	United Nations Children’s Emergency Fund
USAID	United States Agency for International Development
USG	United States Government
VCHW	Voluntary Community Health Worker
WHO	World Health Organization
WHOPES	WHO Pesticide Evaluation Scheme

A. EXECUTIVE SUMMARY

Malaria prevention and control are major foreign assistance objectives of the U.S. Government (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a six-year, comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through the GHI, the United States will invest \$63 billion over the next six years to help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns, and children.

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

In 2007, Ethiopia became one of the PMI focus countries and in June 2010, it was chosen to be one of the first eight GHI Plus countries. Malaria is ranked as the leading communicable disease in Ethiopia, accounting for about 30% of the overall Disability Adjusted Life Years lost. Approximately 68% of the total population of 78 million lives in areas at risk of malaria. According to Ethiopia's Federal Ministry of Health (FMOH), in 2008/2009, malaria was the leading cause of outpatient visits, health facility admissions and inpatient deaths, accounting for 12% of reported outpatient visits and nearly 10% of admissions. Because a large proportion of the population does not have access to health care services, these figures probably under-estimate the true burden of malaria in the country.

PMI support to malaria prevention and control in Ethiopia began in FY2008 with a focus on Oromia Regional State, the largest of the Ethiopia's nine regional states, covering a third of the country. More than 17 million persons are at risk of malaria in Oromia, and malaria accounts for 20-35% of outpatient consultations, 16% of hospital admissions, and 18-30% of all hospital deaths.

Ethiopia has received three grants from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund): Round 2 (\$73 million), Round 5 (\$140 million) and Round 8 (\$276 million). PMI has contributed between \$20 and 30 million annually during the last three years. With this support and that of other donors, the Government of Ethiopia (GoE)'s FMOH has been able to dramatically scale-up its efforts in malaria prevention and control.

The most recent Malaria Indicator Survey (MIS), in 2007, showed a rapid increase in the household insecticide-treated net (ITN) coverage from 6% to 65% in the targeted malarious areas since 2004. However, the survey also showed that Oromia is lagging behind the country's other regional states in key malaria intervention indicators. For example, in Oromia only 41% of households were shown to own one or more ITNs; 29% of pregnant women and 24% children under five years of age slept under an ITN the previous night. The prevalence of malaria parasitemia was shown to be <1%. While this figure could be the result of the scale-up of malaria interventions, it needs to be interpreted with caution. Historically, Ethiopia has experienced cycles of malaria epidemics every five to eight years, with the last nationwide epidemic in 2003. Thus, the low malaria prevalence observed in the MIS 2007 may simply reflect the low transmission characteristics of non-epidemic years.

This PMI Year 4 Malaria Operational Plan for Ethiopia was developed in June 2010 in close consultation with the FMOH, the Oromia Regional Health Bureau (ORHB) and with participation of in-country partners. The activities PMI proposes will complement the FMOH's National Malaria Strategic Plans for Malaria Prevention and Control 2006-2010 and 2011-2015 and build on investments made by the GoE and other partners over the past three years. While the focus continues to be on Oromia Regional State, with FY2011 funding, PMI will begin to expand support to the remainder of the country. The proposed FY2011 PMI budget for Ethiopia is \$41 million. Outlined below are the FY2011 budget's major components, which envisage sustaining and expanding PMI support to currently ongoing activities:

Insecticide-treated Nets (ITNs): Between 2005 and 2009, approximately 20 million long-lasting ITNs (LLINs) were distributed nationwide with support from the Global Fund, including 6.5 million LLINs in Oromia. In spite of this effort, the MIS 2007 showed LLIN ownership of just 65% in areas targeted for distribution. By the end of 2011, the FMOH plans to distribute a total of 15 million free LLINs throughout Ethiopia in another massive national campaign to sustain and increase LLIN coverage. PMI is currently procuring 1.8 million LLINs with FY 2010 funding to contribute to this effort. An additional 1.9 million LLINs will be procured with PMI FY2011 funding to further support Ethiopia's national campaign. PMI LLINs will be delivered through Oromia Regional Health Bureau channels and through networks of community-based (CBOs), faith-based (FBOs) and other non-government organizations (NGOs). LLIN distribution will be complemented by comprehensive behavior change and communication (BCC) efforts, as well as targeted hang-up campaigns to ensure that LLIN use by the population is maximized. PMI will also provide support for national net coverage efforts by building on and strengthening routine distribution systems and support to national malaria commodity micro-planning, which estimates district and community-level LLIN needs and gaps.

Indoor Residual Spraying (IRS): In FY 2010, 646,619 structures were sprayed and more than 2.1 million residents protected with IRS. In addition, PMI support of insecticide-resistance monitoring from 2008 to 2010 has now demonstrated widespread resistance to DDT, leading the Government of Ethiopia to explore alternative insecticides for its next round of IRS. With FY2011 funding, PMI will continue to support Ethiopia's long-standing and extensive indoor residual spraying (IRS) program through a comprehensive range of activities, including improved targeting and enumeration of areas for IRS operations, improved IRS commodities' procurement, distribution and storage systems, training and supervision for IRS application and appropriate pesticide management, entomological monitoring, and environmental compliance. PMI will support spraying for 600,000 household structures in 30 districts of Oromia with high malaria transmission, protecting an estimated 2 million residents. PMI also will continue to support the national Integrated Vector Management (IVM) framework to build capacity for zonal- and district-level vector control specialists to conduct basic entomological monitoring and improved IRS targeting and implementation as well as improved pesticide management.

Malaria in Pregnancy: Because of the generally low endemicity of malaria in Ethiopia, IPTp is not a national strategy. Instead, the focus of malaria during pregnancy activities are on promoting universal ITN coverage and prompt diagnosis and treatment of clinical cases.

Case Management: With previous PMI support, 2.4 million RDTs, 3.3 million doses of artemisinin-based combination therapies (ACTs) and 3.9 million doses of chloroquine were procured and distributed. A further 1 million RDTs, 3.5 million ACT treatments and 2 million chloroquine treatments are being procured with FY2010 funds. PMI also is supporting a review of the national malaria diagnosis and treatment guidelines, including an assessment of the role of rapid diagnostic tests (RDTs). PMI is committed to continue strengthening capacity to conduct quality-assured diagnostic testing for malaria, including provision of supplies, training, supervision and implementation of quality assurance/quality control (QA/QC) systems to improve the quality and accuracy of case management of fever. PMI is also strengthening the pharmaceutical management system, including procurement, warehousing, and delivery

of malaria treatments within the national Pharmaceutical Logistics Master Plan (PLMP). In conjunction with other IEC/BCC efforts, PMI is supporting the ORHB and its expanding system of health extension workers (HEWs) to promote early care-seeking behavior and adherence to antimalarial drug treatment. PMI support has been provided to the Ethiopian Drug Assurance and Control Administration to ensure that all malaria products entering the country meet quality standards. Four of the ten antimalarial drug efficacy monitoring sites throughout the country are being supported by PMI in Oromia. With FY2011 funding, PMI will procure and distribute 6 million multi-species RDTs, 4.5 million ACT treatments, 4 million chloroquine treatments (for treatment of *Plasmodium vivax*), together with drugs for severe disease and pre-referral care.

Epidemic Surveillance / Monitoring and Evaluation: There is an urgent need to improve data and information management for operations in Ethiopia, including tracking of LLINs and other malaria-related commodities, the location and current staffing of health facilities, IRS operations and stock reports. While assisting with the FMOH's new Health Management Information System's (HMIS) roll-out for routine collection of facility-based data, PMI has supported the establishment of an epidemic detection system to capture indicators beyond routine surveillance data, and track morbidity and mortality to evaluate program progress and effectiveness.

With FY2011 funding, this support will be sustained, together with efforts to monitor malaria morbidity and mortality and availability of malaria commodities at the health facility level. This complements support for national, district-level ('bottom-up') malaria commodities' micro-planning to ensure that commodity procurements and distributions match district-level needs and are reaching beneficiaries. FY2011 funds will also support a nationwide MIS, tentatively scheduled to be conducted in late 2011 as a follow-up to the MIS conducted in 2007. PMI will also support a pilot assessment of school-based surveillance as an early warning system for malaria epidemics.

Health systems strengthening and integration: As one of the eight GHI Plus Countries, PMI in Ethiopia is fully aligned with the GHI principles of building country capacity and integrating across programs. PMI provides significant support to Ethiopia's Health Extension Plan (HEP) which has established 15,000 health posts that offer curative and preventive services on a range of conditions at community level. With FY2011 funding, PMI will continue its support for integrated training and supervision of HEWs and for development of their capacity to detect malaria outbreaks in their catchment population. In addition, PMI and PEPFAR will continue to provide the majority of the support for implementing the PLMP and strengthening Ethiopia's drug management system. The PMI-led initiative on micro-planning for malaria commodities also is building capacity for forecasting commodities requirements and monitoring consumption at national, regional, and district levels. These skills can easily be used to forecast and monitor other essential health commodities. In addition, PMI support has helped to re-establish the capacity within Ethiopia to conduct entomologic surveillance and monitor insecticide resistance, which prior to PMI had not been carried out for many years.

B. INTRODUCTION

B.1. Global Health Initiative

Malaria prevention and control is a major foreign assistance objective of the USG. In May 2009, President Barack Obama announced the GHI, a six-year, comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through the GHI, the United States will invest \$63 billion over six years to help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns and children. The GHI is a global commitment to invest in healthy and productive lives, building upon and expanding the USG's successes in addressing specific diseases and issues.

The GHI model is based on: implementing a woman- and girl-centered approach; increasing impact and efficiency through strategic coordination and programmatic integration; strengthening and leveraging key partnerships, multilateral organizations, and private contributions; encouraging country ownership and investing in country-led plans and health systems; improving metrics, monitoring and evaluation; and promoting research and innovation. The GHI will build on the USG accomplishments in global health, accelerating progress in health delivery and investing in a more lasting and shared approach through the strengthening of health systems. In June 2010 Ethiopia was designated as a GHI focus country, which will further emphasize a programmatic focus on country ownership, collaboration, integration and sustainability.

B.2. President's Malaria Initiative

PMI is a core component of the GHI, along with HIV/AIDS, tuberculosis, and neglected tropical diseases. PMI was launched in June 2005 as a 5-year, \$1.2 billion initiative to rapidly scale-up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, funding for PMI has now been extended through FY2014 with the goal adjusted to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. This will be achieved by reaching 85% coverage of the most vulnerable groups, i.e. children under five years of age and pregnant women, with proven preventive and therapeutic interventions, including ACTs, ITNs, IPTp, and IRS.

In implementing PMI, the USG is committed to working closely with host governments and their existing national malaria control strategies and plans. Efforts are coordinated with other national and international partners, including Global Fund, Roll Back Malaria (RBM), the World Bank, the World Health Organization (WHO), the United Nations International Children's Emergency Fund (UNICEF) 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 activities for PMI as well as subsequent evaluations are highly consultative and held in collaboration with the National Malaria Control Program (NMCP) and in-country partners.

This FY2011 MOP is a detailed one-year plan for the fourth year of PMI in Ethiopia. This document builds on the previous MOPs available on the PMI website (www.pmi.gov). The FY2011 MOP briefly reviews the current status of malaria in the country; outlines current prevention and control policies and interventions; identifies challenges and unmet needs to achieve PMI goals; outlines PMI activities from prior years; and describes activities supported by PMI in Year 4, in particular the expansion of specific activities from Oromia to other regional states. The MOP FY2011 was developed in close consultation with the GoE's FMOH NMCP, the ORHB and with participation of many national and international in-country malaria partners. The total amount of FY2011 PMI funding requested for Ethiopia is \$41,000,000.

C. MALARIA SITUATION

C.1. The Changing Ethiopian Context

The preface to the previous MOPs highlighted unique aspects of malaria in Ethiopia, including the PMI geographical focus; Ethiopia's long history of commitment to malaria control; the structure of the health care system; the community-level health extension program; the importance of diagnostics given the presence of both *Plasmodium falciparum* and *P. vivax*; the instability of malaria transmission and pattern of recurrent epidemics. There have been important changes in four of these elements this past year.

Geographical focus and scale: PMI in Ethiopia primarily focused on Oromia during the first three years of the initiative. While it is just one of nine regional states, Oromia comprises one third of the country's land mass (353,007 km²) and population (28.7 million). Oromia is both the largest, and by most health indicators the most underserved regional state in Ethiopia. A third of the country's malaria cases are reported from Oromia. While PMI commodity support and operations will continue to concentrate primarily in Oromia, there will be an expansion nationally, to other regional states to fill commodity gaps and for nation-wide support for planning, training and use of strategic information.

Diagnostics and the treatment of malaria and pneumonia: In September 2007 Ethiopia celebrated the Year 2000 millennium of the Ethiopian Calendar. The commemoration included the FMOH-led 'Millennium Malaria Control Campaign', and a series of one-time treatment campaigns with the ACT drug artemether-lumefantrine (AL). ACT administration was delivered through the HEWs, sometimes presumptively to fever patients (mass fever treatment) and sometimes to entire communities, without any malaria diagnosis (mass drug administration). No data on the proportion of people treated with confirmed malaria or data on adverse drug reactions were collected. Although mass fever treatment with AL and chloroquine are components of the national diagnosis and treatment guidelines, its use should be limited to outbreak response activities. The guidelines state that the treatment of malaria should be guided by confirmed diagnosis whenever the situation permits. Also at that time of the campaign, HEWs were not able to provide pneumonia treatment, and so there was presumed be a large over-use of AL. Since the campaign in 2007, there have been two significant policy changes to refine the diagnosis and treatment of fevers in Ethiopia. First, HEWs now have multi-species RDTs that can diagnosis both *P. falciparum* and *P. vivax*, as well as chloroquine for the treatment of *P. vivax* (which was previously often treated with AL). Second, HEWs are now able to treat suspected pneumonia cases with the antibiotic cotrimoxazole. These new tools have potential to greatly increase the HEWs' capacity for accurate differential diagnosis and treatment of fever at community level.

Entomological monitoring and insecticide selection: With support from PMI, Ethiopia was able to greatly expand capacity for entomological monitoring, including testing for insecticide resistance in anopheline mosquitoes. Evidence of dichloro-diphenyl-trichloroethane (DDT) resistance and, in some areas, pyrethroid resistance prompted the FMOH to pursue a long-term insecticide resistance management strategy and to discontinue DDT after almost six decades of use as the insecticide of choice.

Epidemic threat: 'Epidemic years' occurring every five to eight years are a hallmark of malaria in Ethiopia, with the last such epidemic year occurring in 2003. The MIS 2007 indicated that parasite prevalence (as measured by microscopy) in Ethiopia and Oromia was 0.7% and 0.3%, respectively. While this could indicate that the FMOH-led scale-up of malaria prevention and control interventions may have had a tremendous impact on malaria morbidity and mortality, the data has to be interpreted with caution. The MIS 2007 was a cross-sectional survey in a country where transmission is known to vary spatially and temporally: a low prevalence at the time of the survey does not mean there will not a high burden of malaria a week or a month after the survey. The low parasite prevalence may also reflect decreased exposure to malaria. Consequently, individuals may lack protective immunity. Thus, while no epidemic

outbreaks were reported in 2006 or 2007, several outbreaks have been reported in 2008, 2009 and early 2010. Similarly, according to the latest FMOH data, malaria has again become the most common cause of outpatient visits, health facility admissions and inpatient deaths in the country. Currently, it is unknown whether the observed increase in malaria is due to better case detection by HEWs or to a real change in malaria transmission. The unstable and largely unpredictable epidemiology of malaria in Ethiopia makes surveillance as well as information and logistics management for antimalarial commodities of paramount importance.

C.2. Health Infrastructure in Ethiopia and Oromia

Ethiopia operates under a federal system of government. Administratively, the country is divided into regional states, zones, districts (*woredas*) and communities / municipalities (*kebeles*) (**Figure 1**).

Oromia has 304 districts divided into 17 zones and 9 ‘special towns’ (**Figure 2**). According to 2008/2009 ORHB data, there are 23 hospitals, 548 health centers, 656 health stations and 4,685 functional health posts, operated by the GoE. In addition, there are 4 hospitals, 2 health centers, 80 health stations and 5 health posts operated by non-governmental organization (NGOs). There are also 4 hospitals, 3 health centers and 115 health stations under other governmental organizations (e.g. teaching or armed services hospitals). Oromia’s health professional to population ratio is very low with one physician serving 68,951 people (WHO standard of 1:10,000), and one nurse serving 9,309 people (WHO standard is 1:5,000). The total available hospital beds (GoE 2,217 and NGO 340 hospital beds) total 2,547 with a bed-to-population ratio of 1:10,288 (WHO standard 1:3,000). The health service coverage in Oromia is lower than in most of the other regional states in Ethiopia, which has contributed to low coverage in vital indicators such as vaccination and family planning. As in the rest of the country, the health care service delivery system in Oromia has been re-organized from the previous 6-tier into a 4-tier system. The lowest tier is the so-called ‘Primary Health Care Unit’, which is composed of one health center and five satellite health posts, designed to serve 25,000 people; the second tier is a district hospital with a catchment population of 250,000 people; third is a zonal hospital for one million people; and the top tier is the specialized (regional) hospital for five million people.

