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

# PRESIDENT'S MALARIA INITIATIVE

# MALARIA OPERATIONAL PLAN (MOP)

# ETHIOPIA
# FY 2010

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**ACRONYMS AND ABBREVIATIONS**

| | |
|---|---|
| ACT | Artemisinin-based combination therapy |
| AED | Academy for Educational Development |
| ANC | Antenatal care |
| CAME | Coalition against Malaria in Ethiopia |
| CDC | Centers for Disease Control and Prevention |
| CHP | Community Health Promoter |
| CRDA | Christian Relief and Development Agency |
| DACA | Drug Administration and Control Authority |
| DALY | Disability Adjusted Life Years |
| DDT | Dichloro-diphenyl-trichloroethane |
| DHS | Demographic and Health Survey |
| EHNRI | Ethiopian Health and Nutrition Research Institute |
| EOS | Enhanced Outreach Strategy |
| EPI | Expanded Program for Immunization |
| EPHTI | Ethiopia Public Health Training Initiative |
| ESR | Epidemic Surveillance and Response |
| EQA | External quality assurance |
| FANC | Focused Antenatal Care |
| FBO | Faith-based organization |
| FMOH | Federal Ministry of Health |
| FSN | Foreign Service National |
| Global Fund | Global Fund to Fight AIDS, Tuberculosis and Malaria |
| GIS | Geographic Information Systems |
| GoE | Government of Ethiopia |
| HCSS | Health Commodities Supply System |
| HEC | Health Education Center |
| HEP | Health Extension Package |
| HEW | Health Extension Worker |
| HMIS | Health Management Information System |
| HSDP | Health Sector Development Plan |
| ICAP | International Center for AIDS, Care and Treatment Programs |
| IEC/BCC | Information education communication / behavior change communication |
| IM | Intra-muscular (injections) |
| IMCI | Integrated Management of Childhood Illnesses |
| 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 |
| NSPMCP | National Strategic Plan for Malaria Control and Prevention |
| ORHB | Oromia Regional Health Bureau |
| PEPFAR | President's Emergency Plan for AIDS Relief |
| PFSA | Pharmaceutical Fund and Supply Agency |

| | |
|---|---|
| PHEM | Public Health Emergency Management system |
| PLMP | Pharmaceutical Logistics Master Plan |
| PMI | President's Malaria Initiative |
| PMTCT | Prevention of mother-to-child transmission |
| PSI | Population Services International |
| QA/QC | Quality assurance/quality control |
| RBM | Roll Back Malaria |
| RDT | Rapid diagnostic test |
| RHB | Regional Health Bureau |
| RRL | Regional Reference Laboratory |
| RTI | Research Triangle Institute |
| SNNP | Southern Nations, Nationalities and People's Regional State |
| SP | Sulfadoxine-pyrimethamine |
| TAG | Technical Advisory Group |
| 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 |

## A. EXECUTIVE SUMMARY

In June 2005, the United States Government (USG) announced a new five-year, $1.2 billion initiative to rapidly scale-up malaria prevention and treatment interventions in high-burden countries in sub-Saharan Africa. The goal of the President's Malaria Initiative (PMI) is to reduce malaria-related mortality by 50% after three years of full implementation in each country. This will be achieved by reaching 85% coverage of the most vulnerable groups, children <5 years of age, pregnant women, and people living with HIV/AIDS, with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated bed nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS). Ethiopia became one of the PMI focus countries in 2007.

Malaria is ranked as the leading communicable disease in Ethiopia, accounting for about 30% of the overall Disability Adjusted Life Years lost. Approximately 75% of the country is malarious with about 68% of the total population of 73 million living in areas at risk of malaria. Malaria is reported to cause 70,000 deaths each year. According to Ethiopia's Federal Ministry of Health (FMOH), in 2008/2009, malaria was the first cause of outpatient visits, health facility admissions and in-patient deaths, accounting for 12% of out-patient visits and 9.9% of admissions. However, as 36% of the population does not have access to health care services, these figures probably under-represent the true burden of malaria in the country.

PMI support to malaria control in Ethiopia began in FY08 and focused on Oromia Regional State, the largest of the Ethiopia's 9 Regional States, covering a third of the country. More than 17 million persons are at risk of infection in Oromia; 1.5 to 2 million clinical cases are reported annually, with malaria accounting for 20-35% of outpatient consultations, and 16% of hospital admissions. Malaria is the leading cause of death accounting for 18-30% of all hospital deaths.

Ethiopia has received two grants from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund): Round 2 (2003 – 2008; $73 million) and Round 5 (2005 – 2010; $140 million). With this support, the Government of Ethiopia's FMOH was able to dramatically scale-up its efforts in malaria prevention and control. Major achievements of this scale-up effort have been the free distribution of 20 million ITNs (largely long-lasting insecticidal nets; LLINs), the provision of rapid diagnostic tests (RDTs) and ACTs at peripheral health facilities, the development of district epidemic preparedness plans, and the deployment of 30,000 health extension workers for health care service delivery at community level. Recently, Ethiopia was successful in its application for a five-year Global Fund Round 8 grant of $276 million,to continue scaling-up its malaria prevention and control efforts.

A 2007 Malaria Indicator Survey (MIS) showed a rapid increase in the household ITN coverage from 6% to 65% in the targeted, malarious areas in the last three years. 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 be owning one or more ITNs; 29% of pregnant women and 24% children under five years of age were reported as sleeping 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, the data should 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 2007 MIS may reflect the low transmission characteristics of the non-epidemic years.

This PMI Year 3 Malaria Operational Plan for Ethiopia (Oromia) was developed in close consultation with the FMOH, the Oromia Regional Health Bureau and with participation of many in-country partners in May 2009. The activities PMI proposes to 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, many of the PMI investments will benefit the country as a whole, e.g. designing, piloting and establishing best-practice systems; support for the development and/or revision of national malaria guidelines and policies.

To achieve PMI's goal and targets in Ethiopia, the following major activities are currently ongoing with PMI FY08 and FY09 support and are planned with FY10 funding:

**Insecticide-treated Nets:** Since 2005, approximately 20 million LLINs have been distributed to 10 million households nationwide with support from the Global Fund, including 6.5 million LLINs in Oromia. In spite of this prodigious effort, the MIS 2007 shows coverage rates of 65% in malarious areas and LLINs distributed since 2005 will have to be replaced from 2008 onwards. In FY10, PMI will provide 1.5 million LLINs to support the FMOH in covering the LLIN gap in Oromia Region, which will complement the 559,000 and 750,000 LLINs procured and distributed with PMI support with FY08 and FY09 support. These nets will be delivered through Oromia Regional Health Bureau channels and through networks of community-based and other non-government organizations. PMI will also provide support for national net coverage efforts by building on and strengthening routine distribution systems.

**Indoor Residual Spraying:** PMI will support Ethiopia's long-standing and extensive 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. In FY10, PMI will continue the support begun in FY08 and FY09, where 316,829 and 459,231 household structures in 23 highly malarious districts of Oromia are being sprayed. PMI will also continue to support the Integrated Vector Management framework to build capacity for zonal- and district-level vector control specialists in basic entomological monitoring and improved IRS targeting.

**Malaria in Pregnancy:** Because of the generally low endemicity of malaria in Ethiopia, IPTp is not a national strategy and the focus of malaria during pregnancy activities are on promoting universal ITN coverage and prompt diagnosis and treatment of clinical cases. In FY10, PMI will support improved pre-service training for management of acute malaria and anemia in pregnant women, and the malaria components of the Focused Antenatal Care package.

**Case Management:** PMI is currently supporting a review of the national malaria diagnosis and treatment guidelines, including the role and value of Rapid Diagnostic Tests (RDTs). PMI is committed to continue strengthening diagnostic capacity, including supplies, training, supervision and quality assurance/quality control to ensure strengthening of case management of fever cases attending health facilities in Oromia. Four of the ten antimalarial drug efficacy monitoring sites throughout the country are being supported by PMI in Oromia. PMI is also supporting malaria logistics-related activities within the context of the FMOH's broader, national Pharmaceutical Logistics Master Plan. In conjunction with other IEC/BCC efforts, PMI is supporting the ORHB and its expanding system of health extension workers to promote early care seeking behavior and adherence to anti-malarial drug treatment. PMI is also supporting the Ethiopian Drug Assurance and Control Administration to ensure all malaria products entering the country meet quality standards. In FY08, with PMI support 1,680,000 doses of ACTs and 2,000,000 doses of chloroquine were procured and distributed; a further 750,000 and 2,000,000 dosease of ACTs and chloroquine are on order with FY09 support. Similarly, 820,000 and 600,000 multi-species RDTs are being procured using FY08 and FY09 support. In FY10, the investment to ensure comprehensive case management of fever cases will be continued, including the support for the procurement and distribution of 1.5 million multi-species RDTs and 3.5 million doses of ACTs as well as other antimalarial drugs

(including drugs for severe disease and pre-referral care).