The typical health post is staffed by two HEWs providing health care service delivery on 16 selected ‘health packages’, including one on malaria [<http://cnhde.ei.columbia.edu/training/index.html>]. HEWs are fully paid FMOH staff; they have a high school diploma and usually originate from the communities they serve. The HEWs focus on preventive services, except for malaria where they are expected to confirm diagnosis with an RDT and provide patients with AL (for *P. falciparum*) or chloroquine (for *P. vivax*); severe malaria cases are to be referred to the next appropriate health facility. HEWs are also expected to supervise seasonal activities, such as IEC/BCC activities and mass-vaccination campaigns, participate in surveys and a range of other community health activities that may include malaria-related interventions. Additionally, HEWs have become more directly involved in managing IRS operations in their communities (e.g. by supervising spray teams).

The health center provides comprehensive primary health care services and backup to the health posts by accepting referral cases, while district and zonal hospitals provide secondary health care. In Oromia, hospitals in Adama, Nekemte, Asella, Mettu and Ambo can potentially serve as specialized referral hospitals based on geographical suitability. Jimma Hospital, under the Ministry of Education, is providing tertiary level health care for the city of Jimma and the surrounding population.

C.3. Malaria in Ethiopia and Oromia

Epidemiology: The western, central and eastern highlands, as well as the highland-fringe areas along the Rift Valley are especially vulnerable to epidemic outbreaks. In the past two decades 48 ‘epidemic episodes’ occurred, with severe outbreaks occurring in 1988, 1991, 1992, 1998, 2003, 2004 and 2005.

In Ethiopia, malaria transmission is largely determined by climate and altitude. Most of the transmission occurs between September and December, after the main rainy season from June to August. Certain areas, largely in the western and eastern part of the country including parts of Oromia, experience a second minor transmission period from April to May, following a short rainy season from February to March. Five main malaria eco-epidemiological strata are recognized:

- Stable, year round, transmission in the western lowlands and river basin areas of Gambella and Benishan-Gul Regional States;
- Seasonal transmission in lowland areas <1,500 meters;
- Epidemic-prone areas in highland fringes between 1,500 – 2,500 meters;
- Arid areas where malaria is only found near semi-permanent water bodies; and
- Malaria-free highland areas >2,500 meters.

Additional stratification can be done based on annual rainfall (**Figure 3**).

Burden of Disease: Despite the low parasite prevalence, malaria is the leading communicable disease in Ethiopia. Historically, malaria has forced people to inhabit the less agriculturally productive highlands. Given that the country’s economy is based on agriculture and peak malaria transmission coincides with the planting and harvesting season, the economic impact of malaria is burdensome.

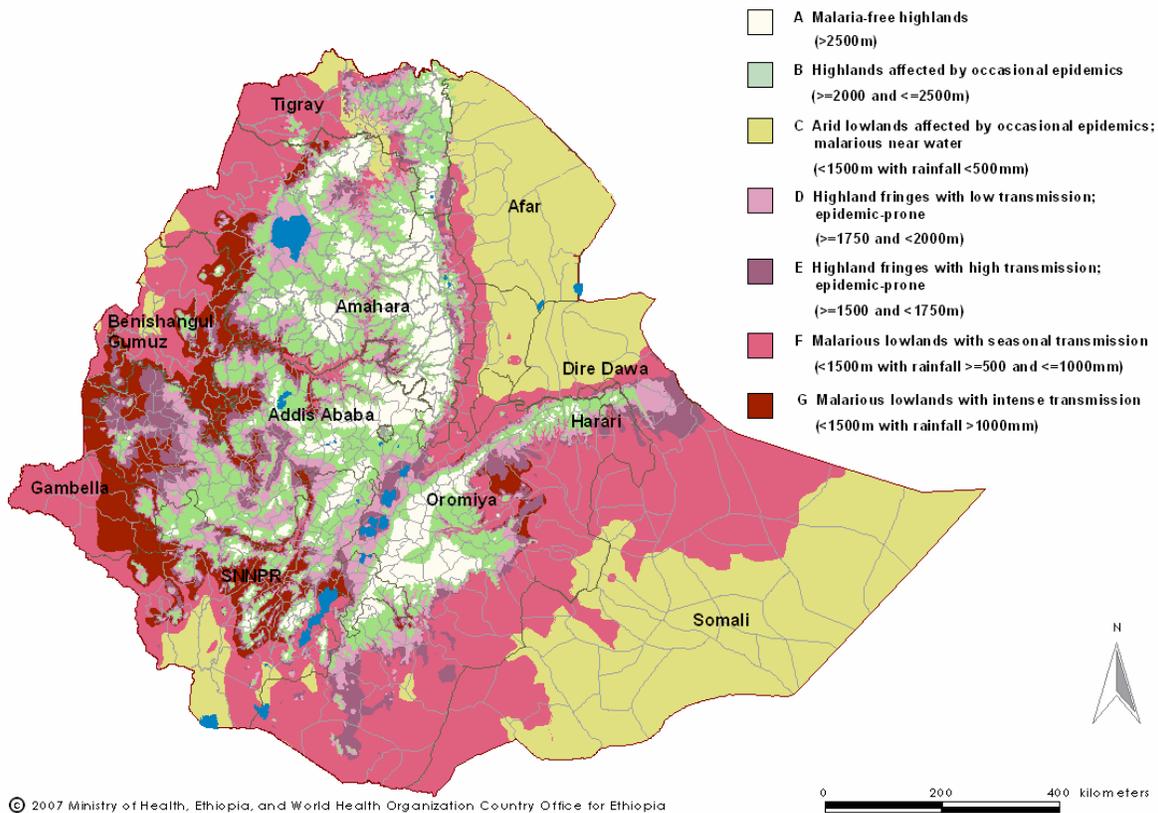
Overall, according to the FMOH, malaria accounts for up to 12% of outpatient consultations and 10% of health facility admissions. About 75% of the country has malaria transmission (defined as areas <2,000 m), with about 68% (i.e. 50 million) of the country’s total population living in areas at risk of malaria. The FMOH estimates that there are 5 – 10 million clinical malaria cases each year. However, of these, at present, only 1,349,659 are reported at national level, with 245,499 (18%) being confirmed by a diagnostic test (note, this does not include data from all health posts). According to FMOH reports, approximately 70,000 people die of malaria each year in Ethiopia.

In Oromia malaria is also considered to be the most important communicable disease. More than three quarters of the state, i.e. 262 of 297 (88%) districts and 4,237 of 6,765 (63%) municipalities, are considered to have malaria transmission, accounting for over 17 million persons at risk of infection. There are an estimated 1.5 to 2 million clinical cases per year, with malaria accounting for 20-35% of outpatient consultations, 16% of health facility admissions, and 18-30% of hospital deaths in the Oromia.

The accuracy of these malaria estimates has been in doubt. In a country with a weak health information system, the few data that are available are often unreliable and likely to overstate malaria burden as only a small percentage of those with fever will have malaria. Recent surveys (see **section E**), appear to indicate a drop in malaria morbidity and mortality. Possible explanations include environmental factors, the cyclical nature of malaria in Ethiopia, and the aggressive scale-up of malaria interventions implemented by the FMOH and in-country malaria partners since 2005. While no malaria outbreaks were reported in 2006 and 2007, there are

signs of increasing malaria transmission in the country, with several focal outbreaks reported in Southern Nations, Nationalities, and People's (SNNP), Amhara, Tigray and Oromia Regional States in 2008, 2009 and early 2010. It remains to be seen whether current outbreaks are an aberration limited in scale and scope, or whether they indicate that Ethiopia is about to experience another of its cyclical 'epidemic years'.

Figure 3. Distribution and Seasonality of Malaria in Ethiopia.



Malaria Vectors: *Anopheles arabiensis*, a member of the *An. gambiae* complex, is the primary malaria vector in Ethiopia, with *An. funestus*, *An. pharoensis* and *An. nili* secondary vectors. The sporozoite rate for *An. arabiensis* has been recorded to be up to 5.4%. The host seeking behavior of *An. arabiensis* varies, with the human blood index collected from different areas ranging between 7.7 and 100%. *Anopheles funestus*, a mosquito that prefers to feed on humans, is the second most common vector of malaria, occurring frequently along the swamps of Baro and Awash rivers and shores of lakes in Tana in the North and the Rift Valley area. *Anopheles pharoensis* is widely distributed in Ethiopia and while its exact role in malaria transmission is unclear, it has shown high levels of insecticide resistance. *Anopheles nili* can be an important vector in local transmission, particularly in Gambella Regional State. Detailed information on the basic ecology and distribution of these vectors in Ethiopia is provided in the MOP FY2008. However, there are serious issues with insecticide susceptibility among these vectors that will have important implications for the vector control strategies (see **section H.2.**).

C.4. History and Current Status of Malaria Control in Ethiopia

1959 – 2003: In 1959, the Malaria Eradication Service was established with funding support by USAID. Ethiopia, along with Zimbabwe and South Africa, were the only three countries in Africa to embark on a malaria eradication effort in line with the Global Malaria Eradication Efforts spearheaded by WHO. In 1976, as in many other countries, the country shifted from an ‘eradication’ program to a ‘control’ program known as the National Organization for the Control of Malaria and Other Vector-Borne Diseases. Until the early 1990s, malaria control was organized by *sectors*, with a sector covering about two to five districts or 75,000 to 150,000 people. Sector Malaria Control Offices were responsible for Malaria Detection and Treatment Posts in each sector, which collected data on microscopically confirmed cases.

Starting in 1993, a major reorganization and decentralization occurred within the FMOH, and the formerly vertical program was dismantled. The Regional States took over responsibility for many aspects of the program, and malaria control (including vector control) was integrated with other parts of the health system. In a subsequent FMOH reorganization, malaria control became a ‘team’ (i.e. the Malaria and Other Vector-Borne Disease Team) under the FMOH’s Disease Prevention and Control Department, rather than a separate department.

In 2000, the GoE became a co-signatory of the Abuja declaration and committed itself to the declaration’s aims to increase coverage of malaria interventions and reduce malaria mortality by half by 2010. A Malaria Control Support Team (MCST) comprising representatives from the FMOH, donor and international organizations (e.g. UNICEF, WHO), and NGOs was formed to provide technical assistance and mobilize support for the government program.

The era of the Global Fund: Ethiopia is the recipient of two grants from the Global Fund: Round 2 (2002 - 2008; \$73 million) and Round 5 (2005 - 2010; \$140 million). Recently, Ethiopia was successful in applying for Round 8 funding support (2008 – 2013; \$276 million). Ethiopia also recently applied for Global Fund Round 10 funds.

Despite a slow start and severe delays in commodity procurement after the award of the Global Fund Round 2 grant, major progress has been achieved since 2005. More than 20 million ITNs (largely LLINs) have been distributed throughout the country. Millions of RDTs and treatment doses of ACTs have been disbursed to health facilities, including the peripheral health posts, in an effort to increase access for timely diagnosis and treatment. IRS activities have also increased with many more districts in malaria epidemic-prone areas covered by IRS. The impressive scale-up of activities has also led to additional funds made available by other international donors as well as NGOs, including UNICEF, the World Bank, the Carter Center, USAID and, beginning three years ago, PMI.

This scale-up of malaria interventions is probably the largest of its kind in sub-Saharan Africa. However, this scale-up also comes with a heavy price tag: to sustain current efforts and achieve national coverage, the GoE's Global Fund Round 8 proposal (pages 57-58) projects that, in addition to Global Fund support until 2013, it will need more than \$150 million annually for procurement and distribution of necessary commodities from 2009 onwards.

Organization of the National Malaria Control Program in Ethiopia: Until recently, the NMCP in Ethiopia was staffed by members of the Malaria and Other Vector-borne Diseases Team and in the FMOH's Communicable Disease Prevention and Control Department. The team's responsibilities included overall coordination of malaria and other vector-borne diseases control at national level, identification of implementation capacity gaps for Regional Health Bureaus (RHBs) and provision of training, formulation and dissemination of malaria national policy and technical guidelines, oversight of policy implementation, monitoring and evaluation (M&E) of impact of operational program activities, and advocacy for malaria as a priority disease. In 2009, however, the GoE completed a Business Process Re-engineering exercise which re-organized GoE ministries and agencies according to eight core processes. Following this re-engineering exercise, the NMCP and Communicable Disease Prevention and Control Department have been absorbed into so-called Directorates, with most malaria activities being implemented by the Directorate for Disease Prevention and Promotion and the Directorate of Medical Services. How the business process re-engineering will affect the NMCP in the long-term, both at the national as well as regional levels, is uncertain.

Counterparts of the NMCP at regional state level are organized differently for different regional states, either as a department, a team or a group of experts under a Communicable Disease Department or Office. In Oromia, malaria and other vector-borne diseases are organized as a department with two teams, the Malaria Diagnostics and Epidemiology Team and the Vector Biology and Control Team; staff in this department reports to the Deputy Head of the ORHB. The department is responsible for coordination of malaria and other vector-borne control activities in Oromia, including planning, implementation and M&E, and support to capacity building of the Zonal and District Health Offices.

In Oromia, at the zonal level, two experts are expected to work on malaria and other vector-borne diseases under the Communicable Disease Team of the Zonal Health Department, one for malaria diagnosis/epidemiology and one for entomology/vector control. These two staff serve as backstops for district malaria control activities, liaising directly with the district malaria control program and the region, ensuring the availability of human resources, equipment and supplies in districts as well as coordinating resources of different malaria stakeholders operating in the zone. Although there used to be a 'Malaria Team' at each of the District Health Offices, the GoE's business process re-engineering has abolished these positions, with six persons at district level responsible for all health issues, including malaria. Programmatic challenges listed by the RHBs include shortages of appropriate health professionals to fully staff the program, high staff turnover, less attention to M&E, and downgrading, in some areas, of the malaria management structure to a level which will impede the successful implementation of malaria program activities.

C.5. Rationale for current allocation of control interventions

For FY2011, PMI is sustaining activities initiated and supported in the prior three years, and adapting to the changing context of malaria in Ethiopia (see **section C.1.**). The PMI budget for Ethiopia for FY2011 is \$41 million, an increase from FY2008 (\$19.8 million), FY2009 (\$19.7 million) and FY2010 (\$31 million). Although the GoE was successful in obtaining further Global Fund funding support, the LLIN, insecticide, RDT and ACT needs will increase from 2011 onwards. PMI support for malaria commodities in FY2011 will be nearly 70%, an increase from 39% in FY2008, 53% in FY2009, and 67% in FY2010. After the massive scale-up of LLINs and ACTs through a still-developing health sector infrastructure,

there is also a large emphasis on micro-planning, supervision and M&E, logistics information management, and IEC/BCC to ensure those commodities reach the populations intended, are used appropriately, and are fully accounted for.

D. NATIONAL MALARIA CONTROL PLAN AND STRATEGY

The overall framework of the national malaria control strategy is set forth in the GoE's Health Sector Development Plan (HSDP), the fourth of which (i.e. HSDP IV 2011 – 2015) is currently being finalized. Ethiopia recently developed a five-year National Strategic Plan for Malaria Prevention and Control (2011 – 2015). This strategic plan was developed following the results observed during the MIS 2007, as well as the discussions and recommendations following a consultative meeting held in Adama, Ethiopia, on March 28-29, 2009 with key in-country and international malaria stakeholders. The HSDP IV and the recently developed national strategic plan are in line with RBM partnership objectives. The following goals and objectives are set out in the five-year strategic plan:

Goals

- By 2015, achieve malaria elimination within specific geographical areas with historically low malaria transmission;
- By 2015, achieve zero deaths due to malaria in the remaining areas with malaria transmission.

Overall objective

The objective of the National Strategic Plan for Malaria Prevention and Control 2011-2015 is to consolidate the achievements of the 2006-2010 strategic plan and sustain its impact.

Specific objectives

- 100% of suspected malaria cases are diagnosed using RDTs and/ or microscopy within 24 hours of fever onset;
- 100% of positive malaria diagnosis are treated according to national guidelines;
- 100% of households in malarious areas own, on average, two LLINs;
- At least 80% of people at risk of malaria use LLINs;
- IRS coverage is increased and maintained to 90% of households in IRS-targeted areas;
- 100% of health posts in malarious *kebeles* provide the full malaria prevention and treatment package, including outreach services;
- To achieve a high quality, broadly-based malaria infection detection, investigation and response surveillance system to further reduce malaria transmission.