**Monitoring and Evaluation:** There is an urgent need to improve data and information management for operations, including tracking of LLIN distributions 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 is currently establishing a sentinel surveillance site system to capture indicators beyond routine surveillance data, and track morbidity and mortality to evaluate program progress and effectiveness. In FY10, support will be given to maintain the newly established sentinel site network, tracking malaria morbidity and mortality data as well as end user data with regards to key malaria commodities (i.e. LLINs, insecticide, RDTs and ACTs). Funds are also budgeted for Oromia as part of a national MIS tentatively scheduled to be conducted between October and December 2010 or in 2011 as a follow-up to the survey conducted in 2007.

The proposed FY10 PMI budget for Ethiopia is $31 million. Of this amount, 68% will support the procurement and distribution of commodities used for malaria prevention and control. The budget breakdown by intervention includes: procurement and distribution of LLINs (38% of the total budget); improved diagnosis, procurement and use of ACTs (28%); IRS activities (28%); epidemic response (1%); monitoring and evaluation (3%) activities; and in-country staffing and administration (3%).

## B. PRESIDENT'S MALARIA INITIATIVE

In June 2005, the USG announced the PMI, a new five-year, $1.2 billion initiative to rapidly scale-up malaria prevention and treatment interventions in 15 high-burden focus countries in sub-Saharan Africa [http://www.pmi.gov]. The goal of this initiative is to reduce malaria-related mortality by 50% after three years of full implementation in each country. This will be achieved by reaching 85% coverage of the most vulnerable groups ---children <5 years of age and pregnant women--- with proven preventive and therapeutic interventions, including ACTs, ITNs, IPTp, and IRS.

The 15 PMI focus countries are Angola, Tanzania, Uganda (since 2006); Malawi, Mozambique, Rwanda, and Senegal (since 2007); and Benin, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Mali, and Zambia (since 2008). Funding for PMI was $30 million in Fiscal Year (FY) 2006, it increased to $135 million in FY07 and to $300 in FY08. While the funding level for PMI in FY09 remained at FY08 levels, it will increase to $500 million in FY10, the last year of the initiative.

In implementing the PMI, the USG is committed to working closely with host governments and in line with 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, World Health Organization (WHO), 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 the PMI as well as subsequent evaluations are highly consultative and held in collaboration with the National Malaria Control Program (NMCP) and in-country partners.

In October 2006, Ethiopia was selected as a focus country of the PMI. In Ethiopia, PMI resources primarily target the Oromia Regional State, the country's largest administrative region and which bears the brunt of the country's malaria burden --- Oromia covers 600,000 $km^2$ and has a population of 27 million.

This Malaria Operational Plan (MOP) for Ethiopia FY10 presents a detailed one-year implementation plan for the third year of the PMI in Ethiopia. This document builds on to the MOP FY08

[http://www.pmi.gov/countries/ethiopia_mop-fy08.pdf] and MOP FY09 [http://www.pmi.gov/countries/ethiopia_mop-fy09.pdf].The MOP FY10 (i) briefly reviews the current status of malaria in the country; (ii) outlines current prevention and control policies and interventions; (iii) identifies challenges and unmet needs if the PMI goals are to be achieved; (iv) outlines PMI activities planned and/or implemented in FY08 and FY09; and (v) provides a description of malaria prevention and control activities that will be supported by PMI in Year 3 in Ethiopia. The MOP FY10 was developed in close consultation with the GoE's FMOH NMCP, the Oromia Regional Health Bureau (ORHB) and with participation of many national and international in-country malaria partners. The total amount of FY10 PMI funding requested for Ethiopia is $31 million.

## C. MALARIA SITUATION

### C.1. The Ethiopian Context

The preface to the MOP FY08 highlighted unique aspects of malaria in Ethiopia, including the PMI geographical focus; Ethiopia's long history of commitment to malaria control; the importance of diagnostics considering ---in some of the country's areas--- the near equal mix of infections caused by *Plasmodium falciparum and P. vivax*, the instability of malaria transmission and pattern of recurrent epidemics. There have been important changes in some of these elements over the past two years.

**Geographical focus and scale:** PMI in Ethiopia primarily focuses on Oromia. While just one of nine Regional States, Oromia comprises one third of the country's land mass (i.e. 600,000 $km^2$) and population (i.e. 27 million). As noted in recent surveys described below, Oromia is both the largest, and by most (health and non-health) indicators the most underserved Regional State in Ethiopia. While PMI commodity support and operations are concentrated in Oromia, overall policy and systems support as well as training and communications materials developed with PMI support will benefit the FMOH and, thus, the country as a whole.

**Millennium Malaria Campaign, Mass Fever Treatment and Mass Drug Administration:** In September 2007 Ethiopia celebrated the Year 2000 millennium of the Ethiopian Calendar. Part of the commemoration was the FMOH-led 'Millennium Malaria Control Campaign', including the final distribution of long-lasting insecticidal nets (LLINs) towards the FMOH target of 20 million LLINs and a series of treatment campaigns with the ACT drug artemether-lumefantrine (AL) as a one-time activity. ACT administration was delivered through the Health Extension Workers (HEWs), sometimes presumptively to fever patients (i.e. mass fever treatment) and sometimes to entire communities, without any malaria diagnosis (i.e. mass drug administration). No data on the proportion of people treated with confirmed malaria or adverse drug reactions were collected. Although mass fever treatment with AL and chloroquine are components of the national diagnosis and treatment guidelines, its use is limited to outbreak responses. The guidelines state that, in general, the treatment of malaria should be guided by confirmed diagnosis whenever the situation permits. PMI and other stakeholders are engaging the GoE FMOH to refrain from using mass fever treatment and, particularly, mass drug administration broadly and making sure that such approach will not be taken in the future while increased access to RDT's offer improved opportunity to obtain credible and accurate point-of care diagnoses.

**The MIS, LLIN gaps and Global Fund proposals:** Ethiopia has received two grants from the GFATM: Round 2 (2003 – 2008; $73 million) and Round 5 (2005 – 2010; $140 million). In October – December 2007, PMI supported and collaborated on a MIS. Results, provided in more detail below, indicated that the free distribution of LLINs significantly increased LLIN coverage in Ethiopia. In just three years Ethiopia increased household ITN coverage from less than 6% to almost 70% in program targeted areas.

However, the survey also showed Oromia continuing to lag behind other Regional States in key malaria indicators. For example, in Oromia only 41% (national average: 53%) of households were shown to be owning one or more ITNs; 29% (national average 35%) of pregnant women and 24% (national average 33%) children under five years of age were reported as sleeping under an ITN the previous night. While these results show rapid scale up, they are below the FMOH target of 100% coverage of households in malarious areas with an average *two* ITNs per household. (*Note*, at the time of the MIS 2007 only 16.7 million nets had been distributed. The FMOH now estimates that with population growth, 11 million households should have been targeted for ITN distribution rather than the originally planned 10 million). Although Ethiopia was successful in applying for Global Fund Round 8 funding support (2008 – 2013; $291 million, of which $55 million are for health systems strengthening), the FMOH estimates that significant gaps in all key malaria commodities (LLINs, insecticide, ACTs and RDTs) remain from 2008 onwards. LLINs distributed in 2005 need to be replaced even as population growth and in-country population migration increases the number of households in need of intervention coverage. Similarly, despite Global Fund Round 5 and 8 funding support, the FMOH projects a gap for RDTs, ACTs, insecticide for IRS and systems support. To sustain the FMOH's targets and efforts in malaria prevention and control, sustained financial support from national and international malaria partners is needed, including from PMI.