National diagnosis and treatment, vector control and other malaria policy and guideline documents are available at: [http://www.moh.gov.et/index.php?option=com_remository&Itemid=47&func=select&id=13].

In the new strategic plan, community empowerment and social mobilization are given top priority among malaria control strategies following the MIS 2007, which showed substantial differences between the coverage and utilization of key malaria interventions by the populations at risk of malaria. Similarly, malaria diagnosis, case management, disease surveillance and epidemic control are geared to serve Ethiopia's goal of shrinking malaria endemic areas by 2015 and country-wide elimination by 2020. Accordingly, all malaria diagnosis is to be based on diagnostic testing, either by microscopy or RDTs, and treatment of malaria cases are to be guided by the result of the diagnosis. Surveillance will focus primarily on individual human cases to identify the sources of infection and limit further transmission.

E. CURRENT STATUS OF MALARIA INDICATORS

E.1. Malaria Indicator Survey 2007

The MIS conducted at the end of 2007 was a large, nationally representative, survey of key malaria interventions, treatment-seeking behavior, anemia prevalence in children <5 years of age, malaria prevalence in all age groups, malaria knowledge among women, and indicators of socioeconomic status. PMI provided technical and financial support to over-sample Oromia Regional State to provide a regionally representative baseline for PMI activities. Field work was carried out from October to December 2007. The survey results were stratified by regional states, altitude (with communities <2,000 meters considered 'malarious'), and districts designated for NMCP targeting.

Compared to the Demographic and Health Survey (DHS) conducted in 2005, results from the MIS 2007 reflect the significant effort of the FMOH-led scale-up of malaria prevention and control interventions, with substantial increases in ITN ownership and use, as well as malaria knowledge. **Tables 1** and **2** report national data for areas <2,000 m and <2,500m; whereas, data reported for Oromia includes all areas ≤ 2,500 m).

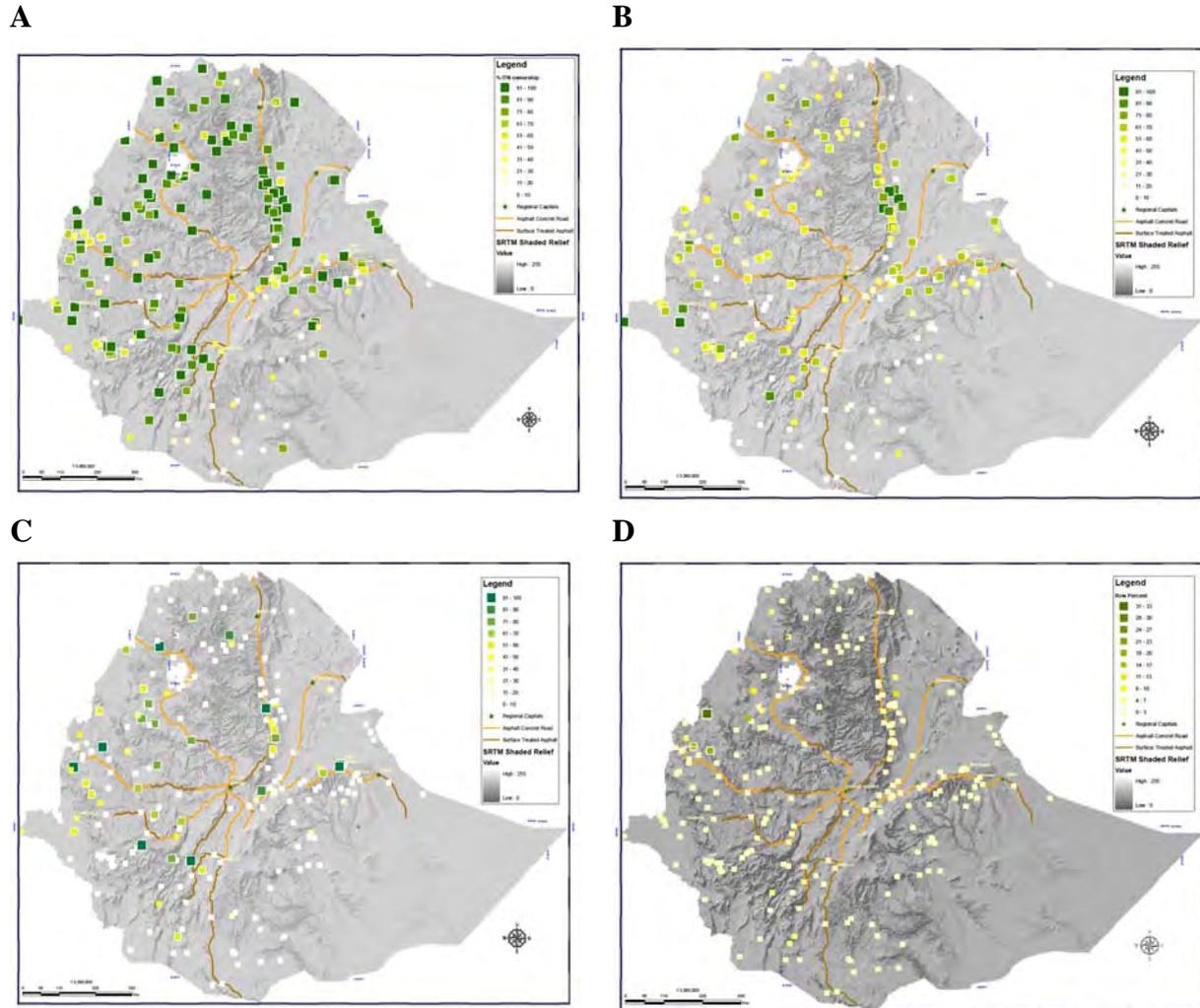
Table 1. Key Malaria Indicators Reported in MIS 2007 at National Level and in Oromia.

<i>Indicator</i>	<i>National (< 2,000 m)</i>	<i>National (≤ 2,500 m)</i>	<i>Oromia (≤ 2,500 m)</i>
Percent households with at least one LLIN	65.3	53.1	41
Percent households with more than one LLIN	36.6	29.5	21.4
Percent children < 5 years of age sleeping under an ITN the previous night	41.5	33.1	24.3
Percent pregnant women sleeping under an ITN the previous night	42.7	35.2	25.6
Percent households reporting indoor residual spraying in the past 12 months	20.0	14.2	12.5
Percent children < 5 years of age with fever in past two weeks	24.0	22.3	21.5
Percent children with fever who took antimalarial drugs	11.9	9.5	6.6
Percent who took an antimalarial drug same or next day	4.8	3.9	1.3
Percent children with fever who sought treatment from facility/provider same/next day	16.3	15.4	16.4
Malaria prevalence by microscopy <i>P. falciparum</i> (%)	0.7	0.5	0.1
Malaria prevalence by microscopy <i>P. vivax</i> (%)	0.3	0.2	0.2

Table 2. Malaria Knowledge among Eligible Women Age 15-49 years.

<i>Region</i>	<i>Percent who have heard of malaria</i>	<i>Percent who recognize fever as symptom</i>	<i>Percent who report mosquito bite as cause</i>	<i>Percent who report nets for prevention</i>
<i>National (< 2000 m)</i>	79.5	50.8	41.1	38.2
<i>National (≤ 2500 m)</i>	74.6	44.4	35.8	32.8
<i>Oromia (≤ 2500 m)</i>	68.8	31.6	32.0	22.6

Figure 4. MIS 2007 Malaria Intervention Coverage and Parasitemia.



Note. A: ITN coverage in Ethiopia: Percentage of households in enumeration areas owning at least one insecticide-treated net. B: ITN use in Ethiopia: Percentage of households in enumeration areas using at least one insecticide-treated net. C: IRS coverage in Ethiopia: Percentage of households in enumeration areas sprayed with a residual insecticide in the 12 months preceding the survey. D: Distribution of *Plasmodium* infection in Ethiopia: Percentage of surveyed individuals in enumeration areas positive for *P. falciparum* or *P. vivax* by microscopy examination.

The MIS 2007 also showed the gaps in the scale-up of malaria interventions, clearly indicating needs for a comprehensive IEC/BCC approach to (i) maximize use of ITNs; (ii) maximize the efforts made in scaling-up IRS activities (e.g. by reducing refusal rates of households to be sprayed and decreasing the practice of plastering after IRS); (iii) substantially increase access as well as use of malaria case management services; and (iv) increase community knowledge of malaria manifestations, prevention and control (**Figure 4**).

F. GOALS AND TARGETS OF THE PRESIDENT'S MALARIA INITIATIVE

Under the GHI, the goal of PMI is to reduce the burden of malaria (morbidity and mortality) by 70% compared to 2006/2007 levels in the initial PMI countries. By 2015, PMI will have assisted the Oromia Regional State of Ethiopia to achieve the following targets in populations at risk for malaria and targeted by activities supported by PMI:

- >90% of households with a pregnant woman and/or children <5 years of age will own at least one ITN;
- 85% of children <5 years of age will have slept under an ITN the previous night;
- 85% of pregnant women will have slept under an ITN the previous night;
- 85% of houses in geographic areas targeted for IRS will have been sprayed;
- 85% of pregnant women and children <5 years of age will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the last 12 months (*note*, because of the highly seasonal transmission of malaria in Ethiopia, one spray round per year is thought to be enough to protect the community);
- 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 (*note*, for reasons described below, this target does not apply to Ethiopia);
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and
- 85% of children <5 years of age with suspected malaria will have received treatment with an ACT in accordance with national malaria treatment policies within 24 hours of onset of their symptoms.

G. EXPECTED RESULTS – FY2011

With FY 2008 – FY 2010 PMI funding in Ethiopia, emphasis included: (i) initiating PMI activities as outlined in the previous year's MOPs, complementing activities of the FMOH; (ii) ensuring that planned PMI activities make greatest use of existing systems and capacity and that these systems are able to absorb future PMI and other funding support; (iii) strengthening FMOH scale-up of malaria prevention, control and case management activities; and (iv) establishing the necessary evidence-based system to enable comprehensive monitoring and evaluation for both PMI and FMOH malaria activities.

To achieve results and to ensure that activities are implemented effectively, FY2008 direct implementation activities (e.g. IRS, IEC/BCC, malaria laboratory diagnosis) were largely focused on a selected number of highly malarious zones within Oromia: East Shoa, Arsi, West Arsi, Jimma and West Hararge. With FY09 funding, these focus areas continued, with many activities expanding to additional zones and districts within Oromia. With FY2010 funding, there was further expansion of activities to additional zones and districts within Oromia, with some national-level activities, including chloroquine procurement and distribution (for treatment of *P. vivax* infection). With FY2011 funding, there will be an expansion to other regional states for selected commodity support as well as for nationwide support for planning, training and use of strategic information.

Prevention

- In Year 4, 1.9 million LLINs will be procured and distributed free of charge through multiple channels. As detailed below in the LLIN gap analysis (**Table 4**), the additional 1.8 million LLINs in FY 2010 plus the 1.6 million from FY 2008 and FY 2009 will significantly improve coverage in

Oromia. Disbursements will be linked to improved tracking and program information management at district, zone and regional level;

- In Year 4, 600,000 structures (approximately 375,000 households) will be sprayed in 30 districts of five administrative zones (East Shoa, Arsi, West Arsi, West Hararge and Jima), an increase from the number sprayed during the last two years. This will result in 2 million people protected with IRS. The exact number of targeted households will be adjusted during the regional and district IRS micro-planning and depending on epidemiological and program data available at that time;

Case Management

- PMI will support the procurement and distribution of 6 million multi-species RDTs. RDT investments will be linked to close monitoring of their exact use and value to the program;
- In Year 4, 4.5 million ACT treatments and pre-referral and severe malaria drugs for the treatment of falciparum malaria as well as 4 million chloroquine treatments of vivax malaria will be procured and distributed. The primary focus for commodity distribution will be Oromia, with distributions to other regional states to be determined in consultation with the FMOH.

H. INTERVENTIONS: PREVENTION

H.1 Insecticide-treated Nets (ITNs)

Background

LLINs distribution and projected gaps: With substantial inputs from a number of partners, especially Global Fund, the Carter Center and PMI, more than 20 million LLINs have been distributed since 2005 targeting, on average, two LLINs per household (*note*, the national policy was recently changed to provide LLINs for each sleeping place in a household). The MIS 2007 results indicate that in malarious areas, 66% of households have at least one ITN (**Figure 4**). The MIS 2007 confirmed that the average household includes 4.5 members sharing 1.8 sleeping spaces, confirming that the target of supplying each household with two family-sized LLINs should be adequate to attain universal coverage. The difference between the 66% LLIN coverage determined by the MIS 2007 and the target universal coverage could be due to a number of factors:

- At the time of the MIS 2007 (i.e. end of 2007) only about 16.7 million LLINs had been distributed; after complete distribution of LLINs, coverage is estimated to have now reached about 78%;
- The original demographic data (e.g. household size; population spread) used to estimate the number of households in malarious areas in 2005 appear to have under-estimated the true situation, according to recent population census survey data. The FMOH now estimates that there are 11 million households in malarious areas, not the 10 million previously estimated;
- A proportion of LLINs distributed in 2005 and 2006 are likely to have deteriorated to the point where owners no longer used them. Observations through field visits and by partners in Ethiopia estimate physical loss rates of around 10% in the first year (with geographical variations), including loss due to 'leakage' of LLINs outside the target areas.

The LLINs distributed by the FMOH since 2005 were distributed through a variety of channels, with the majority delivered for free through stand-alone campaigns and through the integrated Expanded Program on Immunization and the Enhanced Outreach Strategy (biannual campaigns of vitamin A supplementation, de-worming, immunizations and nutrition screening). With the current high LLIN coverage rates in communities, new distribution strategies are required to provide LLINs to households

not previously covered (due to population growth or resettlement) and replace ‘lost’ LLINs no longer providing protection (i.e. due to wear and tear or loss of insecticidal residual activity).

Mechanisms for LLIN distributions are largely through campaigns, including distributions during emergencies such as floods, droughts, epidemics and conflicts. The core approach for LLIN distribution is to integrate in the future with the expanding Health Extension Program (HEP) to ensure a continuous supply of LLINs at the village level for the coming years, with HEWs and their network of Voluntary Community Health Workers (VCHWs) identifying families in need of having their LLINs replaced. HEWs have LLIN registers with information on when and how many LLINs were previously provided to each household in their villages. The information is then forwarded to the national HEP database managed at FMOH and RHB level.

There will be an estimated national LLIN gap of about 6.75 million in 2011, including an estimated a gap of 2.4 million for Oromia. The 1.9 million LLINs PMI will procure and distribute in FY2011 will significantly contribute toward closing the gap for 100% LLIN coverage in Oromia (**Table 3**).

Table 3. ITNs (LLINs) Gap Analysis for Ethiopia FY 2011 .

	<i>National</i>	<i>Oromia</i>
Total ITNs in country as of 2009 (best estimate)	20,502,898	6,717,454
Total ITN's needed annually to support new pregnancies and births	2,940,524	1,028,160
Total ITNs needed to replace nets distributed in 2005	4,243,157	1,020,600
Total requirement for ITNs to Reach 100% coverage in 2010*	12,299,809	4,029,840
Number of ITNs in 2010 from other funding sources	6,748,115	2,210,914
Remaining ITN gap for 2010	6,748,115	2,410,914

* The FMOH target is to cover all households in malarious areas with, on average, two LLINs per household.

Taxes and tariffs and registration for commercially-imported LLINs: In January 2008 the 5% tariff on ITNs was removed. However, none of the WHO Pesticide Evaluation Scheme (WHOPES) approved LLINs are registered for commercial importation and sale by local retailers. Efforts will be made to engage the national regulatory authorities to enable broader access to LLINs for those individuals and organizations – primarily in urban and peri-urban areas not targeted for the mass free distributions – who may want to purchase their own nets.

Progress During Last 12 Months

Between FY 2008 and FY 2010 PMI procured a total 3.4 million LLINs, which were distributed primarily through the HEWs in Oromia. Distribution of LLINs was based on an Oromia-wide micro-plan developed by the PMI implementing partner UNICEF in collaboration with the ORHB. This micro-plan includes district and kebele level data about number of malaria cases and key malaria commodities including ACTs, chloroquine, LLINs and insecticide (see **section J.2.**). For example, for LLINs each micro-planning meeting included records of the number of LLINs previously distributed that were more than three years old and which need to be replaced. The micro-plan projects the 12-month need and gap of

LLINs based on district-level malaria and LLIN data. Thus, the number of replacement LLINs in all malaria-affected kebeles was calculated. In addition to replacement LLINs, the number of “gap filling” nets was calculated by quantifying the number of new households (resulting from immigration and population growth rates) and malaria affected households that never received nets in previous distributions. The micro-plan data now serves as a model ‘best practice’ for other regional states, as it helped streamline and coordinate the commodity procurement and distribution process as well as allowing for tracking of commodity distributions. The ORHB and UNICEF also used the micro-plan to distribute with PMI support 475,000 LLINs in Oromia procured by the World Bank.

In May 2010, 35,000 LLINs were distributed by a U.S. Army Civil Affairs team (Combined Joint Task Force for the Horn of Africa, CJTF-HOA) to a population of 93,000 in Dollo Mena District, Bale Zone, Oromia. The civil affairs teams with local volunteers helped to properly install nets in the sleeping areas of the households, which was complemented by IEC/BCC activities on the correct use of LLINs. A pre- and post-hang-up survey was carried out to assess the added value of the hang-up campaign in terms of household malaria knowledge and LLIN use; data are currently being analyzed.

Proposed Activities for FY 2011 (\$12,850,000)

- **Procurement and distribution of LLINs** (\$12,750,000): Due to the pressing need in covering the LLIN gap from 2009 onwards, PMI will increase its support for procurement and distribution to 1.9 million LLINs in FY2011. The LLINs will be distributed free through a range of distribution channels including health facilities and HEWs, schools and churches, and NGOs. In addition to the LLIN procurement and distribution, PMI will also in collaboration with the FMOH and other in-country stakeholders be developing an LLIN replacement strategy.
- **Hang-up campaigns** (\$100,000): In FY2011, PMI will continue to support LLIN hang-up campaigns in selected districts; districts will be selected following discussions with the ORHB and CJTF-HOA.

H.2. Indoor Residual Spraying

Background

IRS has a long history in Ethiopia, and remains a key component of the national malaria control strategy. As detailed in previous MOPs, DDT has been the primary insecticide used for IRS from the start of the program until the spray round of 2009, except in some areas where malathion was sporadically used.

Following the decentralization of the vertical malaria control program, IRS operations are now implemented in communities targeted for spraying within each district. Selection of communities for spraying is based on the history of malaria cases, altitude, and the presence of nearby anopheline breeding sites and agriculture and water development practices. The same communities are often repeatedly selected for IRS because of continued high numbers of suspected malaria cases or other situations conducive to high transmission. It is believed that epidemics may be triggered when focalized *An. arabiensis* breeding in temporary rain pools and *An. pharoensis* breeding in lake margins and river beds spread with the onset of the rains.

Prior to PMI funding to Ethiopia, many targeted areas went unsprayed. Thus, of the 3,932 kebeles classified as malarious in Oromia in 2007, only 953 of the 1,407 kebeles designated to be sprayed were actually sprayed, mostly because of lack of operational funding. In FY 2011, it is expected that the number of villages covered by IRS will increase for two reasons: (i) PMI will support spraying 600,000 structures (approximately 375,000 households); and (ii) increased efforts of the FMOH to provide funds to scale-up IRS coverage in targeted areas from 30% to 90% by 2013. Following PMI and WHO

supported work demonstrating high levels of DDT resistance throughout the country, the FMOH decided to discontinue use of DDT for IRS operations. Deltamethrin is currently the insecticide used in 2010 operations, with carbamates (bendiocarb) recommended for IRS use in areas of pyrethroid resistance and in areas where malaria outbreaks occur. The FMOH now acknowledges that a long-term insecticide resistance strategy is crucial to ensure continued efficacy of IRS in Ethiopia. Spraying is conducted by contract spraymen (i.e. not by women) who receive six-day training; it is implemented by squads of four spraymen and a porter, supervised by a squad leader. Squad leaders may be either contracted workers or employees of the district health department. Each district employs approximately five spray squads during a 40-day period immediately prior to the start of rainy season or before the start of main transmission season depending on the residual life of insecticide used. Limited motorized transportation requires spray teams to camp in the vicinity of spray operations and to use mules when vehicles are unavailable or access is difficult by road. Ten to thirteen houses are sprayed per day by each IRS sprayman using 8-liter Hudson X-Pert[®] sprayers.

Challenges and limitations to IRS identified in the national malaria strategic plan include the timing and quality of IRS, development of resistance in vector populations, particularly DDT, limited funds for insecticides, pumps and spare parts, vehicles and operational funds, re-plastering of houses, and the need to improve environmental compliance. Although the Global Fund is providing funds for FMOH-led IRS training in many of the targeted districts, there is a critical need for expansion of training for effective and environmentally compliant implementation of IRS.

Insecticide availability and use: Ethiopia has a Supplemental Environmental Assessment (SEA) for insecticides. In 2009 the SEA was expanded to include all four WHOPES-approved classes of insecticides, i.e. organochlorines, organophosphates, carbamates and pyrethroids. This will enable more flexibility in pesticide selection in efforts to mitigate the emergence of resistance to any one class of insecticide.

Adami Tulu pesticide processing plant: Since 2001, the state-owned Adami Tulu Pesticide Processing Plant in Oromia has formulated pesticides, including DDT, from imported technical-grade active ingredients. In 2009 the plant began formulating deltamethrin to be used for IRS. Further, the plant is preparing to formulate the carbamate propoxur and the organophosphate fenitrothion in 2010.

Insecticide susceptibility studies: As detailed in the previous MOPs, insecticide susceptibility tests were carried out, between 1986 to 1995, on 16 occasions in eight areas in the country. Resistance to DDT in six areas averaged 22% (range: 5% to 33%) with focal areas of high resistance to DDT. In two sites of Oromia in 2007, 96% and 22% resistance to DDT was shown in Gibe river valley and around Sodore (East Shoa zone), respectively. Resistance to pyrethroids is focal: 100% of mosquitoes were susceptible to 0.5% permethrin and 0.05% deltamethrin in Awassa, Anduse and Sabure, but 25% of *An. arabiensis* in Metehara were resistant to permethrin. Strengthening and expansion of insecticide resistance monitoring is a critical area of PMI-support. With PMI support, insecticide resistance monitoring studies were carried out in 2008 and 2009 at 15 sites in Oromia on four classes of insecticides. High DDT resistance in the local populations of *An. arabiensis* was observed at five sites in Oromia in 2008; there also appeared to be decreased susceptibility to deltamethrin. Based on these preliminary results the FMOH recognized the need to intensify and expand testing nationwide. PMI supported resistance monitoring in ten sites in Oromia and WHO organized resistance monitoring in nine sites in five other regional states in 2009. From 2008 and 2009 monitoring resistance to DDT was between 15% and 100% in 24 sites; there is some indication that resistance is associated with areas that has continuous exposure to DDT. Deltamethrin resistance ranged from 5% to 76% in 20 sites, with resistance being greater than 20% in 12 sites. Resistance to malathion ranged between 1% and 60% in 17 sites, with greater than 20% resistance in four sites. Bendiocarb resistance ranged between 0% and 48% in 17 sites, with two sites reporting greater than 20% resistance. No resistance was found against primiphos-methyl in four sites. While the epidemiological significance of these test results is not yet known,

the FMOH decided to discontinue using DDT. An interim decision was made to use deltamethrin for 2010 IRS activities in areas where resistance to deltamethrin is low and or not known. For epidemic response and areas with high deltamethrin resistance, bendiocarb was recommended. Residual efficacy data is being collected on deltamethrin WP and WG, bendiocarb WP and primiphos-methyl CS.

Larval source management: In addition to IRS, the FMOH and ORHB have spent considerable efforts on larval control, targeting 25% of vector breeding grounds for elimination by community participation, with the remaining 75% of positive breeding sites to be treated with insecticides (usually the organophosphate insecticide temephos) by trained health workers. Larval control has been implemented in several areas including urban and semi-urban areas, refugee camps, development projects and irrigation schemes areas. Environmental management had been the main vector control strategy in most urban areas of Oromia, despite any documented evidence of efficacy. In Oromia, between 2002 and 2007, more than 900 km² of breeding sites were either filled or drained. In spite of these efforts, there had been very little capacity to effectively target, monitor and evaluate these activities.

The FMOH and ORHB recognize the challenge of determining productivity of breeding sites and documenting the impact of larval control. The ORHB has also identified low community participation as a barrier to the larval control efforts. Responding to this need, the USAID IVM project supported an assessment visit in September 2008 to evaluate the feasibility of larval control in Oromia. The main habitats sampled during this visit were bottom valleys of Welenchiti, the sugar plantations in Wonji and the pits, pools and ponds in rural Zuway. Although malaria prevalence is likely to be high around the bottom valleys of Welenchiti, it was deemed logistically difficult to control larvae in such large flooded large areas. On the other hand, the sugar estate and Zuway had small-sized breeding sites which were readily accessible. Plans are currently being developed to support further investigations into the efficacy and effectiveness of larval source reduction in these areas. This has also become more urgent with the potential inclusion of larval control as a component responding to the challenge of insecticide resistance in adult mosquitoes (see above). Moreover, the FMOH's decision to include larval source reduction and environmental management in the new 2011 guidelines for community-level health extension workers will ensure that the above PMI-supported work will assist in advising the FMOH where and where not larval source reduction is effective.

Progress During Last 12 Months

PMI's IRS activities are fully integrated within the FMOH's national malaria prevention and control strategy and fully coordinated with FMOH and ORHB. PMI provides support to IRS operations at three levels in Ethiopia: national, regional and in selected, highly malarious zones of Oromia (**Table 4**). At the national level, PMI uses existing working groups to support the FMOH, including in the development of guidelines, policy and strategy as well as technical assistance for operations, IRS equipment and entomological monitoring. In Oromia as a whole, PMI supports procurement of insecticide needs, annual IRS micro-planning, training workshops, and some operational funds for implementation and supervision. The difference in the districts specifically targeted by PMI (FY2008 / 2009: 23; FY2010: 30) is that, in addition to the support provided to Oromia as a whole, PMI provides the complete costs for equipment, IRS operations and environmental compliance.

Table 4. Levels of PMI Support for IRS activities in Ethiopia.

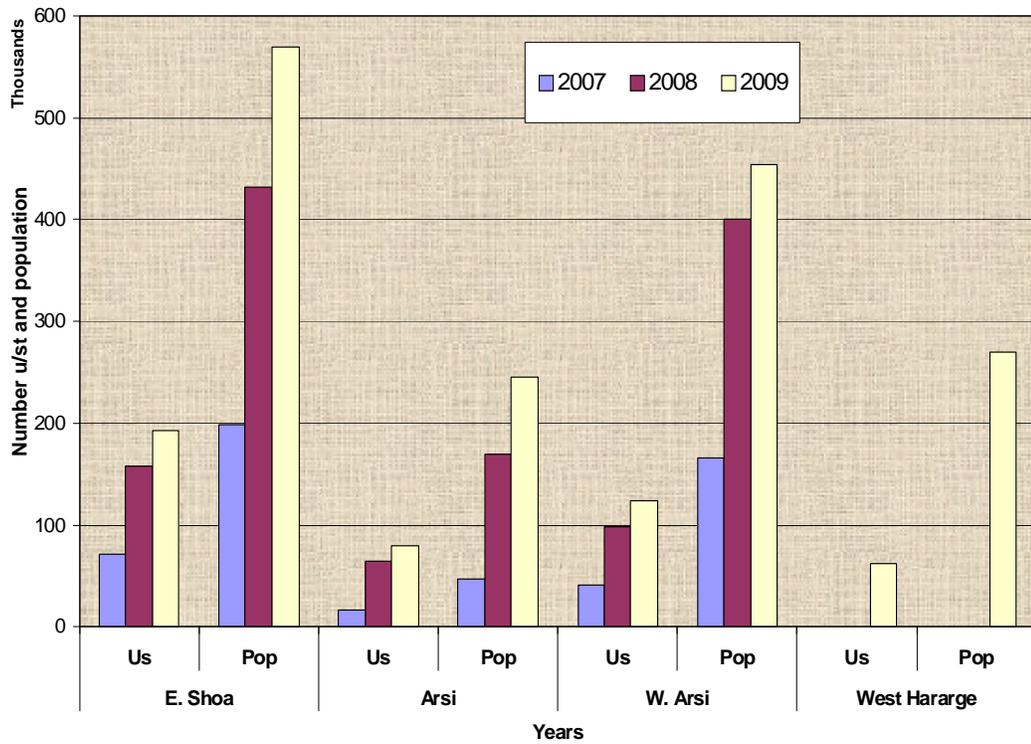
<i>National Level</i>	<i>Regional (Oromia) Level</i>	<i>Targeted Zones</i>
<ul style="list-style-type: none"> - Policy technical assistance, including development, review, or modification of in-country guidelines; - Training workshop, e.g. spray pump maintenance; - Technical assistance in procurement of IRS equipment and environmental compliance; - Rehabilitation of Adama Malaria Reference Training Center. 	<ul style="list-style-type: none"> - Micro-planning to assist ORHB to assess IRS gaps and needs; - Training for spray pump maintenance; supervision of IRS activities; entomological monitoring; - Procurement of insecticide / provide partial operational funds; - Technical assistance in procurement of IRS equipment and environmental compliance. 	<ul style="list-style-type: none"> - Micro-planning to assess gaps and needs for IRS in PMI target districts; - Training for spray pump maintenance; supervision of IRS activities; <i>plus</i> spray operator training - Procurement of insecticide and IRS equipment - Entomological Monitoring - Implementation and supervision of IRS operations; - Environmental compliance.

While the PMI supported entomological monitoring activities are focused on the 30 target districts, they are representative of the entire Oromia Regional State, and complement activities that the FMOH will initiate in all other regional states of the country with Global Fund support. Before PMI began work in Ethiopia, there was no routine entomological monitoring at either regional state or national level. The assessments conducted between 2008 and 2010 were led by staff from the PMI implementing partner with technical support from PMI and CDC and included field staff from the districts. Laboratory testing for resistance was conducted through an agreement with faculty from the Pathobiology Department of Addis Ababa University.

In FY 2009 PMI completed a SEA for the use of all classes of IRS insecticides. In FY 2009 and FY 2010, PMI supported the purchase of 1,200 spray pumps and spare parts kits, personal protection and other minor equipment (e.g. camping equipment) for 1,500 spray operators for IRS activities in up to 30 districts of five administrative zones (i.e. East Shoa, Arsi, West Arsi, West Hararge and Jimma) that historically accounted for 40% of the malaria in Oromia. Insecticide for IRS was procured by non-PMI USAID/Ethiopia funds from FY2006 and FY2007 (i.e. DDT for FY2008 and FY2009 IRS activities) or provided by the FMOH (i.e. deltamethrin for FY2010 activities). Evaporation tanks to contain insecticide waste were constructed in those districts targeted for IRS by PMI. A total of 50 staging areas and camping sites were identified in 30 districts for triple-rinsing and evaporation tanks to capture waste-water. Based on the shift from DDT to other insecticides for IRS, some of the evaporation tanks were modified to soak pits and new soak pits were established for the new seven districts supported by PMI. A mid-spray campaign environmental compliance inspection highlighted the need for improved storage facilities at the district level, separate training for storekeepers, and stronger supervision. Accordingly, rehabilitation of 30 district storage facilities, including the seven new districts added since FY2009, was completed.

The FY 2010 IRS target was 600,000 household structures, but when spraying took place in these districts, 670,221 structures were found. Of these, 646,619 (96.5%) were sprayed protecting just over 2.1 million residents. Training of IRS trainers was provided to 259 persons who in turn trained 1,841 spray operators and 1,144 door-to-door mobilizers. PMI support significantly increased the structures sprayed and population protected in the target zone districts in 2008, 2009 and 2010 when compared to the spraying activities conducted by the ORHB in 2007 (**Figure 5** and **Table 5**). In addition to the districts where PMI covered the complete costs and management of the IRS operations in FY2009 and FY2010, the ORHB used insecticide supplied by USAID/Ethiopia, but provided its own equipment and operational costs to spray an additional 1.5 million structures, protecting nearly five million persons in Oromia.

Figure 5. Household structures sprayed and population protected in 2007 (ORHB) and 2008 - 2009 (PMI).



Note. Pop, population structure; Us, household unit structures

Table 5. Comparison of household structures sprayed FY2008 – 2010.