**Epidemic threat:** 'Epidemic years' occurring every 5 to 8 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 due to the cross-sectional nature of the survey in a context of unstable transmission. In Ethiopia, malaria transmission is known to be highly heterogeneous between Regional States, zones, districts and municipalities. Similarly, the MIS data could also mean that few individuals have protective immunity, and that malaria is 'unstable'. Thus, while no epidemic outbreaks were reported in 2006 and 2007, several outbreaks have been reported in 2008 and early 2009. Similarly, according to the latest FMOH data, malaria has (again) become the most common cause of out-patient visits in the country. Currently, it is unknown whether the observed increase in malaria transmission is due to better case detection (e.g. because of the availability of community-based case management through HEWs) and surveillance, or due to a real change in malaria transmission. Notwithstanding, the unstable and largely unpredictable malaria epidemiology 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 297 districts divided into 17 zones and 9 'special towns' (**Figure 2**). According to 2008 ORHB data, there are 22 hospitals, 242 health centers, 656 health stations and 1814 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 organizations (NGOs). There are also 4 hospitals, 3 health centers and 115 health stations under other governmental organizations (e.g. teaching or armed services hospitals) and 7 nursing colleges in the region that offer a three-year Diploma program. The colleges' total annual enrollment has been tripled recently and each college admits a minimum of 250 students per year. Pharmaceutical retail outlets in the region include 49 pharmacies (GoE 11, and private 38), 119 drugs shops (GoE 5, private 114) and 1035 private or rural drug vendors that provide service in their respective areas. 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 Primary Health Care Unit with one health center and five health posts, designed to serve 25,000 people; the second tier is a district hospital with a catchment area 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 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]. The HEWs focus on preventive services, except for malaria. For malaria, HEWs are expected to confirm diagnosis with a 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 information education communication / behavior change communication (IEC/BCC) 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. As described in more detail below, in May 2009, Ambo district (approximately 1 hr from Addis in Oromia), reported 600 suspected cases of malaria, 300 of which were confirmed to be positive for *P. falciparum* by RDTs.

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 above sea level (m);
- Epidemic-prone areas in highland fringes between 1,500 – 2,500 m;
- 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**).

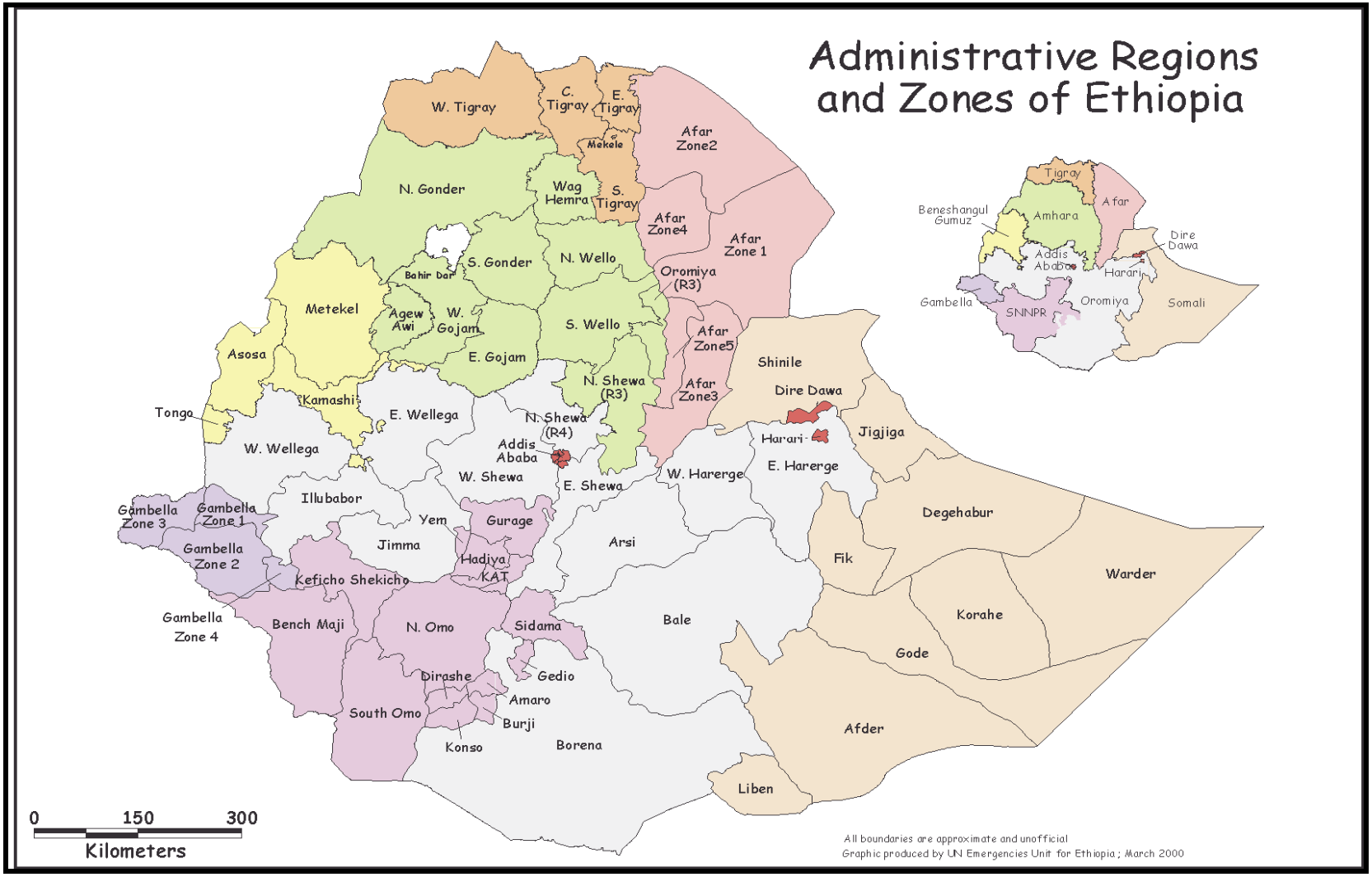
**Burden of Disease:** Malaria is the leading communicable disease in Ethiopia. The economic impact of malaria is very significant, as the country's economy is based on agriculture and peak malaria transmission coincides with the planting and harvesting season. Historically, malaria has forced people to inhabit the less agriculturally productive highlands.

Overall, according to the FMOH, malaria accounts for up to 17% of outpatient consultations, 15% of admissions and 29% of in-patient deaths. About 75% of the country is malarious (defined as *areas <2000 m*), with about 68% (i.e. 50 million) of the country's total population living in areas at risk of malaria. Approximately 9.5 million clinical cases of malaria were reported annually between 2001 – 2005 (range: 8.4 – 11.5 million), with an annual average of 487,984 laboratory confirmed cases over the same period (range: 392,419 – 591,442). 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. Three quarters of the region, i.e. 262 of 297 (88%) districts and 4,237 of 6,765 (63%) municipalities, are considered malarious, 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 hospital admissions, and 18-30% of hospital deaths in the region.

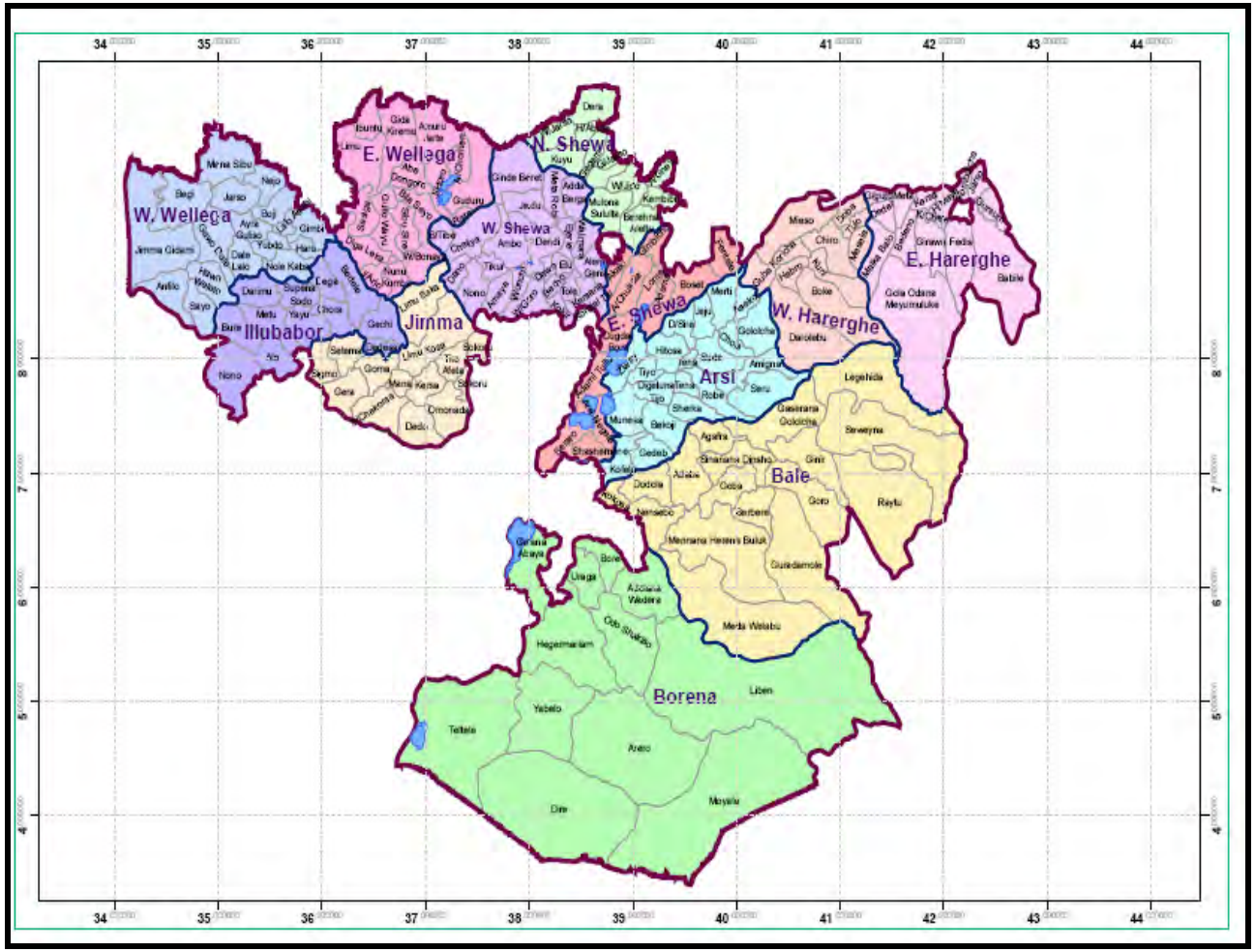
The accuracy of these malaria estimates has been in doubt. In a country with a poor health information system, the few data that are available are frequently unreliable. Recent surveys, described below, appear to indicate a drop in malaria morbidity and mortality. Possible explanations include environmental factors, the cyclical nature of malaria in Ethiopia, and the aggressive scale-up of malaria prevention and control interventions implemented by the FMOH and in-country malaria partners since 2005 (see sections **C.1.** and **C.4.**). While no epidemic 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 and early 2009. 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 one of the cyclical 'epidemic years'.