Zone	District	FY2008		FY2009		FY2010	
		HH structures sprayed *	Coverage (%)	HH structures sprayed *	Coverage (%)	HH structures sprayed **	Coverage (%)
East Shoa	Adama	22192	84	28,061	93.3	29667	95.0
	Adea	12535	97.4	20,685	93.4	23377	96.9
	Adami Tulu	18514	93.5	29,822	92.4	38766	96.9
	Akaki	6087	96	13,752	96.9	14080	98.1
	Boset	23569	94.9	21,365	91	23925	99.1
	Bora	10052	90.2	12,797	88.8	16770	98.0
	Dugda	14749	87.3	17,654	89.1	17476	88.3
	Fentale	9848	68.4	15,017	76.5	19265	90.3
	Gimbichu	ND	ND	2,410	99.6	2490	99.4
	Lume	14959	93.1	10,995	65	17082	92.0
	Liben Chukala	20715	92.4	20,251	91.9	24923	100.0
	Zone Total	153220	89.51	192,809	88.7	227,821	95.7
Arsi	Dodota	17027	96.3	18,727	95.1	20955	98.3
	Jeju	18578	96.1	12,566	97.3	14186	99.8
	Merti	7872	97.8	15,564	91.5	17729	98.0
	Sire	8460	96.4	8,825	94.7	9621	94.8
	Zuway Dugda	12955	92.6	23,891	93.9	28301	97.5
	Zone Total	64892	95.68	79,573	94.3	90,792	97.1
West Arsi	Arsi Negele	36252	93.8	34,406	96.8	35952	98.2
	Shashamene	22798	91.9	41,306	96.4	28565	95.0
	Shala	21602	99.1	22,583	91.4	27926	94.2
	Siraro	18065	89.1	26,188	90.4	35085	95.1
	Wondo	ND	ND	ND		13843	95.7
	Zone Total	98717	93.54	124,483	94.2	141371	95.9
West Hararge	Miesso	ND	ND	24,282	91.8	22714	89.4
	Chiro	ND	ND	25,745	94.2	30887	96.2
	Anchar	ND	ND	12,510	97.6	12554	96.6
	Zone Total	-	-	62,537	93.9	66155	93.8
Jimma	Sokoru	ND	ND	ND	ND	15,446	99.0
	Omo Nada	ND	ND	ND	ND	28,600	97.8
	Tiro Afeta	ND	ND	ND	ND	22,155	99.4
	Kersa	ND	ND	ND	ND	22,161	95.7
	Seka Chokorsa	ND	ND	ND	ND	17,897	98.9
	Shebe Sombo	ND	ND	ND	ND	13,056	99.7
	Zone Total	-	-	-	-	119,315	98.2
Grand Total		316829	91.96	459,402	91.8	646,619	96.5

Note. ND, districts were not targeted for PMI-supported IRS activities.

Proposed USG component for FY2011 (\$9,225,000)

FY 2011 PMI support for IRS operations in Oromia is expected to be at the same level as in FY 2010, i.e. targeting about 600,000 structures. There will, however, be changes in the approach. After receiving support during three rounds of spraying, some of the districts (see **Table 5**) have developed sufficient technical expertise, and possess adequate environmental compliance facilities, storage, equipment and supplies. Consequently, some of these districts will “graduate” (based on discussions and priorities of

ORHB) and continue IRS implementation on their own, i.e. with regular ORHB and minimum PMI support; PMI support will be limited to insecticide, transportation and/or operational costs. This will allow PMI support to expand to new districts and zones in Oromia. As there is a shift from DDT to other more costly classes of insecticides, more funding is required for the insecticide procurement. Training on IRS techniques, environmental compliance and use and maintenance of spray pumps will be provided to districts beyond those 30 districts –including to national level– receiving comprehensive support for IRS operations. The exact levels for each component, as well as the balance between support for the ‘complete package’ in 30 districts and partial support for operations in other districts will be determined after evaluating the FY 2010 IRS operations, which should be completed by October 2010.

- **Procurement of insecticide** (\$3,600,000): Insecticides are budgeted at \$3,600,000 for FY 2011. The exact allocations and specifications of insecticides will be adjusted upon completion and review of the FY 2010 IRS activities.
- **Procurement of IRS equipment and supplies** (\$1,750,000): Additional spray pumps, spare parts kits and replacement personal protective equipment will be procured in FY2011. The equipment will be for both new districts that will be included in PMI-supported IRS activities as well as replacing equipment in districts currently targeted for PMI-supported IRS activities. The exact allocations between equipment and insecticides will be adjusted upon completion and review of the FY2010 IRS activities.
- **IRS operations:** (\$2,750,000) In FY 2011, PMI will continue to support the ORHB in planning, implementation and evaluation of IRS in Oromia. The target number of structures in districts provided full support will be approximately 600,000, roughly the same as FY 2010. In addition it is expected in FY 2011 support for operations will be spread more broadly to other districts beyond the five zones covered in FY2010.
- **IRS training** (\$100,000): In FY2011, PMI will support in-service training at federal and regional levels to increase the FMOH’s and RHB’s capacity in planning and management of IRS operations, environmental compliance and poison control.
- **Entomological capacity building and monitoring services** (\$400,000): Results from past years indicated the need for expanding entomological monitoring, which includes vector identification, density and insecticide resistance status from the original four sites sampled in January 2009. PMI has completed resistance monitoring in ten sites in FY 2010. In FY 2011 resistance monitoring will expand to 15 sites (including five sites from FY 2010 and ten new sites), with activities being implemented by the PMI implementing partner with assistance from Addis Ababa University, Jimma University and the Ethiopian Health Research and Nutrition Institute (EHNRI). Technical support will be provided to coordinate entomological monitoring activities implemented by the FMOH in sites beyond Oromia (through Global Fund Round 8 support).
- **Pesticide management of IRS operations** (\$375,000): Continued support will be provided for expansion of the SEA and improved pesticide management within the current IRS operations. PMI will support an assessment to establish the inventory of insecticides at district, zonal and regional level; the procurement of mobile incinerators for disposal of insecticides currently used in IRS; and the development of a plan to dispose of the expired DDT at various levels.
- **Environmental compliance monitoring** (\$50,000): In FY 2011, an external environmental compliance assessment of Ethiopia IRS activities will be performed. Insecticide production,

distribution, use, storage and disposal as well as insecticide tracking systems and/or tools will be monitored.

- **Integrated Vector Management** (\$200,000): In FY 2011, support will be provided to help the GoE develop an IVM strategy and to conduct operational research for the ongoing investments in larval source reduction. Support to a comprehensive IVM program will include a needs assessment to identify policy, managerial and human resource needs followed by technical support for improving policy, legislation and institutional arrangements, capacity-building and integration with other vector-borne diseases in Ethiopia. Confirmation of significant insecticide resistance in parts of Oromia indicate an urgent need for resistance management efforts, including sound integration of complementary interventions to augment the current IRS and LLIN programs. The second part of this activity, will be for technical support and operations research on evaluating the efficacy and feasibility of larval source reduction in Ethiopia. A protocol has been submitted to the PMI Operational Research Committee.

H.3. IEC/BCC and support to community-based organizations

Background

Communications with families, community-based networks and health posts are an essential component of PMI support of IEC/BCC activities. The GoE has made a large investment in building and equipping of health posts and training of HEWs, who are meant to focus on community health prevention services and messages. PMI-funded IEC/BCC activities are supporting these HEWs with communications materials and training.

IEC/BCC is implemented as a unified element to support the ORHB Health Education Unit and the FMOH's Health Education Extension Center. IEC/BCC activities provide malaria-specific materials through a wide range of community-based organizations, women's groups, churches, NGOs and other networks of civil society with materials and training. Several community-based organization networks work in the education and health sector, including the CORE Group (hosted by the Christian Relief Development Agency) and the Coalition against Malaria in Ethiopia (hosted by the Malaria Consortium).

PMI-funded IEC/BCC activities began in FY 2009. While the rapid scale-up in LLIN ownership has been impressive, Ethiopia does not have a tradition of net use. Key objectives for IEC/BCC are to increase community knowledge regarding malaria diagnosis, treatment, and control, especially relating to (i) the establishment of a culture of correct and consistent LLIN use; (ii) increased community awareness about the effectiveness of IRS and the need to reduce re-plastering of walls; and (iii) improving treatment-seeking behavior for fever.

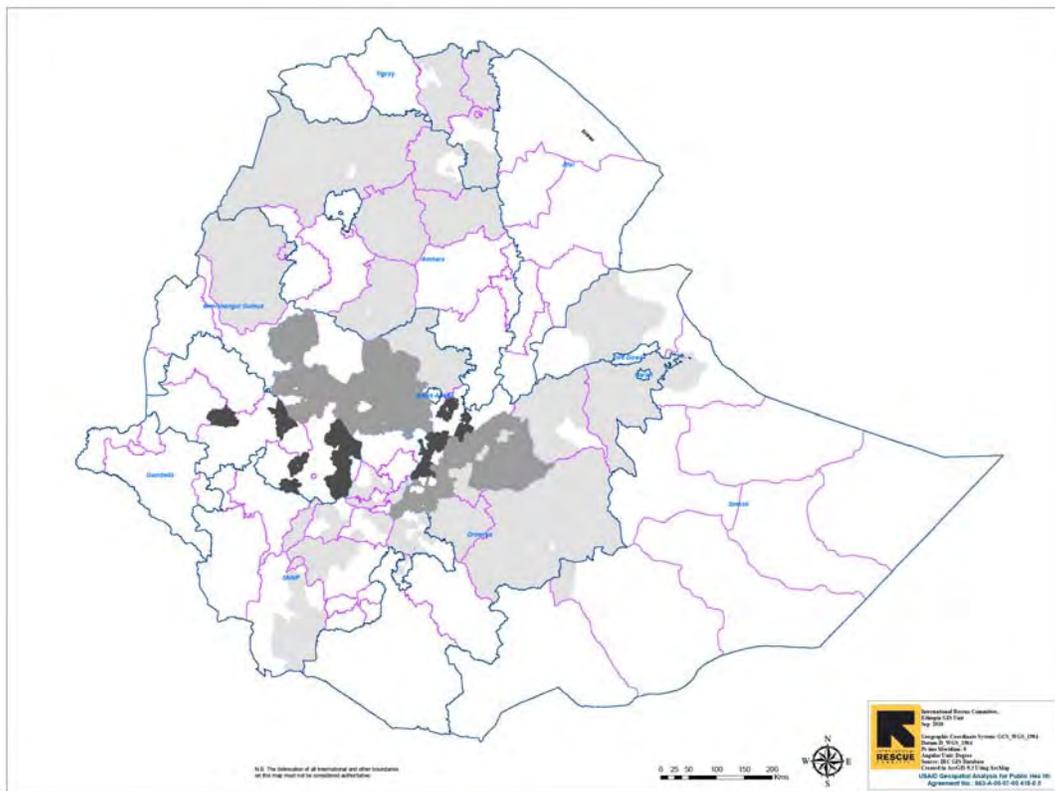
The MIS 2007 showed moderate use of LLINs (at altitudes <2,000 m, 60% of children in houses that owned at least one ITN slept under the net the previous night; similarly, at altitudes <2,000m, 66% of pregnant women in houses that owned at least one ITN slept under the net the previous night) (see **section E**). In a separate household survey, LLIN use was shown to be significantly associated with whether households had been sprayed with insecticide, received LLINs for free, LLIN age and shape. Thus, for example, use of LLINs was 1.6-fold (95% C.I. 0.6 – 3.4) greater in households that owned conical nets compared to those that owned rectangular nets. Nets that were paid for were more likely to be used than free nets (76% vs 63%), and net-owning households that had their house sprayed in the past year were more likely to have had at least one person sleep under a net the previous night than households that had not been sprayed. (81% vs 70%).

To date, efforts to improve LLIN use have employed a mix of communication channels, including mass communications (particularly radio), print media, inter-personal and participatory communication methods. IEC/BCC materials for malaria have been developed by a range of in-country partners.

Progress During Last 12 Months

In FY 2009, PMI supported the formation of a malaria IEC/BCC stakeholder partnership (i.e. the Malaria BCC Task Force), which works with stakeholders on IEC/BCC message harmonization and standardization of operational and research protocols. Through a series of meetings, the task force developed and agreed to four essential malaria actions for a person to take. PMI-funded collection of baseline data on the gaps in malaria IEC/BCC information in Oromia; developed malaria IEC/BCC training materials; and finalized a strategy for large-scale roll-out of those malaria IEC/BCC activities. The strategy combines various IEC/BCC approaches, including mass media, focus group discussions, and community conversations targeting either communities as a whole, individual households or specific target groups (e.g. school children), and is currently being implemented in more than 200 districts of Oromia. Materials developed with PMI funding are also being used by other USAID/Ethiopia implementing partners as well as Peace Corps Volunteers, and CJTF-HOA (**Figure 6**).

Figure 6. Geographical coverage of PMI-supported IEC/BCC activities.



Note. Light grey areas: IEC/BCC activities are integrated into a project platform implementing maternal, newborn and child health; family planning; and reproductive health activities at community health post level. Medium and dark grey areas: IEC/BCC activities are implemented through a combination of community conversation, household-level visits and focus group discussions. All areas are reached by IEC/BCC messages disseminated via mass media.

Proposed USG Component for FY 2011 (\$2,000,000)

PMI is currently conducting a review of its strategy for roll-out of IEC/BCC interventions. The most critical aspect of this review is the effort to ensure that IEC/BCC activities have sufficient population coverage in Oromia to reach the PMI target of 85% coverage of the most vulnerable groups. This review is intended to focus on areas of coverage, targeting the areas in Oromia with the highest reported malaria prevalence. Given the remoteness of many of districts in Oromia, and the reported high rates of radio use, PMI will seek to make use of radio programs to deliver malaria messages and work through a wide range of implementing partners and in-country stakeholders to deliver those messages. Additionally, PMI will continue to provide IEC/BCC materials developed to other implementing organizations, so that reach of these materials can be maximized.

- **IEC/BCC (\$1,500,000):** In FY2011, PMI will continue to support the implementation of malaria-specific IEC/BCC messages through a range of different channels, including mass media, community conversations and house-to-house visits. In FY2011, PMI will also support the dissemination of those messages beyond Oromia into all regional states of the country and trainings on IEC/BCC and developed materials will be given to FMOH staff from all regional states and zones as well as from partner organizations (see below). Partners will be trained in the various IEC/BCC approaches, how to disseminate the messages, and how to measure their impact in terms of malaria knowledge and behavior change.
- **IEC/BCC – other platforms (\$500,000):** Materials that have been developed with PMI support will be translated into all major languages of Ethiopia, reproduced and disseminated through a variety of platforms, including PeaceCorps Volunteers, CJTF-HOA, USAID/Ethiopia implementing partners as well as local CBOs and FBOs. Links with the private sector, specifically companies working in the agricultural sector, will be established, and IEC/BCC messages will be distributed to these companies.

H.4. Malaria in Pregnancy Including Intermittent Preventive Treatment (IPTp)

Background

Ethiopia has a relatively low antenatal care (ANC) coverage compared to other countries in the region. The DHS 2005 indicated that for Ethiopia as a whole, only 28% of mothers received care from a health professional for their most recent birth in the five years preceding the survey. Only 12% of women made four or more ANC visits during their entire pregnancy and only 6% make their first ANC visit before the fourth month. Furthermore, although pregnant women are at greater risk of infection and disease, overall they do not represent a sufficiently large proportion of the total number of malaria patients to warrant specific targeting of interventions. Hence, IPTp is not part of the Ethiopian National Malaria Prevention and Control Strategic Plan.

Therefore, the FMOH focuses more on scaling-up universal LLIN coverage and prompt diagnosis and treatment of clinical cases in pregnant women. Diagnostic and treatment guidelines for Ethiopia are currently under review, and these will contain recommendations regarding the use anti-malarial drugs during pregnancy. IEC/BCC messages in this regard will be formulated based on these guidelines.

Progress During Last 12 Months

Although IPTp itself is not part of the national strategic plan, in FY 2011 PMI is supporting maternal and perinatal protection from malaria with Focused Antenatal Care (FANC) Services and Safe Motherhood and Adolescent Reproductive Health through an emphasis on anemia management, distribution of LLINs

during ANC visits, and the diagnosis and management of acute malaria in pregnant women. PMI will also emphasize program integration and synergy with other GHI activities such as those supported by the President's Emergency Plan for AIDS Relief (PEPFAR). This will include ensuring that health providers counsel mothers on early detection of anemia and iron and folate supplementation, as well as the importance of using a LLIN during pregnancy and for the newborn. In FY 2010, PMI also supported a policy review of malaria in pregnancy and training and supervision support at the zonal level. Within the support for case management, there will be a focus on expanding and improving care for women with acute malaria. This activity will be closely coordinated with the PMI support for case management supervision.

Proposed USG component for FY 2011 (no additional funding required)

Expanding Malaria in Pregnancy services through safe motherhood and Focused Antenatal Care (no additional funding required): PMI will continue to collaborate and coordinate activities with USAID/Ethiopia family planning and reproductive health programs. PMI will ensure that malaria-specific updates for technical materials and guidelines are provided to other USG programs, including PEPFAR-funded activities focusing on the prevention of mother-to-child-transmission of HIV (PMTCT). PMI will also support pre- and in-service training for management of acute malaria in pregnant women (see below). Funding for these activities is included in **sections H.3.** and **I** of the MOP.

I. INTERVENTIONS: CASE MANAGEMENT

I.1. Diagnosis

Background

The low prevalence of malaria in Ethiopia, coupled with the mix of falciparum and vivax malaria, point to the need diagnostic testing for all suspected cases of malaria prior to initiating treatment. PMI, therefore, has moved quickly to support the scale up of high quality diagnostic testing for malaria at both health facility and community levels in Ethiopia. Current treatment guidelines recommend microscopic examination of all clinically-suspected malaria cases presenting to hospitals and health centers. At health posts and health centers where microscopy is not available malaria RDTs are used to confirm the diagnosis.

Progress During Last 12 Months

After a baseline laboratory assessment conducted at 69 health facilities in 2009 identified a number of areas that would benefit from strengthening, PMI supported the NMCP and EHNRI, to develop a National Diagnosis and Monitoring Policy Guideline and standardized training materials for laboratory staff. PMI also supported the development and publication of updated quality assurance guidelines, which include standard operating procedures, job aids, supervision checklists, and procedures for cross-checking blood slides from facilities. These guidelines have been disseminated to regional health authorities and facilities throughout the country.

Implementation of the national guidelines is now underway. With support from PMI, 57 health facilities in five zones in Oromia (i.e. East Shoa, Arsi, West Arsi, Jimma and West Hararge) have received new microscopes, centrifuges (for micro-hematocrit measurement) and updated laboratory registers. Their staff have been given refresher training and are receiving regular technical supervision. Activities are also underway to strengthen the three Oromia regional reference laboratories in Adama, Jimma and Nekemte.

In 2009, PMI also supported a comparative assessment of the accuracy and usability of three different

brands of multi-species RDTs. The results of the study were also instrumental leading the FMOH to decide to shift from single-species to multi-species malaria RDTs. This has enabled health workers to assess differentiate non-falciparum malaria from those who do not have malaria, thereby reducing the overuse of antimalarial drugs and improving the management of other causes of fever. Based on the results of this study, PMI supported the procurement and distribution of 1.68 million multi-species RDTs, which are now being used by HEWs and in some other health facilities to diagnose malaria in Oromia. At the primary health care unit level, the malaria diagnosis and treatment protocol has been incorporated into the integrated community case management of fever guideline for HEWs and the national Integrated Management of Newborn and childhood illnesses package for health workers.

Proposed USG component for FY 2011 (\$5,800,000)

In FY 2011, PMI will build upon the successful initial phase of implementation and scale-up its strengthening of diagnostic testing for malaria to a total of 113 facilities in 10 zones of Oromia. Support to the regional reference laboratories will be accelerated and expanded beyond Oromia. PMI will also increase procurement of RDTs as diagnostic testing for malaria continues to scale up.

- **Support for quality assurance system for microscopy and RDTs** (\$970,000): Technical and programmatic support to health facilities laboratories and HEWs will be scaled up to 140 facilities in 10 zones of Oromia. Additionally operational support will be provided to the 12 regional reference laboratories in Ethiopia as well as major regional hospitals. This will include support for refresher training, supervision, other QA/QC activities, and program monitoring.
- **Technical assistance for quality assurance of diagnostic testing** (\$30,000): Technical support and oversight from international experts in malaria laboratory diagnosis will be provided to the implementing partner in Ethiopia to assure that internationally-accepted best practices are being implemented and that diagnostics strengthening activities are of the highest possible quality.
- **Procurement of RDTs** (\$4,500,000): Approximately 6 million multi-species RDTs will be procured and distributed to health facilities, specifically health posts. As determined through an extensive malaria commodity micro-planning exercise (see **section J.2.**). This will meet the entire projected needs for Oromia. Additionally, PMI will provide an allocation of RDTs to the FMOH to fill gaps in RDT requirements in other parts of Ethiopia, including in refugee camps along the Sudanese and Somali borders. RDTs will be tested for quality at accredited laboratories following standardized protocol prior to shipment to Ethiopia
- **Procurement of lab equipment/supplies** (\$300,000): PMI will support further procurement of 250 laboratory kits to provide essential supplies and reagents to laboratories that conduct malaria microscopy. In addition, based on an assessment that will take place in those facilities that will be added to receive PMI support in FY2011, 50 additional microscopes will be procured for those facilities that lack one that is functional.

I.2. Pharmaceutical Management

Background

To address the multiple problems (e.g. commodity bottlenecks, stock-outs, expiry) observed in all layers of the national drug management system, the FMOH, in 2005, developed a PLMP and later created the Pharmaceutical Fund and Supply Agency (PFSA). Under this new plan, there was a radical redesign of the governance, policies, and infrastructure of the existing logistics system, including the establishment of

drug distribution “hubs” to directly supply health centers, health posts, and hospitals. Because of its complexity and cost, the new system has been slowly implemented and essential commodities are still being distributed based on existing donor-supported systems. For malaria, UNICEF still procures and distributes the bulk of malaria commodities (i.e. ACTs, chloroquine, RDTs, and LLINs), including those funded by the Global Fund and PMI. For Oromia, UNICEF also supports the annual quantification of malaria commodity needs to the district level through a series of zonal level micro-planning meetings where malaria commodities’ consumption, needs and gaps are discussed and which results in the region-wide malaria commodity microplan.

The Ethiopia DACA is responsible for establishing and implementing quality assurance systems for the country, including drug registration, overseeing the safety of imported medicines, and post-marketing drug quality monitoring.

Progress During Last 12 Months

In late 2008, PMI funded a situational analysis of malaria, tuberculosis, and HIV drugs in all regional states of the country, with a special focus on Oromia. For malaria, there were serious shortages and stockouts of ACTs (especially child doses) and chloroquine (drug of choice for *P. vivax*); expired drugs; weak inventory control tools; inadequate medication records; and poorly organized and inadequate storage facilities. Based on this assessment, PMI supported the development of standard operating procedures and forms for the quantification, requisition, drug exchange/transfer and management of malaria commodities. A new medication record was also designed.

In addition, PMI began improving malaria commodity management in 66 health centers and 20 health posts in Oromia through improved training and supervision. During FY 2009 and FY 2010, PMI expanded this malaria commodity management program to 200 health centers and additional health posts. Malaria drug management data is now reported bi-monthly for all facilities, including availability and expiry of antimalarial drugs, staff availability and capacity, and accurate reporting of antimalarial drug consumption. The data allows for monitoring and tracking of PMI- and FMOH-supported distribution of malaria commodities to health facilities.

In support of DACA, PMI conducted a rapid assessment of Ethiopia’s pharmaceutical quality assurance system and established a post-marketing drug quality monitoring program in five locations in Oromia, including the establishment of drug testing mini-labs and the training of DACA staff on drug sampling and testing. The first and second round of drug sampling was completed and the laboratory confirmatory testing of the second round is ongoing. To date, the results of this monitoring program indicate that the number of antimalarial drugs / products available in the public and private sectors in Ethiopia is limited, with most drugs sampled passing the drug quality control testing. In FY 2010, PMI expanded the post market drug quality monitoring program beyond Oromia (including establishing two additional sentinel locations) and further improved the regulatory capabilities of DACA. PMI also ensured that the activities are coordinated with other USG implementing partners and in-country stakeholders in a context of a changing PLMP and the nascent establishment of the PFSA.

UNICEF supported micro-planning meetings with participants from all malaria-affected woredas and zones in Oromia in 2009 and 2010, to determine the requirements of ACT treatments and RDTs at district level. The main purpose of these micro-plans was to develop a “bottom-up” needs-based plan, where requirements are identified by staff at woreda (district) level based on practical needs, rather than the usual “top down” push system, where distributions are estimated at federal level (see **section J.2.**). The micro-plan is continuously being updated when distributions of commodities to the zones and districts occur. The updated micro-plan is being shared with PMI implementing partners so as to inform them

when commodities will and should be available in the locations of implementation (e.g. health facilities). Partners then report back to PMI if commodities are available or not.

Proposed USG component for FY2011 (\$1,200,000):

- **Strengthening of anti-malarial drug management** (\$950,000): In FY 2011, PMI will help sustain and expand the malaria drug management program from the present ~200 health centers covering approximately two-thirds of the malarious areas within Oromia to support for strengthening health systems and pharmacy logistics for PFSA involving all regional states of Ethiopia. The program will focus on:
 - Improving the management of malaria commodities, including quantification, requisition, drug exchange/transfer, and expiry tracking/disposal;
 - Improving the storage, organization, and security of drugs within health facilities and zonal/districts;
 - Promoting the rational use of malaria drugs by anti-malarial drug management training of central-level PFSA and health facility level staff in drug management, as well as through on-site supervisions;
 - Implementing the PMI end-use verification program, ensuring that anti-malarial drugs distributed through PMI funding support are available at facilities and reach beneficiaries.
- **Strengthening of drug quality monitoring** (\$250,000): In FY 2011, PMI will sustain and further improve DACA's drug quality assurance program by:
 - Supporting post-marketing drug quality monitoring in a minimum of seven locations, including at least two that are outside of Oromia;
 - Improving DACA's existing drug registration program through training, updating tools and procedures, and short-term technical assistance;
 - Strengthening DACA's quality control laboratory.

I.3. Treatment

Background

In Ethiopia, *P. falciparum* and *P. vivax* are the two dominant malaria species. Overall *P. falciparum* accounts for about 60% of the malaria, is implicated most often in epidemics and is responsible for most severe illness and death. Current treatment policy recommends AL as the first-line drug for the treatment of uncomplicated *falciparum* malaria and chloroquine for the treatment of *vivax* malaria. For infants <5 kg of body weight and pregnant women in the first trimester, oral quinine should be administered.

At the health facility level, malaria is suspected when a patient has a fever or history of fever in the last 24 hours and lives in or has travelled to an area with malaria transmission within the last 15 days. If microscopy (i.e. at health centers and hospitals) or RDTs (i.e. at health posts) are available, diagnostic testing should guide clinical management (see **section C.1.**). If microscopy or RDTs are not available, the health worker is instructed to assess for signs and symptoms of severe malaria. If these danger signs are absent, the guidelines recommend treatment with AL. If danger signs are present, the current guidelines instruct the health worker to administer a first dose of intramuscular or oral quinine and refer to the next level of the health system.

Because of poor access to health care, the FMOH embarked on an ambitious HEP in 2005, primarily funded by the Government of Ethiopia, the Global Fund, the Global Alliance for Vaccines and Immunization, and World Bank. The HEP was established to provide universal health coverage to the population of Ethiopia through building community-level health posts staffed by two, paid HEWs.

Between 2005 and 2009 about 15,000 health posts were built and staffed with 30,000 HEWs (see **section C.2.**).

Microscopy is not available at health posts and there are sometimes stock-outs of RDTs. Therefore, a substantial proportion of malaria cases are clinically diagnosed by the HEWs. Referral systems are weak and pre-referral treatment is not yet available. Currently the treatment guidelines are under revision and include a recommendation for HEWs to provide patients with severe malaria pre-referral treatment with rectal artesunate and refer to a higher-level facility.

Progress During Last 12 Months

With FY10 funding PMI is procuring 3.5 million ACT and 2 million chloroquine treatments. PMI has also supported the revision of existing malaria treatment guidelines. As part of this undertaking, the MCST which will address treatment algorithms, use of ACTs and other antimalarial drugs, as well as implementation strategies with particular emphasis on the challenges of malaria epidemiology in Ethiopia including seasonal and periodic malaria outbreaks. Topics to be addressed include the use of ACTs in pregnant women, and artemisinin derivatives for pre-referral treatment and for treatment of severe disease in health facilities.

As with other malaria commodities, despite Global Fund support, the national and Oromia commodity gap for ACTs will increase from 2011 onwards, and could severely undermine the continued efforts of the GoE to achieve its goal of universal access to timely diagnosis and treatment of malaria as well as efforts to respond to epidemics. With FY 2010 funding, PMI will focus its resources on filling the commodity gap for ACTs at the national level.

PMI also is working with the ORHB, FMOH and other implementing partners to support health worker training at both the health center and health post levels. PMI will also support an assessment of performance standards and the quality of the pre-service and in-service training; support in-service training programs for clinical officers and HEWs through the well-established Integrated Refresher Training Program, which is implemented by the FMOH in collaboration with UNICEF.

Continuous intensive supervision and monitoring is the key to improved clinical case management. PMI will support District Health Office staff providing monitoring and supervision of the health centers, and support health center staff in their monitoring and supervision of the health posts. This supervision is being integrated into established, USAID/Ethiopia-supported family planning/maternal, newborn and child health activities. The supervision will ensure that case management is implemented effectively and in line with FMOH guidelines. PMI, along with other partners, will assist in reviewing the quality and competency of the supervisors, and help support refresher trainings and other approaches, such as coaching, to further improve supervisors' capacity. This will include support to training materials and checklists as well as transportation and other costs to ensure the supervision is actually taking place. PMI will also support a quantitative/qualitative study to document the extent and nature of adherence to malaria treatment (including barriers and methods to improve adherence), which will help guide IEC/BCC approaches.

Proposed USG component FY2011 (\$6,500,000)

- **Procurement of ACTs (\$4,500,000):** PMI will support the procurement and distribution of 4,500,000 AL treatments, which matches the AL need for Oromia based on the district-level micro-plan as well as a contingency amount for national-level distribution by the FMOH in case of AL shortages and/or epidemic outbreaks.

- **Procurement of chloroquine, pre-referral treatments and drugs for severe malaria** (\$900,000): PMI will support the procurement and distribution of the entire estimated national need for chloroquine (i.e. 4 million treatments) and other antimalarial drugs, including drugs for severe disease and pre-referral care. Chloroquine, pre-referral treatment and drugs for severe malaria will be tested for quality at accredited laboratories following standardized protocol prior to shipment to Ethiopia.
- **Support for supervision and monitoring of malaria treatment** (\$600,000): Support to supervision and monitoring of malaria treatment at health facility level, i.e. primarily health centers and health posts, will be continued during FY 2011. This will include in-service training of health workers in up-to-date malaria case management guidelines, on-site supervisions and ensuring that case management reporting is complete and accurate. This PMI support is integrated into a wider USAID/Ethiopia project platform focusing on maternal and child health, reproductive health and family planning, and which is being implemented in 283 districts in 6 regional states of the country (approximately a third of the country). Whether in the event of an ‘epidemic year’ occurring or increased malaria morbidity and mortality, it is expected that the supervision and monitoring of case management activities will be sustained, so as to ensure that patients receive best-practice care.
- **IEC/BCC for case management** (no additional funding required - costs covered in **section H.3.**) In conjunction with IEC/BCC efforts for LLINs and IRS, PMI will continue to support the ORHB and FMOH to promote early care seeking, adherence to antimalarial drugs and other issues around case management, as part of a comprehensive capacity-building effort. Materials developed by PMI and the BCC Task Force will be made available to the FMOH and other partners for roll-out in the other regional states.
- **Case management pre-service training** (\$500,000) PMI will support integrated pre-service training of various cadres of health workers. Training will focus on the clinical and laboratory management of malaria (see **section M**).

J. EPIDEMIC SURVEILLANCE / MONITORING AND EVALUATION

J.1. Epidemic Detection and Response

Background

Malaria epidemics in Ethiopia have been documented since the 1930s. One of the most notable occurred between June and December 1958 and was responsible for an estimated three million clinical cases of malaria and 150,000 deaths. Since 1958, major epidemic years have occurred approximately every five to eight years. Guidelines for Malaria Epidemic Prevention and Control were published by the FMOH in November 2004. These guidelines detail the human vulnerability factors, including population movement as well as meteorological indicators such as rainfall, temperature and humidity that affect the occurrence of epidemics.

Epidemic detection relies on passive case detection of clinically diagnosed cases at health posts and health centers. In this system, the median weekly clinically diagnosed malaria cases over the previous five years are charted and plotted on a graph. If the current week’s numbers exceed the median of the past five years, the health worker is to report a potential epidemic. A rapid assessment team is then dispatched to confirm that an epidemic exists or is threatening, establish the cause and scale of the epidemic, and identify local capacity to deal with it. The guidelines recommend mass treatment with ACTs and

chloroquine for fever cases. A stock of 20% of ACTs is to be held at the regional level for epidemic response. If there is potential for continued transmission, IRS will be implemented. For this reason all districts with a potential for epidemics are advised to reserve a stock of insecticide for epidemic response and spraying operations would begin following either a three- or six-day training period for local spray operators.