**Figure 1. Administrative Regional States and Zones of Ethiopia.**



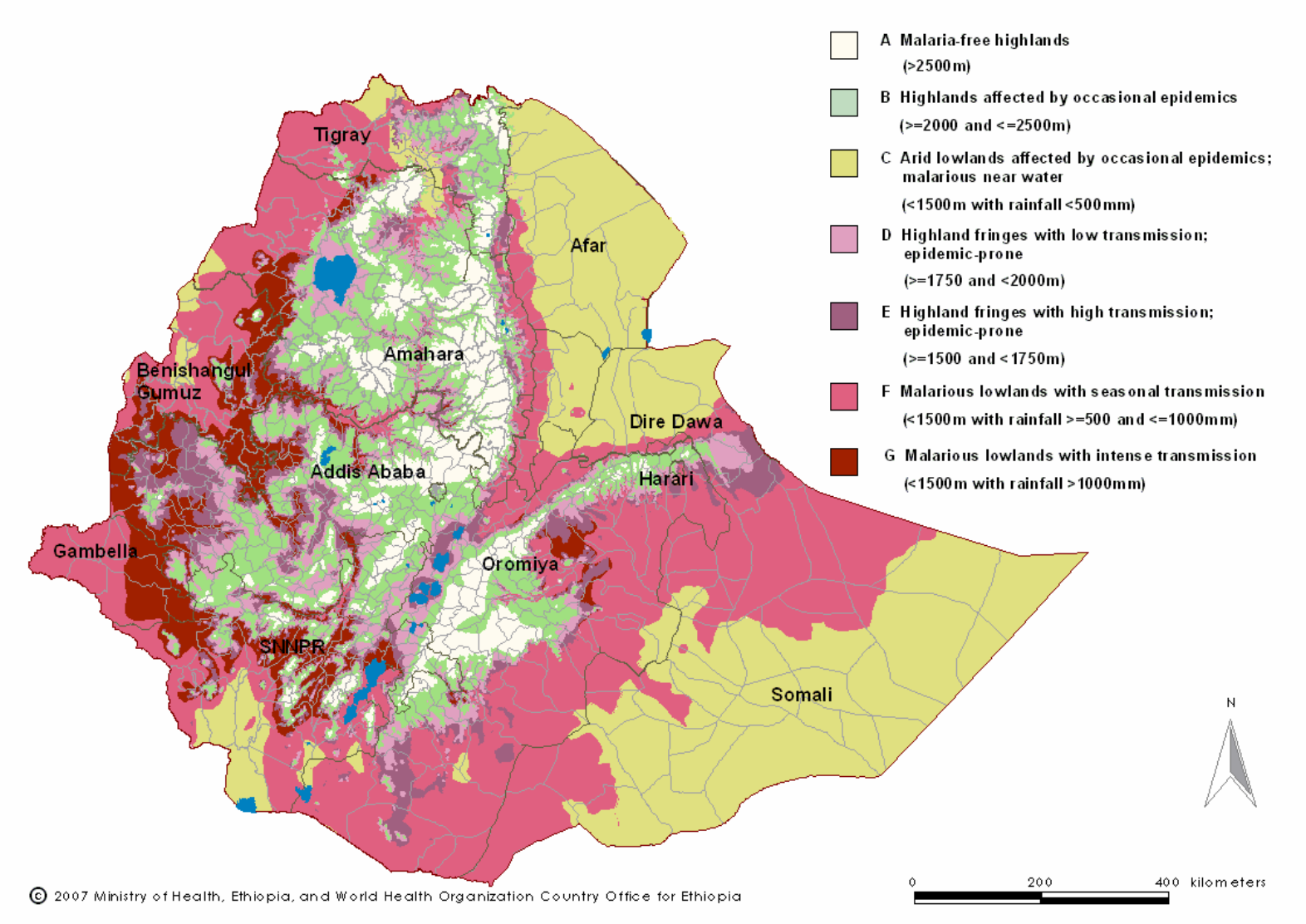

Note. Regional States are in different colors, zones in same colors. Ethiopia has 9 Regional States; additionally there are 2 ‘City Councils’ (i.e. Addis Ababa, Dire Dawa).

**Figure 2. Administrative Zones and Districts of Oromia Regional State.**




Note. Administrative Zones of Oromia are in different colors, districts in same colors. Oromia has 17 Zones and 9 ‘Special Towns’, and 297 districts including towns.

**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 up to 5.4%. Anthropophily of *An. arabiensis* varies, with the human blood index collected from different areas ranging between 7.7 and 100%. The highly anthropophilic *An. funestus* 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. *An. pharoensis* is widely distributed in Ethiopia and while its exact role in malaria transmission is unclear, it has shown high levels of insecticide resistance. *An. nili* can be an important vector in local transmission, particularly in the Gambella Regional State. Detailed information on the basic ecology and distribution of these vectors in Ethiopia is provided in the MOP FY08 and not repeated here. However, as discussed in section **H.2.**, there are serious issues with insecticide susceptibility among these vectors that will have important implications for the vector control strategies.

## 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; $291 million, of which $55 million is for health systems strengthening). 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 two 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 Round 8 proposal (pages 57-58) projects that, despite 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 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 currently unknown.

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 the 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. They 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 the malaria program activities.

### C.5. Rationale for current allocation of control interventions:

For FY10, PMI is sustaining activities initiated and supported in FY08 and FY09, and adapting to the changing context of malaria in Ethiopia as described above in section **C.1.** The PMI budget for Ethiopia for FY10 is $31 million, an increase from FY08 ($19.8 million) and FY09 ($19.7 million) (*Note*, the FY10 budget also includes 18 months funding for LLIN, ACT, RDT and IRS commodities).

After the massive scale-up of LLINs and ACTs through a still-developing health sector infrastructure

there is a large emphasis on 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.

Although the GoE was successful in obtaining further GFATM funding support, the LLIN, insecticide, RDT and ACT needs will increase from 2011 onwards if current GoE efforts to scale-up malaria prevention and control are to be expanded and/or sustained. Hence, for FY10, the PMI support for malaria commodities (i.e. primarily LLINs, insecticide, RDTs and ACTs) will increase from 53% to 68%. Finally, as it appears that in 2009 Ethiopia may be entering one of the cyclical 'epidemic years,' there is a strong emphasis on epidemic surveillance and response.

## D. NATIONAL MALARIA CONTROL PLAN AND STRATEGY

The overall framework of the national malaria control strategy is set forth in the GoE's Third Health Sector Development Plan 2005 - 2010 (HSDP III) [http://www.moh.gov.et/index.php?option=com_remository&Itemid=47&func=fileinfo&id=192]. Ethiopia recently developed a six-year (2010 – 2015) National Strategic Plan for Malaria Prevention, Control and Elimination. 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 malaria stakeholders. The HSDP III and the recently developed national strategic plan are in line with RBM partnership objectives. The following goals and objectives are set out in the six-year strategic plan:

*Goals*

- By 2015, achieve malaria elimination within specific geographical areas with historically low malaria transmission area;
- By 2015, achieve near zero malaria transmission in the remaining malarious areas of the country.

*Overall objective*

The objective of the 2010-2015 National Strategic Plan is to consolidate the achievements of the 2006-2010 National 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 policy and guideline documents for Diagnosis and Treatment, Vector Control (including IRS), and Epidemic Prevention and Control 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 population 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 will be based on parasitological diagnosis either by microscopy or RDTs, and treatment of malaria cases are fully guided by the result of the diagnosis. Surveillance is planned to focus mainly on individual human cases to identify the sources of infection and limit further spread in the population, i.e., further reduce malaria 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 <2000 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. Of note, **Tables 2** and **3** report national data for areas <2000 m and <2500m; whereas, data reported for Oromia includes all areas ≤ 2500 m).

**Table 2. Key Malaria Indicators Reported in MIS 2007 at National Level and in Oromia.**

| *Indicator* | *National (< 2000 m)* | *National (≤ 2500 m)* | *Oromia (≤ 2500 m)* |
|---|---|---|---|
| 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 | 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 *P. falciparum* | 0.7 | 0.5 | 0.1 |
| Malaria prevalence by microscopy *P. vivax* | 0.3 | 0.2 | 0.2 |

**Table 3. Malaria Knowledge among Eligible Women Age 15-49 years.**

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

However, 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.

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

The goal of PMI is to reduce malaria-associated mortality by 50% compared to pre-initiative levels in PMI countries. By the end of FY10, 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 – YEAR THREE

In Year 1 and 2 of PMI in Ethiopia, emphasis included: (i) initiating PMI activities as outlined in the MOP FY08 and FY09 as well as 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 scaled-up malaria and prevention activities; and (iv) establishing the necessary evidence-based system allowing for comprehensive M&E of operational malaria program activities of both PMI and FMOH.

To achieve results and to ensure that activities are implemented effectively, Year 1 direct implementation activities (e.g. IRS, IEC/BCC, malaria laboratory diagnosis) were, to a large extent, focused on a selected number of highly malarious, administrative zones within Oromia: East Shoa, Arsi, West Arsi, Jimma and West Hararge. In Year 2, these activities were sustained, with many activities expanded to additional zones and districts within Oromia. In Year 3, further expansion of activities to additional zones and districts within Oromia is anticipated, with some activities also being implemented at a national level (e.g. ACT procurement and distribution).

*Prevention*

- In Year 3, 1,500,000 LLINs will be procured and distributed free of charge through multiple channels. As detailed below in the LLIN gap analysis (**Table 4**), the additional 1,500,000 LLINs in FY10 plus the 1,459,000 from FY08 and FY09 could bring coverage rates significantly. Disbursements will be linked to improved tracking and program information management at district, zone and regional level;
- In Year 3, 500,000 structures (approximately 250,000 households) will be sprayed in 30 districts of four administrative zones (East Shoa, Arsi, West Arsi, West Hararge), an increase from the number sprayed in Years 1 and 2. The exact target number of households will be adjusted during the regional and district IRS microplanning and may be adjusted depending on epidemiological and program data available at that time;

*Case Management*

- PMI will support the procurement and distribution of 1,500,000 multi-species RDTs in Year 3. RDT investments will be linked to close monitoring of their exact use and value to the program;

- In Year 3, 3,500,000 treatments of ACTs including pre-referral and severe malaria treatments will be procured and distributed to all government health facilities in Oromia.

## H. INTERVENTIONS: PREVENTION

### H.1 Insecticide-treated Nets (ITNs)

*Background*

**LLINs distribution and projected gaps:** With substantial inputs from a number of partners, more than 20 million LLINs have been distributed since 2005 through GFATM and partner support; with an average of two LLINs per household. The MIS 2007 results indicate that in malarious areas, 66% of households have at least one ITN. The MIS confirmed that the average household includes 4.5 members sharing 1.8 sleeping spaces, confirming that supplying each household with, on average, 2 family-sized LLINs is adequate to attain universal coverage. The difference between the observed ITN coverage (66%) and the expected coverage (100%) is due to a number of factors:

- At the time of the MIS (end of 2007) only about 16.7 million LLINs had been distributed; after complete distribution of LLINs the 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, according to recent population census survey data, under-estimated the true situation, with the FMOH now estimating that 11 million households are located in malarious areas and, hence, should have been targeted for LLIN distribution;
- A proportion of LLINs distributed in 2005 and 2006 are, because of wear and tear as well as loss of residual insecticidal efficacy, likely to have deteriorated to the point where owners no longer used them. Studies have shown physical loss rates of around 10% in the first year, including loss due to 'leakage' of LLINs outside the target areas which has been confirmed by program field visits carried out in Ethiopia (with geographical variations) (UNICEF, *personal communication*).

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 integrated through Expanded Program on Immunization (EPI) and the Enhanced Outreach Strategy (EOS) (biannual campaigns of vitamin A supplementation, de-worming, immunizations and nutrition screening). The distribution plan was to scale-up LLIN distribution to the target 100% LLIN coverage (2 nets per household) in each community at a time, thus achieving universal coverage at village level within weeks. With the current high LLIN coverage rates in communities, new distribution strategies are required to provide LLINs to households not previously covered (i.e. 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 'catch up' and 'keep up' are primarily campaign distributions, including distributions during emergencies (e.g. floods, droughts, epidemics and conflicts). The core approach for the various LLIN distribution channels is to integrate LLIN distribution into 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 being forwarded to the national HEP database managed at FMOH and RHB level

**Table 4. ITNs (LLINs) Gap Analysis for Ethiopia FY10 .**

| | *National* | *Oromia* |
|---|---|---|
| Total ITNs in country as of 2009 (best data estimate) | 20,502,898 | 6,717,454 |
| Total ITN's Needed 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.

Thus, there will be an estimated national LLIN gap of about 6.75 million in 2010, including in this analysis an estimated a gap of 2.4 million for Oromia. Thus, the 1,500,000 LLINs to be procured and distributed in FY10 would significantly contribute toward closing the gap for 100% LLIN coverage in Oromia.

**Taxes and tariffs and registration for commercially-imported LLINs:** In January 2008 the 5% tariff on ITNs was removed. However, none of the 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 to date of PMI supported activities*

In FY08 PMI procured 559,000 LLINs, which are being distributed through multiple channels, including through the HEWs and immunization campaigns. Following discussion with the ORHB these LLINs are of conical shape, which is known to be associated with greater use of LLINs. Coverage and distribution of LLINs will be based on a Oromia-wide microplan developed by the PMI implementing partner, UNICEF, in collaboration with the ORHB. The microplan projects the 12-month need and gap of LLINs based on district-level malaria and LLIN data. The microplan data will be used by the ORHB and other stakeholders to distribute LLINs in Oromia as well as serve as a model 'best practice' for other Regional States. Thus, the ORHB and UNICEF also recently used the microplan to distribute with PMI support 475,000 LLINs in Oromia procured by the World Bank.

In FY09, it is anticipated that 900,000 LLINs will be procured and distributed by UNICEF with PMI funds; these LLINs will be procured in the fall of 2009.

*Proposed USG component for FY09 ($10,000,000)*

Due to the pressing need in covering the GoE gap for LLINs from 2009 onwards (**Table 4**), PMI will increase its support for the number of bednets procured and distributed to 1,500,000 LLINs in FY10. The LLINs will be distributed free through a range of distribution channels including health facilities and HEWs, schools and churches, NGOs, food security and other social welfare programs. In addition to the

LLIN procurement and distribution, PMI in-country staff will also be actively involved in formulating an ITN/LLIN replacement strategy for LLINs in collaboration with the FMOH and other in-country stakeholders. Finally, plans are being developed to conduct an independent verification activity to determine if the LLINs are actually in the houses of the intended recipients..

### 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 the FY08 and FY09 MOPs, DDT has been the primary insecticide used for IRS in Ethiopia for decades, except in some areas where malathion was sporadically used.

Following the decentralization of the vertical malaria control program (see section **C.4.**), IRS operations are now implemented in communities selected within each district. Selection of communities for spraying is based on local knowledge using information on the history of malaria cases, altitude, and the presence of nearby anopheline breeding sites, with rainfall patterns being used to determine the number of annual spray rounds required. The same communities are often repeatedly selected for IRS because of continued high numbers of suspected malaria cases every year or proximity to a lake. It is believed that *An. pharoensis* and *An. arabiensis* breeding in lake margins and breeding sites created in river beds may be focal points for initiating epidemics when the rainy season begins, thereby allowing anopheline populations to spread.