Depending on the scale of the epidemic, additional spray pumps may be borrowed from neighboring districts, but, in general, spray operators are contracted locally. If the magnitude of the epidemic is beyond the capacity of the region, the FMOH can declare a national epidemic and request support from international communities and partners. An effective communication and reporting system between various administrative levels is critical for an appropriate response.

Resources allocated for epidemic containment are insufficient. Most districts have inadequate epidemic preparedness plans and lack sufficient contingency funds to respond. This prohibits effective containment of epidemics, particularly at the district level. Lack of skilled health personnel and poor coordination and management compounds the problem. The ability to detect and respond to epidemics is also restricted by limitations of the health information system. Recording and reporting school absenteeism to the nearest health facility on regular basis might provide evidence as to the burden of disease, and potentially the burden of malaria, in the community. Although District Health Offices and zonal health bureaus are instructed by national guidelines to have a 10-15% stockpile of malaria commodities, this is often not feasible due to planning and funding restrictions or increased clinical demand for these supplies.

In 2009, a Public Health Emergency Management system encompassing reporting from health posts, health centers and hospitals was established. It is envisaged that this weekly vertical reporting system will collect a host of malaria indicators. Malaria cases are reported by two age groups (under five and over five years of age) including clinical malaria (outpatient and inpatient), confirmed malaria by species, malaria in pregnancy, and severe malaria/anemia in those under five years of age. By 2010, this system had yet to be fully operational at regional and national scale.

Assuming that with improved IRS coverage and LLIN use, malaria transmission continues to decrease, the focus of malaria control will turn toward surveillance in order to identify the source with the aim of halting ongoing transmission. To this end, the recently developed FMOH National M&E Plan aims to achieve a high quality, broadly based malaria infection detection, investigation and response 'Surveillance System' to further reduce malaria transmission and improve the detection and timely response to malaria epidemics

Progress During Last 12 Months

PMI is providing support for the development of a strengthened Epidemic Surveillance and Response (ESR) system in Oromia at the community, district, zonal and regional levels. In order to detect epidemics quickly, PMI has started supporting strengthening of the alert system and health worker trainings for early epidemic detection in FY 2010.

Epidemic Detection and Surveillance Sites: In order to support the GoE's desire to support a high quality, broadly based malaria infection detection, investigation and response system, PMI supported the development of a strengthened ESR system in Oromia. Health facilities were purposefully selected based on the epidemiological profile of the catchment area and capture malaria indicators beyond the limited indicators collected in the HMIS. Designated health facility personnel responsible were trained in data collection and reporting. Data collection began in February 2010 at 5 sites, with five additional sites being established currently. Of note is that the sites in Ethiopia are not a single health facility; rather they are comprised of the so-called 'primary health care unit', i.e. one health center and its five satellite health

posts. By including health posts, we aim to understand how increases of malaria cases and epidemic outbreaks occur at the community and sub-community level, as well as piloting approaches documenting this process prospectively (e.g. by equipping health posts with digitized maps where health extension workers (HEWs) will be able to visualize occurrence of cases over time and providing HEW with cell phones to inform fluctuations in malaria case load and/or outbreaks). We also aim to understand how health centers become gradually affected by increases in cases numbers or epidemic outbreaks at (sub)community level. The sites' increased capacity in diagnostic capacity, data collection, reporting and analysis will enable us to monitor malaria trends prospectively, and yield a better understanding of malaria epidemiology as well as the burden it causes on the health system. It is envisaged that approaches and tools developed under this activity (e.g. HEW mapping of cases at community level) will then be scaled-up to regional and national level through an integrated USAID/Ethiopia health project platform (see below). PMI support complements Global Fund support for 40 epidemic detection sites that are being established by the FMOH outside of Oromia.

Proposed USG component for FY 2011 (\$500,000)

- **Epidemic Detection and Surveillance Sites** (\$300,000) In FY2011, PMI will continue to support a network of epidemic detection sites established in 2010. The sites will continue to comprehensively enumerate malaria morbidity, epidemiology, and diagnostic tests results, and inform improvements in malaria surveillance. Additionally, sites will provide crucial data on health service delivery and health systems, including health facility access, patient turnover, commodity availability and consumption. A comprehensive review of the epidemic detection site data and activities will be done in FY2012 to determine whether PMI will support this activity in the future.
- **Strengthening Routine Epidemic Detection and Surveillance** (\$200,000) With FY2011 funding, PMI will continue to strengthen the capacity of community-level HEWs and HEW supervisors to detect and respond to increases in malaria case loads or epidemic outbreaks at the community level by HEW and HEW supervisor training, integrated supervisions and regular field visits. The support uses a large USAID/Ethiopia's health project platform integrating Health, PEPFAR and PMI funds, including support for malaria case management supervision; the project is being implemented in 283 districts in 6 regional states (approximately a third of the country). The health centers and health posts that the project supports are not epidemic detection sites; the purpose of the activity is to strengthen surveillance in the health care delivery system as a whole, leveraging the project's reach and ability to communicate with us with regards to occurring epidemic outbreaks, thereby ensuring that a timely response is forthcoming. When outbreaks are detected at community-level, PMI will ensure that ORHB, FMOH and EHNRI are notified, so that a coordinated response can be implemented. If new approaches to improve epidemic surveillance are found to be effective (e.g. mapping of malaria micro-clusters; school-based surveillance), above project platform will also be used to scale-up these approaches to national level.

J.2. Monitoring and Evaluation

Background

With PMI support, a National Malaria M&E Plan was recently developed. This plan aims to coordinate the collection, analysis, and management of malaria data to inform programmatic decisions and to assess whether the goals of the National Strategic Plan for Malaria Prevention and Control 2011 - 2015 (see **section D**) are being achieved.

Currently, Ethiopia has a paper-based system of data collection at the health facility level; however, little information is actually used for decision-making and resource allocation at either the local, regional, or national level. Consequently, Ethiopia's FMOH is in the process of revising the Health Management Information System (HMIS). This revised HMIS, which includes a total of 106 indicators and is primarily supported via funds from PEPFAR and the Global Alliance for Vaccines and Immunization, aims to provide one standardized set of health indicators nationally. There are two malaria-specific indicators:

- Malaria cases, disaggregated into clinical and lab-confirmed, reported per 1,000 population, disaggregated into clinical and confirmed cases, with the latter further disaggregated by species, i.e., *P. falciparum*/other, among:
 - children <5 years of age, and
 - people at least five years of age; and
- Malaria case fatality rate among:
 - children <5 years of age [in patients]
 - people at least 5 years of age [in patients]

Progress During Last 12 Months

Monitoring and evaluating is a core component of PMI to deliver results in-country. All of PMI implementing partners submit a comprehensive performance monitoring plan with their annual work plans, outlining activities and the respective input, output and impact indicators. Additionally, PMI supported a number of complementary activities to monitor and evaluate the reach and impact of the FMOH and PMI supported malaria interventions.

Malaria risk maps: Given the varying epidemiologic profile of Ethiopia, resource allocation for malaria prevention and control activities must be targeted strategically. Malaria risk mapping is critical, first to improve targeting PMI and other program resources, and second to track progress at the community level. PMI supported the development of a detailed malaria risk map in Oromia, identifying areas at risk for malaria, including epidemic-prone areas, based on the best available data.

ITN database: PMI supported the development of an ITN tracking system in order to effectively track ITN distributions. This is closely related to the regional and district level malaria commodity microplanning project and to supply chain strengthening projects. Although this database is Oromia-specific, the model developed is available for application throughout Ethiopia.

Malaria Indicator Survey: PMI supported the 2007 Malaria Indicator Survey – a nationally representative household survey, which assessed coverage, access and use of malaria interventions. Results revealed that although nearly 2/3 of households nationally possess at least one ITN, only 41% of households in Oromia own at least one ITN. There was a similar discrepancy with regard to ITN use among children under 5. While 42% of children under 5 nationally slept under an ITN the night prior to the survey, only 24% of children under 5 living in Oromia did so (see **section E**). Although a DHS was scheduled for early 2010, implementation has been postponed until at least late 2010. Initially, PMI funds were expected to support the DHS 2010 by the inclusion of a malaria module. However, as of July 2010, the FMOH decided that the timing of DHS 2010 related to the Ethiopian malaria transmission season would not allow for comparison of MIS and DHS data, and, consequently, scheduled a MIS for late 2011.

Malaria commodities' micro-plan: PMI supported micro-planning meetings with participants from all malaria-affected woredas and zones in Oromia in 2009 and 2010 to determine the requirements of RDTs, ACTs and LLINs at district level. The main purpose of these micro-plans was to develop a “bottom-up” needs-based plan, where malaria commodity requirements are identified by staff at the district level based on practical needs, rather than the usual “top down” push system, where distributions are estimated at federal level. The micro-plan is continuously being updated when distributions of commodities to the

zones and districts occur. The updated micro-plan is being shared with PMI implementing partners to inform them when commodities will and should be available in the locations of implementation (e.g. health facilities). Partners then report back to PMI if commodities are available or not. Commodity requirements are determined based on health facility consumption records from previous years in each woreda. The micro-plan also considered the numbers of newly constructed health facilities and those expected to be operational in the next year. The results were also used to estimate the needs of pediatric and adult tablets of chloroquine to treat *P. vivax* malaria (which was not available in health facilities prior to establishment of PMI in the country). The micro-plan prioritizes and rationalizes malaria commodity distributions through the year based upon an updated inventory of supplies and epidemiological reports of increased local malaria activity (such as “hot-spot” districts.).

Field Epidemiology and Laboratory Training Program: Ethiopia began its new Field Epidemiology and Laboratory Training Program (FELTP) in October 2008 with technical assistance from CDC. Modeled on CDC’s Epidemic Intelligence Service Program, the Ethiopia FELTP is a two year, full-time, postgraduate competency-based training program consisting of about 25% class work and 75% field residency. Trainees are closely supervised and provide epidemiologic service to the FMOH. Graduates of FELTP will receive a Masters Degree in Public Health and Field Epidemiology. A steering committee has been operational since then, training modules are being developed for each course, and an Ethiopian Program Director and other key staff were hired in 2008. Initial field sites will be Addis Ababa and Oromia region. The program will join the African Field Epidemiology Network, through which it can exchange experiences and collaborate with similar programs of other countries in the region. PMI plans to provide two FELTP residents in FY2011 with professional support, including malaria projects that will provide professional experience with training and educational value.

Proposed USG component for FY2011 (\$1,125,000)

PMI plans to strengthen and support malaria M&E activities in Oromia as well as nationally. These activities will result in improved information regarding the current status and tracking of trends in the overall malaria situation and a variety of indicators of PMI components, both at the population level and facility level.

Malaria Indicator Survey 2011 (\$600,000): In FY2011, PMI will support a MIS, which will be the follow-up to the MIS 2007. As with the MIS 2007, this household survey will be nationally representative, but will over-sample Oromia to provide an Oromia-specific estimate, and will occur during peak transmission season. The focus of the MIS will be to provide (follow-up) data on coverage, access and use of malaria interventions. Given the low levels of parasitemia detected in the MIS 2007, PMI funding will not be used for the collection of biomarkers to assess parasite prevalence. PMI will continue discussions with FMOH counterparts and partners on the planning, protocol, implementation and analysis of this survey.

School based surveillance (\$200,000): Given the logistic and ethical issues regarding the entomological inoculation rate, the parasite rate (proportion of surveyed persons with parasites detected in the blood) among children aged 2-10 has historically been used to estimate malaria transmission intensity. Although household surveys may survey children under the age of 5, the older school age child is absent from the sampled population. Given the patterns of malaria transmission in Ethiopia, school-based surveillance is particularly advantageous. Sampling children at school typically results in high compliance, reduced costs, provides data at the local level, and can provide more frequent monitoring than is possible via household surveys. PMI will support a pilot study to assess the utility of school based surveillance. Notably, this surveillance activity will integrate with surveillance for other NTDs, including soil transmitted helminths.

National malaria commodities micro-plan (\$250,000): In FY2011, PMI will continue to support the development of an annual malaria commodities' micro-plan. The plan projects the 12-month, district-level needs and gaps of all main malaria commodities, including RDTs, ACTs, chloroquine, LLINs and insecticide. The microplan data will be used by the ORHB and other stakeholders to procure and distribute these commodities; coordinate procurement and distribution with other stakeholders; and enable the ORHB and stakeholders to track the commodities' distribution. PMI will support a commodity microplan for Oromia and expand its support to carry out similar microplan meetings in the rest of the country.

Field Epidemiology and Laboratory Training Program (\$75,000): The FELTP in Ethiopia was initiated in 2007 with a initial cohort of 13 trainees. The GoE has requested that the FELTP expand to accommodate 23 trainees. PMI will support 2 trainees who will focus their field training on malaria prevention and control, including malaria outbreak detection and response activities, and an evaluation of malaria surveillance efforts.

K. HIV/AIDS AND MALARIA

Background

Malaria and HIV are two important health issues in Ethiopia. While biologic interactions between HIV and malaria are recognized, there are still opportunities for programmatic synergies. PMI is currently working with PEPFAR, as they develop their Ethiopia FY2011 Country Operational Plan to ensure our respective plans complement and strengthen each other. Thus, approximately 30% of PMI's budget is currently going to so-called 'wrap around' activities with PEPFAR, i.e. either through co-funding of an award or by leveraging resources that have been established through PEPFAR support previously (e.g. laboratory infrastructure).

Proposed USG component for FY2011 (No additional funding required)

- **IEC/BCC:** PMI and PEPFAR will coordinate IEC/BCC activities to increase preventive and curative malaria and HIV/AIDS interventions using a range of different community-based and non-community-based approaches. With PEPFAR, community-based, malaria-specific IEC/BCC messages (developed with PMI support) aim to increase ANC attendance as well as strengthening ANC/PMTCT service delivery in communities of Oromia and other regional states. This ensures increased coverage and reach of malaria in pregnancy interventions supported by PMI.
- **Coordination of laboratory support:** PMI is building upon the existing structures and mechanism that have been developed and established through PEPFAR and Global Fund support. Columbia University is leading the implementation of malaria and HIV/AIDS laboratory activities under both PMI and PEPFAR support. These laboratory activities will also leverage USAID/Ethiopia funding for tuberculosis diagnosis and laboratory strengthening. Such coordination will prevent duplication of systems, materials and fragmentation of laboratory services to support vertical program activities as well as maximize the USG's investments.
- **Pre- and in-service training of health professionals:** Currently, pre- and in-service training of health workers in Ethiopia is being implemented on an *ad hoc* basis, depending on programmatic needs and funding. In 2011, it is anticipated that pre-training needs of all health teams of the USAID/Ethiopia Health, AIDS, Population and Nutrition (HAPN) office will be integrated, including funds from PMI, PEPFAR and Health, Population and Nutrition. It is envisaged that this will strengthen service delivery by providing trainees with a comprehensive platform of theoretical and

practical knowledge as well as standardize training systems and approaches.

- **Pharmaceutical systems strengthening:** PEPFAR has been supporting the development of the country-wide PMLP as well as several activities strengthening procurement, delivery, storage, dispensary and tracking of HIV and non-HIV drugs. PMI is building upon these activities so as to be able to track antimalarial drugs within the existing system, ensuring that approaches are not duplicated.
- **Policies and guidelines:** PMI has developed, modified or updated several of the in-country malaria and HIV guidelines and strategies in FY10. It is envisaged that future respective policies and guidelines will continue to include biological as well as programmatic information and guidance for malaria and HIV/AIDS (e.g. for case management of malaria as a co-infection in HIV/AIDS patients).

L. NEGLECTED TROPICAL DISEASES AND MALARIA

Background

Several neglected tropical diseases (NTDs) are prevalent in Ethiopia, including soil-transmitted helminths, filariasis, leishmaniasis, onchocerciasis, schistosomiasis, and trachoma. While up-to-date information exists for some of the diseases because of operational program activities by either the FMOH or in-country stakeholders (e.g. Carter Center), data for others is limited (e.g. filariasis and schistosomiasis).

Only trachoma and onchocerciasis have large-scale intervention programs in Ethiopia, with mass drug administration campaigns using amoxicillin and ivermectin. For those areas where malaria, filariasis and leishmaniasis occur, it is likely that the malaria vector control interventions of IRS and LLINs will also have an impact on these other vector-borne diseases.

PMI supported the development a malaria risk map for Oromia using data from school-based malaria surveys. Leveraging additional funding support from the Wellcome Trust, school children were also surveyed for helminths. Survey results in 83 schools showed that 2,828/8,455 (33.5%) fecal samples collected were positive for hookworm; co-infection with soil transmitted helminths and *Plasmodium* was rare occurring in only 21 children (0.25%). It is anticipated that the results of that survey will also be used to develop a risk map for helminths.