Many targeted areas go unsprayed. Of the 3,932 communities classified as malarious in Oromia in 2007, only 953 of the 1,407 communities designated to be sprayed were actually sprayed, mostly for lack of operational funding. In FY10, it is expected that the number of villages covered by IRS will increase for two reasons: (i) PMI will support spraying more than 500,000 structures (approximately 250,000 households); and (ii) increased efforts of the FMOH to provide funds to scale-up IRS coverage in targeted areas from 30% to 90%. At the present time only DDT is used in Oromia (not malathion or the pyrethroids). Spraying is conducted by contract spray men (i.e., not by women) who receive six-day training. IRS is implemented by squads of four IRS spray men 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 IRS spray squads during a 50-day period immediately prior to the start of rainy season. Limited motorized transportation requires IRS spray teams to camp in the vicinity of spray operations and to use mules when vehicles are unavailable. 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 strategic plan include the timing and quality of IRS, development of high levels of resistance in vector populations, particularly DDT, limited funds for insecticides, pumps and spare parts, vehicles and operational funds, re-plastering of houses, and environmental compliance. Although the Global Fund is providing funds for IRS training in 40 districts, there is a critical need for expansion of training for effective and compliant implementation of IRS activities. In order for districts to procure insecticides, the regions must deposit funds in national bank accounts prior to placing orders.

**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. organo-chlorines (e.g. DDT), organo-phosphates (e.g. malathion), 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 ingredient. In 2009 the plant has also begun formulating deltamethrin to be used for IRS. In FY09 PMI provided technical assistance for quality control at the plant resulting in the DDT sachets being stamped with unique district identifiers for improved tracking; improved sachet packing and sturdier shipping boxes, plus an additional quality assurance step to inspect the final overall packing.

**Insecticide susceptibility studies:** As detailed in the MOP FY 08 and FY09, 16 insecticide susceptibility tests were carried out between 1986 to 1995 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.

Therefore, with PMI support, insecticide resistance monitoring studies were carried out in 2008. High DDT resistance in the local populations of *An. gambiae s. l.* (presumably *An. arabiensis*) was observed, as depicted from the small number of knocked down mosquitoes in addition to lower mortality rates (**Table 5**). There also appears to be decreased susceptibility to deltamethrin, with 30% and 74% of female *An. gambiae s. l.* resistant in Asendabo and Eddo-kontola (but with only 4% resistant in Adama). There was a higher susceptibility to malathion in the two areas tested. While the epidemiological impact of these tests of physiological resistance are not yet known, the results point to the urgency for a more precise understanding of the degree and spread of resistance, and the need to investigate alternative insecticides covered under the expanded SEA.

**Table 5. Susceptibility status of *An. gambiae* s. l to DDT, deltamenthrin and malathion in Oromia Region in Ethiopia (November 2008 – January 2009).**

| District | Village | Number tested* | | Number dead (%) | | Number knocked-down at the end of 80 minutes (%) | |
|---|---|---|---|---|---|---|---|
| | | Male | Female | Male | Female | Male | Female |
| *DDT* | | | | | | | |
| Adama | Sodere | 120 | 113 | 32 (26.7) | 39 (34.5) | 34 (28.3) | 40 (35.4) |
| | Gergedi | 100 | 100 | 23 (23.0) | 18 (18.0) | 26 (26.0) | 27 (27.0) |
| Lume | Koka | 100 | 120 | 22 (22.0) | 13 (10.8) | 25 (25.0) | 25 (20.8) |
| Adami-tulu | Eddo-kontola | 85 | 86 | 5 (5.9) | 1 (1.2) | 5 (5.9) | 1 (1.2) |
| Omo-Nada | Asendabo | 100 | 100 | 4 (4.0) | 1 (1.0) | 0 (0.0) | 1 (1.0) |
| *Deltamethrin* | | | | | | | |
| Adama | Sodere | ND | 100 | ND | 96 (96.0) | ND | 91 (91.0) |
| Adami-tulu | Eddo-kontola | 80 | 100 | 43 (53.8) | 26 (26.0) | 54 (67.5) | 75 (75.0) |
| Omo-Nada | Asendabo | 100 | 100 | 67 (67.0) | 70 (70.0) | 68 (68.0) | 73 (73.0) |
| *Malathion* | | | | | | | |
| Adami-tulu | Eddo-kontola | 100 | 100 | 96 (96.0) | 94 (94.0) | | |
| Omo-Nada | Asendabo | 108 | 102 | 86 (79.6) | 93 (91.2) | | |

**GoE activities in 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 removal by community participation and for 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 900,000 $m^2$ of breeding sites were either filled or drained. In spite of these considerable efforts, there had been very little capacity to effectively target, monitor and evaluate these activities.

The FMOH and ORHB now recognize the challenge of determining the productivity of suspected breeding sites and the lack of good documentation of the impact of the larval control efforts. The ORHB has also identified low community participation as a challenge 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, sugar plantation in Wonji and the pits, pools and ponds in rural Zuway. Although malaria prevalence is likely to be high around valleys, it was deemed logistically problematic to organize ground application of larvicides in such areas that flood large areas and become inaccessible on foot. The sugar estate has discrete larval habitats that can be controlled by larviciding. It was suggested that the sugar estate should take responsibility for larviciding as part of their efforts to control malaria in the estate.

It was concluded together with the stake holders that larviciding is likely to succeed best in the Zuway area where breeding sites are small in size and readily accessible.

Once this larval source management program is established, it would serve as a training platform for monitoring and decision making on the efficacy and feasibility of larval source management in specific habitats.

*Progress to date of PMI supported activities*

PMI's IRS activities are fully integrated within the FMOH's national strategy and the ORHB strategy. PMI provides support to IRS operations at three levels in Ethiopia: national, regional in three highly malarious zones of Oromia as shown in the table below. At the national level, PMI uses existing working groups to provide support to the FMOH, including in the development of guidelines, policy and strategy as well as technical assistance for operations, IRS equipment and entomological monitoring. In the Oromia as a whole, PMI supports procurement of all insecticide needs, annual IRS micro-planning, training workshops, and some operational funds for implementation and supervision. The difference in the 24 target districts is that in addition to the support provided to the region as a whole, PMI provides the complete costs for equipment, IRS operations and environmental compliance. The balance of support to the twenty-three targeted districts and support to the rest of the region will be re-evaluated after the current spray round.

**Levels of PMI support for IRS activities in Ethiopia.**

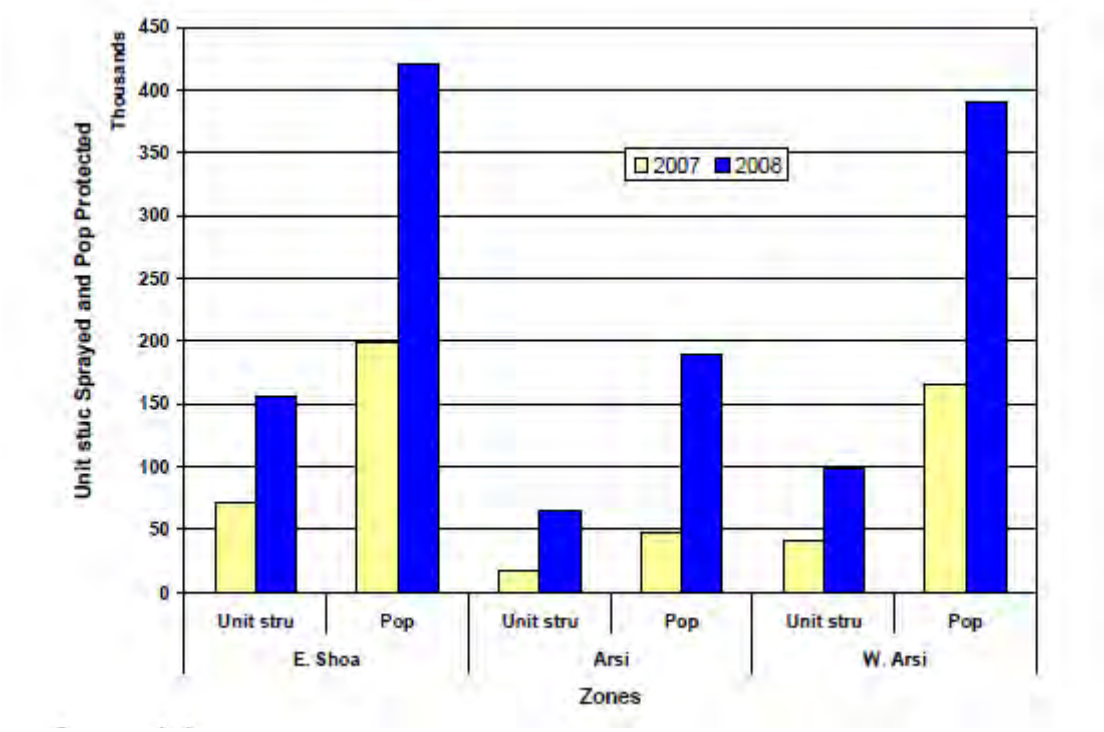
| National Level: | Regional Level: | Targeted three zones |
|---|---|---|
| - Policy TA, including development/review/modification of in-country guidelines;<br>- Training workshop, e.g. spray pump maintenance;<br>- TA in procurement of IRS equipment and environmental compliance;<br>- Rehabilitation of Adama Malaria Reference Training Center. | - Micro-planning to assist ORHB to assess IRS gaps and needs;<br>- Training for spray pump maintenance; supervision of IRS activities; entomological monitoring;<br>- Procurement of insecticide / provide partial operational funds<br>- TA in procurement of IRS equipment and environmental compliance; | - Micro-planning to assess gaps and needs for IRS in PMI target districts;<br>- Training for spray pump maintenance; supervision of IRS activities; entomological monitoring; *plus* spray operator training<br>- Procurement of insecticide and IRS equipment<br>- Entomological Monitoring<br>- Implementation and supervision of IRS operations;<br>- Environmental compliance; |