Proposed USG component for FY 2011 (no additional funding required)

PMI in-country staff will assist the FMOH in finalizing a National NTD strategy as well as support a workshop to discuss coordination and integration of malaria activities with activities planned under the NTD strategy.

M. CAPACITY BUILDING WITHIN THE NATIONAL MALARIA CONTROL PROGRAM

Background

Ethiopia faces many challenges related to human resources for healthcare needs, including the shortage of skilled health workers, high turnover and lack of motivation to retain health professionals in remote and inaccessible health facilities. Decentralization of the health care system places an additional management burden on the Zonal and District Health Offices. While it is beyond the ability of PMI to address the

system-wide capacity issues, there are areas within the NMCP where capacity can be strengthened.

The FMOH Human Resources for Health Strategy was released in June 2010. A comprehensive USAID/Ethiopia Health, AIDS, Population and Nutrition (HAPN) office-wide training and education project is in the late stages of formulation in response to this document and after consultation with many donors and stakeholders.

Staff retention: The ORHB has created a staff retention strategy, incorporating both financial and in-kind incentives. The scheme is categorized through a geographic stratification. Each level provides a top-up salary and/or doubling of in-service time at post depending on the geographic strata (e.g. rural, remote village). Non-financial, in-kind incentives include provision of full infrastructure and housing supplies for health professionals, including HEWs, in remote places.

Supervision: Supervision from the top level down to the community level is weak due to shortages of human and financial resources. Practical training in supervisory skills can be improved. There is also a lack of skilled experts in malaria vector control at the regional and zonal levels.

Ethiopia began its new FELTP in 2007 with technical assistance from CDC (see **section J.2.**).

*Proposed USG support for FY 2011 (see **section I.3.**)*

Together with funds from PEPFAR, Health, Population and Nutrition, PMI will contribute malaria-related training within a Human Resources for Health project to be awarded in FY 2011. Through this project, PMI will collaborate with partners to strengthen the capacity of the ORHB and FMOH staff and others at the national, district and community levels to plan, implement, supervise, monitor and evaluate malaria prevention and control activities. Skills strengthening will address needs in human resources and financial management, information technology and project management, as well as malaria-specific technical skills.

Through pre-service and in-service training and quality assurance, PMI will help keep health providers in their current positions and location. While the RHBs will concentrate on staff retention plans and incentive structures, PMI will support quality training and follow-up to identify strengths and weaknesses in health worker performance.

In FY 2009, and FY 2010 PMI placed technical experts of implementing partners in the ORHB (either at regional, zonal or district level) to assist with malaria activities; it is envisaged that this support will continue in FY 2011. In addition to working closely with their RHB counterparts, these and the PMI staff will coordinate with other malaria partners, especially other GoE ministries, UNICEF, WHO, the private sector and civil society. Support for training will include pre-service, in-service and refresher training of health workers in case management, laboratory diagnosis, IRS, commodity logistics, interpersonal communication and supervision. With FY2011 funding, PMI will continue to focus its assistance on malaria-specific supervision and work with other partners to ensure that this supervision is integrated with other supervision activities (e.g. HIV/AIDS).

N. COMMUNICATION AND COORDINATION OF IN-COUNTRY PARTNERS

Background

The MCST provides coordinated malaria technical support to the national and regional programs and is comprised by members of the FMOH, donor and international organizations, governmental and non-

governmental organizations, and academia. The primary task of the MCST is to support the FMOH and RHBs through ongoing technical assistance, resource mobilization, and support to epidemic preparedness and response. The MCST provides a common forum to share duties and responsibilities, avoid duplication and discuss priorities. PMI became members of the MCST in FY 2008.

Part of the MCST is the Technical Advisory Committee (TAC), which includes the main malaria stakeholders in the country, i.e. FMOH, Carter Center, CNHDE, MACEPA, Malaria Consortium, PMI, UNICEF and WHO. The TAC represents a technical core of the MCST which advises the FMOH on policy and program implementation issues, provides technical assistance on an *ad hoc* basis, and has assisted with malaria program integration issues. Currently, PMI is co-chairing the TAC.

Progress to date of PMI supported activities

PMI has also been instrumental in the development and finalization of four Global Fund proposals (Round 7, 8 and 10, and Round 2 Rolling Continuation Channel) as well as the development and updating of in-country guidelines and strategies.

Proposed USG component for FY 2010 (no additional funding required)

Activities started in FY 2008 will continue to be implemented through FY 2011. These will further strengthen in-country coordination through semi-annual PMI implementing partner planning and progress report workshops for each major set of PMI activities outlined in the MOP. FMOH and RHB officials are also invited to these meetings. These workshops will ensure that (i) materials, guidelines, policies, strategies are reviewed, updated, modified and/or developed; (ii) activity progress, needs and gaps are discussed; (iii) an activity plan for the next year is developed based on needs and gaps identified as well as based on availability of PMI funding; (iv) partners' roles and responsibilities are defined; and (v) partners consensus and buy-in is assured. It is believed that this approach will foster strong coordination and collaboration between partners, optimal benefit and impact for FMOH and NMCP, as well as avoid duplication of malaria prevention and control activities.

O. STAFFING AND ADMINISTRATION

Current PMI team is comprised of four staff from USAID/E (i.e. one U.S. Personal Service Contract Malaria Advisor, one Foreign Service National (FSN) Senior Malaria Advisor, one FSN Malaria Advisor, one FSN Program Manager) and one CDC Malaria Advisor. The PMI staff form a single inter-agency team led by the USAID/Ethiopia Mission Director and the Chief of the USAID/Ethiopia HAPN Office. Additionally, PMI shares a number of USAID/Ethiopia support staff with other USAID/Ethiopia offices, including the Financial Controller, the Executive Officer and drivers; PMI contributes its share to those supporting staff.

The PMI team shares the responsibility for development and implementation of PMI strategies and work plans, coordination with national authorities, managing collaborating agencies and supervising day-to-day activities. The PMI team works together to oversee all technical and administrative aspects of the PMI in Ethiopia, including finalizing details of the project design, implementing malaria prevention and treatment activities, M&E of outcomes and impact, and reporting of results. All PMI staff members report to the USAID/Ethiopia Mission Director or the HAPN Office Chief.

Proposed USG component FY 2011 (\$1,700,000)

The current PMI staffing structure will continue in FY 2011. However, because of USAID/Ethiopia's move to the U.S. Embassy's compound, cross-cutting administrative costs increased. Costs for 4 CDC TDYs not covered by PMI core funds are also included.

Table A

**President's Malaria Initiative – Ethiopia
Planned Obligations for FY2011 (\$41,000,000)**

Proposed Activity	Mechanism	Budget	Commodities	Geographic area	Description of Activity	Page Reference
PREVENTIVE ACTIVITIES: INSECTICIDE TREATED NETS						
LLIN procurement and distribution	UNICEF	12,750,000	12,750,000	Oromia/National	Provide 1,900,000 free LLINs through health facilities, HEWs and other networks	
LLIN hang up-keep up campaigns	<i>Tbd</i>	100,000		National	Implementation of selected LLIN hang-up campaigns through CJTF-HOA	
Subtotal		12,850,000	12,750,000			
PREVENTIVE ACTIVITIES: INDOOR RESIDUAL SPRAYING						
Procurement of insecticide	<i>Tbd</i>	3,600,000	3,600,000	Oromia	Procurement of insecticide for IRS activities	
Procurement of IRS equipment and supplies	<i>IRS2 IQC Global Task Order</i>	1,750,000	1,750,000	Oromia	Spray equipment and personal protective gear	
IRS operations	<i>IRS2 IQC Global Task Order</i>	2,750,000		Oromia	Training, implementation and supervision support for IRS operations targeting 600,000 households	
IRS training	<i>IRS2 IQC Global Task Order</i>	100,000		National	Building the national capacity for IRS operations planning and management, environmental compliance and poison control	
Entomological monitoring and capacity-building	<i>IRS2 IQC Global Task Order</i>	400,000		National	Sustaining capacity for entomological monitoring for vector control, including Adama training facilities	
Pesticide management	<i>IRS2 IQC Global Task Order</i>	375,000	100,000	National	Support for comprehensive management of insecticide stocks and waste; development of national insecticide inventory; procurement of	

Proposed Activity	Mechanism	Budget	Commodities	Geographic area	Description of Activity	Page Reference
					mobile incinerators	
Environmental compliance monitoring	<i>Tbd</i>	50,000		National	TA support for review of environmental compliance of PMI supported activities	
Integrated vector management : strategy development and larval source reduction	RTI <i>IVM</i>	200,000		National	Support to GoE to transition to IVM; operational research to assess the efficacy of larval source reduction to reduce transmission	
Subtotal		9,225,000	5,450,000			
PREVENTIVE ACTIVITIES: IEC/BCC						
IEC/BCC for LLINs, IRS, case management	<i>AED C-Change</i>	1,500,000		Oromia/National	Implementation of various IEC/BCC approaches; collaboration with RHB, HEC and in-country partners; sub-awards to NGOs, CBOs, FBOs	
IEC/BCC for LLINs/ACTs management (other platforms)	<i>Tbd</i>	500,000		Oromia/National	Training and dissemination of developed IEC/BCC through variety of platforms, including Peace Corps Volunteers, CJTF-HOA, USAID/Ethiopia implementing partners, CBOs, FBOs and private sector	
Subtotal		2,000,000				
PREVENTIVE ACTIVITIES: IPTp						
Malaria in pregnancy and IPTp		0		Oromia/National	Collaboration and coordination with USAID/Ethiopia family planning and reproductive health programs.	
Subtotal Prevention		24,075,000	18,200,000			

Proposed Activity	Mechanism	Budget	Commodities	Geographic area	Description of Activity	Page Reference
CASE MANAGEMENT: DIAGNOSIS						
Support for quality assurance system for microscopy and RDTs	Columbia University <i>ICAP</i>	970,000		Oromia/National	Support RHB, EHNRI and RRLs to improve laboratory services and QA/QC for microscopy and RDTs at national and health facility level	
Support for quality assurance system for microscopy and RDTs	MCDI <i>IMaD</i>	30,000		Oromia/National	TDYs for technical assistance of main PMI-supported malaria diagnostic activities	
Procurement of RDTs	UNICEF	4,500,000	4,500,000	Oromia/National	Procurement and distribution of 6,000,000 RDTs to support FMOH/ORHB efforts to scale-up RDT use at health facility level	
Procurement of lab equipment/supplies	JSI <i>Deliver</i>	300,000	300,000	Oromia	Procurement of laboratory equipment and supplies (e.g. microscopes), and including logistics systems support	
Subtotal		5,800,000	4,800,000			
CASE MANAGEMENT: PHARMACEUTICAL MANAGEMENT						
Strengthening of drug management system capacity	MSH <i>SPS</i>	950,000		National	Strengthening of drug management system, quantification and procurement; distribution management; and health facility drug availability and management	
Strengthen drug quality monitoring	USP <i>PQM</i>	250,000		National	Support to DACA for monitoring of post marketing anti-malarial drug quality regionally and nationally	
Subtotal		1,200,000				
CASE MANAGEMENT: TREATMENT						
Procurement of ACTs, pre-referral treatment and drugs for severe malaria	UNICEF	4,500,000	4,500,000	Oromia/National	Procurement of 4,500,000 ACT treatment dosages; rectal artesunate and severe malaria treatment and supplies	

Proposed Activity	Mechanism	Budget	Commodities	Geographic area	Description of Activity	Page Reference
Procurement of chloroquine, pre-referral treatment and drugs for severe malaria	UNICEF	900,000	900,000	National	Procurement of 4,000,000 treatment dosages of chloroquine as well as drugs for pre-referral and management of severe malaria to cover national needs	
Provide systems support for ongoing supervision and monitoring of malaria treatment	Pathfinder <i>IFHP</i>	600,000		National	Support for health worker supervision for management of malaria at district-level health centers and community-level health posts; collaboration with Zonal and District Health Offices	
Pre-service training clinical officers and HEWs in diagnosis and treatment	<i>Tbd</i>	500,000		National	Pre-service training of clinical officers and HEWs for improved diagnosis and treatment including rational use of drugs	
Subtotal		6,500,000	5,400,000			
Subtotal Case Management		13,500,000				

Proposed Activity	Mechanism	Budget	Commodities	Geographic area	Description of Activity	Page Reference
EPIDEMIC SURVEILLANCE / MONITORING AND EVALUATION: EPIDEMIC DETECTION AND RESPONSE						
Maintenance of Epidemic Detection Sites	UNC <i>MEASURE III</i>	300,000		Oromia	Maintain 10 epidemic detection sites, reporting both district and community-level data on malaria morbidity and mortality, as well as data on occurrence of transmission microclusters, patient access, and commodity use	
Epidemic surveillance and response	Pathfinder <i>IFHP</i>	200,000		National	Support for ESR planning at district and zonal level; support for surveillance system; operational costs; reserve stocks for LLINs, RDTs and drugs budgeted in prevention and case management sections	
EPIDEMIC SURVEILLANCE / MONITORING AND EVALUATION: MONITORING AND EVALUATION:						
Malaria Indicator Survey	<i>Tbd</i>	600,000		National	Support for implementation of Malaria Indicator Survey in 2011	
School based surveillance	<i>Malaria Consortium</i>	200,000		National	OR to assess the efficacy and feasibility of using school as sites to monitor malaria transmission and occurrence of epidemic outbreaks	
National malaria commodities micro-plan	UNICEF	250,000		National	Expansion of yearly malaria commodity microplan as done in Oromia to other regional states of the country	
Field Epidemiology Lab Training Program (FELTP)	CDC <i>IAA</i>	75,000		National	Support for applied epidemiology and laboratory training for FMOH staff	
Subtotal Epidemic Surveillance / Monitoring and Evaluation		1,625,000				

Proposed Activity	Mechanism	Budget	Commodities	Geographic area	Description of Activity	Page Reference
IN-COUNTRY MANAGEMENT AND ADMINISTRATION						
TDY	CDC IAA	50,000			4 two-week trips: one for sentinel site supervision and one for strategic guidance to epidemiological work	
In-country staff; Admin. Expenses	CDC IAA	400,000			Salaries, benefits of in-country CDC PMI staff (1)	
In-country staff; Admin. Expenses	USAID	1,350,000			Salaries, benefits of in-country USAID PMI staff (1 PSC/3 FSN); support for ICASS of CDC PMI staff	
Subtotal Management Administration		1,800,000				
TOTAL		41,000,000	28,400,000		Commodities (69.27%)	

Table B

President's Malaria Initiative – Ethiopia
Year 4 (FY2011) Budget Breakdown by Partner (\$41,000,000)

Partner Organization	Geographic Area	Activity	Budget
<i>AED C-Change</i>	Oromia/National	IEC/BCC for LLINs, IRS, case management	\$1,500,000
<i>CDC IAA</i>		In-country staff; administrative expenses, TDYs	\$525,000
<i>Columbia University ICAP</i>	Oromia/National	Support for quality assurance system for microscopy and RDTs	\$970,000
<i>RTI IVM</i>	National	IVM transition and operational research	\$100,000
<i>JSI Deliver</i>	Oromia	Procurement of laboratory equipment and supplies	\$300,000
<i>Malaria Consortium</i>	Oromia	School-based surveillance operational research	\$200,000
<i>MCDI IMAD</i>	Oromia	Support for quality assurance system for microscopy and RDTs	\$30,000
<i>MSH SPS</i>	National	Strengthening of drug management system capacity	\$950,000
<i>Pathfinder IFHP</i>	National	Provide systems support for ongoing supervision and monitoring of malaria treatment; epidemic surveillance and response	\$800,000
<i>IRS2 IQC Global Task Order</i>	Oromia	Procurement of IRS equipment; IRS operations; Entomological monitoring and capacity-building; Pesticide management	\$5,375,000
<i>Tbd</i>	Oromia/National	IEC/BCC for LLINs/ACTs management (other platforms); procurement of insecticides; pre-service training clinical officers and HEWs in diagnosis and treatment; Malaria Indicator Survey	\$5,350,000
<i>UNICEF</i>	Oromia/National	Procurement and distribution of RDTs, ACTs, chloroquine, pre-referral and severe antimalarial drugs, LLINs; support for national commodities' micro-planning	\$22,900,000
<i>University of North Carolina MEASURE III</i>	Oromia	Training Zonal Health Officers in data management; sentinel site maintenance; program tracking tools and skills strengthening;	\$300,000
<i>USAID</i>		In-country staff; administrative expenses; USAID TDY core-funded	\$1,350,000
<i>USP PQM</i>	National	Strengthen drug quality monitoring	\$250,000
Total			\$41,000,000