While the PMI- supported entomological monitoring activities are focused on the 24 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 support, there was no routine entomological monitoring at either regional or national level. The assessments conducted in 2008 and in 2009 were led by staff from RTI with technical support from PMI/Ethiopia and CDC/Atlanta 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 FY08 PMI completed a SEA for the use of IRS pesticides, DDT and malathion, and 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. Insecticide for the entire Regional State was procured by non-PMI, USAID/E funds from FY06 and FY07. Evaporation tanks for insecticide were constructed in those districts targeted for IRS. Thus, a total of 29 staging areas and camping sites were identified in 20 districts for triple rinsing and a need for evaporation tanks to capture waste water. A mid-spray operation environmental compliance inspection highlighted the need for improved storage facilities at the district level, separate training for storekeepers, and stronger supervision.

PMI supported the ORHB's micro-planning meeting for IRS activities, including targeting, mapping and information management related to IRS in three administrative zones (i.e. East Shoa, Arsi, West Arsi) and 19 districts that historically contributed about 40% of the malaria in Oromia. The FY08 target was 425,000 household structures, but when the spraying took place in these districts, only 326,000 were found. Of these, about 316,829, or 92% were sprayed protecting just over one million residents. Training of IRS trainers was provided to 152 persons who in turn trained 1,046 spray operators. Another training of trainers for health communication (IEC/BCC) was provided to 36 district health education focal persons, who in turn trained and oriented 835 community leaders and district political figures. As shown in the following graph, PMI support significantly increased the structures sprayed and population protected in these three zones in 2008 when compared to the spraying activities conducted by the Oromia RHB in 2007 (**Figure 4**). In addition to the 19 districts where PMI covered the complete costs and management of the IRS operations, the ORHB used insecticide supplied by USAID, but with its own equipment and operations costs to spray an additional 1.5 million structures, protecting nearly five million persons in the region. -

**Figure 4. Unit structures sprayed and population protected in 2007 (Oromia RHB) and 2008 (PMI/RTI).**




*Proposed USG component for FY10 ($8,530,000)*

FY10 PMI support for IRS operations in Oromia is expected to be at the same level as in FY08 and FY09, with approximately the same number of targeted structures (i.e. 500,000). There will, however, be changes within this overall budget, with less funding for capital equipment (e.g. spray pumps and parts) and more funding for insecticides, which, in FY08 and FY09, were purchased with non-PMI USAID/E FY06 and FY07 funds. The exact levels for each component, as well as the balance between support for the 'complete package' in 19 districts and partial support for operations in the rest of Oromia will be determined after evaluating the FY09 IRS operations, which should be completed by August 2009

- **Procurement of IRS equipment and insecticide:** ($4,750,000) Additional spray pumps, spare parts kits and replacement personal protective equipment are estimated at about $1,7500,000. Insecticides are currently budgeted at $3,000,000 for FY10. The exact allocations between equipment and insecticides will be adjusted upon completion and review of the FY09 spray season. Additional spray equipment will be supplied for districts beyond the three zones covered in FY09 (*Note,* the commodity procurements are to cover 18 months).

- **IRS Operations:** ($2,750,000) In FY10, PMI will continue 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 500,000, roughly the same as FY09. In addition it is expected in FY10 support for operations will be spread more broadly to other districts beyond the original three zones.

- **Entomological capacity building and monitoring services:** ($300,000) Results from FY08 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 will expand monitoring to 10 sites in FY09. Technical support will be provided to coordinate entomological monitoring activities implemented by the FMOH in sites beyond Oromia (through GFATM R8 funding support).

- **Pesticide Management of IRS operations** ($50,000): Continued support will be provided for expansion of the SEA and improved pesticide management within the current IRS operations.

- **Quality control at the Adami Tulu Pesticide Processing Plant and feasibility of incineration facilities:** ($330,000) In FY09, PMI supported quality control at the Adami Tulu pesticide plant, and is planning a study to examine the feasibility for the GoE to construct an incineration facility. In FY10, support will be expanded to follow up on the feasibility study of a pesticide incineration facility. The outcome of the study will enable a final decision on the establishment of the incinerator, and subject to all necessary environmental standards being met, it is envisioned that the facility would be jointly financed by other partners.

- **Environmental compliance monitoring** ($50,000) In FY10, 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** ($300,000) In FY10 support will be provided to help the GoE develop IVM and to conduct operations research for the ongoing investments in larval source management. 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, costing approximately $100,000, will be for technical support and operations research on evaluating and improving GoE larval source management strategies and practices. A separate proposal, this component will be submitted to the PMI Operations 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 tremendous investment in the building and equipping of health posts and the 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 and support the ORHB Health Education Unit and the FMOH's Health Education Extension Center (HEEC). 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. A number of 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 FY09, coordinated by the Academy for Educational Development (AED)'s C-Change program. 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 facilitating reduced re-plastering of walls; and (iii) improving treatment-seeking behavior for fever.

The 2007 MIS showed moderate use of LLINs (at altitudes <2000 m, 60.1% of children in houses that owned at least one ITN slept under the net the previous night; similarly, at altitudes <2000m, 65.7% of pregnant women in houses that owned at least one ITN slept under the net the previous night). In a separate AED survey, LLIN use was shown to be significantly associated with a number of factors, including 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%) 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, including UNICEF, AED and Population Services International (PSI).

*Progress to date of PMI-supported activities*

In FY09, C-Change led 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 eight essential malaria actions for a person to take; these actions have now been pre-tested and reviewed for final production. C-Change is currently collecting baseline data on the gaps in malaria IEC/BCC information in Oromia; coordinating IEC/BCC activities with other PMI implementing partners (i.e. RTI, Pathfinder/JSI); developing training malaria IEC/BCC training materials; and finalizing its strategy for large-scale roll-out of those malaria IEC/BCC activities.

*Proposed USG Component for FY10 ($1,500,000)*

Following discussion with PMI, C-Change 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 the key malaria messages and work through a wide range of implementing partners and in-country stakeholders to deliver those messages.

### 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 heath 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, with a big difference in women attending between urban (55%) and rural areas (8%). Only 6% make their first ANC visit before the fourth month. The data for Oromia are below the national average, with only 25% receiving care from a health professional (and only 0.6% from a traditional birth attendant). Although pregnant women clearly are at greater risk of infection and disease, they do not represent a large proportion of the total number of malaria patients, as malaria in Ethiopia affects all age groups and both sexes equally. Furthermore with the (generally) low malaria transmission in Ethiopia, the overwhelming majority of infections in pregnant women are symptomatic. IPTp targets asymptomatic infections, which are probably rare except possibly in Gambella and Benishan-Gul Regional States. *Hence, IPTp is not part of the Ethiopian National Malaria Control Strategy.*

Given this situation, the FMOH focuses more on scaling-up universal ITN coverage and treatment of clinical cases in pregnant women. Diagnostic and treatment guidelines for Ethiopia are currently under review, and these should contain recommendations regarding the use of ACTs in the first trimester of pregnancy. IEC/BCC efforts in this regard will be formulated based on these guidelines.

*Progress to date of USG supported activities:*

Although IPTp itself is not part of the Ethiopian Malaria Control Strategy, in FY10 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, integration of LLINs into ANC visits, and the recognition and management of acute malaria in pregnant women. 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 after birth along with protecting the newborn. In FY10, PMI will also support 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 FY09 ($0)*

**Expanding Malaria in Pregnancy services through safe motherhood and Focused Antenatal Care:** (no additional costs) As in FY08 and FY09, for FY10 PMI will continue to collaborate with family planning and reproductive health programs – including PEPFAR and the prevention of mother-to-child-

transmission of HIV (PMTCT) program activities by providing malaria-specific updates for technical materials and guidelines. PMI will also support pre-/in-service training for management of acute malaria in pregnant women (see below).

## I. INTERVENTIONS: CASE MANAGEMENT

### I.1. Diagnostics

*Background*

The mix of parasite species, the different treatment regimens, and the unstable nature of malaria transmission are unique features of malaria in Ethiopia, demanding a special emphasis, and significant investment, on improved diagnostics.

Malaria diagnosis and treatment algorithms depend on the level of the four-tiered health care system. The current treatment guidelines recommend microscopic examination of clinically suspected malaria cases to be implemented at regional/referral hospitals, district hospitals and health centers. In health facilities and other settings where microscopy is not available (i.e. primarily health posts and some health centers) use of malaria RDTs will complement clinical diagnosis.

*Progress to date of PMI supported activities*

To assess the availability of laboratory infrastructure and capacity for malaria diagnosis at all levels of the health care system in Oromia, an evaluation has been carried out in selected health facilities. These 69 health facilities (7 hospitals, 3 regional laboratories, 3 malaria centers, 46 health centers, and 10 health posts) were given priority due to the malaria burden in their respective catchment areas. The assessment showed great variability with regards to laboratory diagnostic capacity, both in terms of human resources (e.g. number of trained laboratory technicians) as well as infrastructure (e.g. number of functioning microscopes). PMI is currently supporting the procurement of laboratory equipment (e.g. microscopes and micro-hematocrit centrifuges) for those facilities identified in the baseline assessment..

In support of the national program and in collaboration with the Ethiopian Health Nutrition Research Institute (EHNRI), PMI's implementing partner for laboratory strengthening, Columbia University's International Center for AIDS, Care and Treatment Programs (ICAP) is developing a National Diagnosis and Monitoring Policy Guideline, standardizing training materials for laboratory staff and designing a quality assurance system. This system for maintaining diagnostic quality will include internal (e.g. provision and implementation of standard operating procedures and checklists) as well as external support activities (e.g. delivery and cross-checking samples or slides from facilities) quality assurance / quality control (QA/QC).

To support on-going improvement of diagnostic services, PMI will conduct regular supervisory visits and on-the-job training by laboratory experts at the appropriate level, and review comprehensive reporting of QA/QC data. Initial activities will focus on five administrative zones, i.e. East Shoa, Arsi, West Arsi, Jimma and West Hararge. These activities will build on existing laboratory systems and infrastructures established through PEPFAR funding support

With the ultimate goal of providing laboratory confirmation of all malaria cases by either microscopy or RDTs, there is a gap in supply of RDTs for Oromia with what is currently available from other sources

(e.g. Global Fund Round 8 grant does include procurement of RDTs). Based upon the diagnostics policy review, PMI will support the procurement and distribution of RDTs, with already 820,000 RDTs procured using Year 1 funds. PMI and other in-country stakeholders have been successful in advocating the FMOH for the use of multi-species RDTs in the future to enable specific diagnoses and treatments, and currently diagnostic guidelines / strategies are being revised to reflect this change.

PMI is supporting a comparative evaluation of the field applicability among health workers of several brands of RDTs (e.g. Parascreen (used in the MIS 2007), ICT Combo and CareStart RDTs) for sensitivity, specificity, storage stability; ease-of-use and test acceptance.

*Proposed USG component for FY10 ($3,050,000)*

A crucial component of effective case management is malaria diagnostic capability at all levels of the health care system. PMI continues to be committed to strengthening diagnostic capacity to support effective case management by ensuring that all the necessary components for accurate and reliable laboratory diagnosis of malaria exist in Ethiopia.

- **Support for quality assurance systems for diagnostics** ($1,000,000) PMI will continue to support the malaria diagnosis QA/QC diagnostic activities ensuring that they are fully operational and taking advantage of 'best practices' and technical support from across all PMI countries. The activities established in Years 1 and 2 will be expanded to include additional health facilities, particularly health centers and health posts in additional administrative zones and districts of Oromia.

- **Procurement of RDTs** ($1,850,000) Depending on a review of the effective use of RDTs to improve prescribing practices along with the projected FMOH gap analysis, PMI will procure and distribute 1,500,000 multispecies RDTs.

- **Procurement of lab equipment/supplies** ($200,000) PMI's support to laboratory services will expand to other administrative zones and districts in Oromia. The details of the laboratory equipment necessary for malaria diagnosis will be determined through health facility needs assessments, but are likely to include microscopes and microscope repair kits, centrifuges, and a variety of laboratory reagents.

### I.2. Pharmaceutical Management

*Background*

To address the multiple problems observed in all layers of the national drug logistics system, the FMOH, in 2005, developed a Pharmaceutical Logistics Master Plan and later created the Pharmaceutical Fund and Supply Agency (PFSA). Under the new plan, there will be 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 undertakes the procurement and distribution of the bulk of malaria commodities (ACTs, RDTs, and LLINs), including those funded by the Global Fund and PMI. For Oromia, UNICEF also supports the annual quantification of malaria commodity needs.

The Ethiopia Drug Assurance and Control Administration 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 to date of PMI-supported activities*

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. Based on this assessment, the PMI supported the development of standard operating procedures and forms for the requisition, quantification, drug exchange/transfer, managing and where possibly avoiding expiry of malaria commodities and the design of a new medication record. In addition, PMI began improving malaria commodity management in 66 health centers and 20 health posts in Oromia through improved training and supervision. During FY09, this program will be expanded to another 75 health centers and additional health posts.

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 sentinel locations in Oromia, including the provision of drug testing mini-labs and the training of DACA staff on drug sampling and testing. The first round of testing was completed and the laboratory confirmatory testing is ongoing. In FY10, PMI will help expand the post market drug quality monitoring program beyond Oromia (including establishing two additional sentinel sites) and will further improve the regulatory capabilities of DACA. PMI will also ensure that the activities described below are also coordinated with other USG implementing partners and in-country stakeholders in a context of a changing Pharmaceutical Logistics Master Plan and the nascent establishment of the PFSA.

Proposed USG component for FY2010 ($1,200,000):

- **Strengthening of anti-malarial drug management** ($800,000) In FY10, PMI will help expand the malaria drug management program from the present 66 health centers and 20 health posts in Oromia to approximately 200 health centers and to an increasing number of health posts, thereby covering approximately two-thirds of the malarious areas within Oromia. 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;
    - Implementing the PMI end-use verification program.

- **Strengthening of drug quality monitoring** ($400,000) In FY10, PMI will further improve DACA's drug quality assurance program by:
    - Supporting post-marketing drug quality monitoring in a minimum of seven sentinel sites, including at least two that are outside of Oromia region;
    - 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*

*P. falciparum* and *P. vivax* are the two dominant parasite species in Ethiopia. In malaria epidemics, *P. falciparum* is the dominant parasite species causing severe illness and death. Current treatment policy recommends the AL as the first-line drug for the treatment of uncomplicated *falciparum* malaria and chloroquine for the treatment of *vivax* malaria.

At the health post level, malaria is suspected when a patient has a fever or history of fever in the last 24 hrs and lives in a malarious area or has traveled to a malarious area within the last 15 days. If RDTs are not available, the HEW 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 (IM) or oral quinine and refer to the next level of the health system. If RDTs are available, the results should guide clinical management. A positive RDT for *P. falciparum* mandates clear action, but a negative RDT may result in referral, treatment with chloroquine or even AL (if the latter is the only antimalarial drug available). There is no national policy for HEWs to follow IMCI guidelines.

At the health center level and above, the first-line treatment of uncomplicated *P. falciparum* malaria is AL. For infants <5 kg of body weight and pregnant women in the first trimester, oral quinine should be administered. For the treatment of malaria due to *P. vivax*,, the first-line drug is chloroquine. In malaria-free areas and where compliance can be ensured, in order to prevent *P. vivax* relapses, primaquine may be administered (*Note*, in actual clinical practice, it seems likely that primaquine is used very rarely in Ethiopia, in part because of lack of capacity for blood testing for G6PD deficiency that is needed to minimize potential primaquine toxicity). Parenteral quinine is used for the treatment of severe malaria. There are detailed guidelines on patient management including salient clinical features and management of complications.

Because of poor access to health care, the FMOH embarked on an ambitious Health Extension Program (HEP). This initiative plans to reach universal health coverage primarily though building health posts staffed by two HEWs. The plan is to build 15,000 posts, staffed by 30,000 HEWs among the 626 districts.

Microscopy is not available at health posts and there are inadequate supplies of RDTs. Therefore, most of the malaria cases are clinically diagnosed by the HEW. This is a difficult setting to provide an accurate diagnosis in an environment where *P. falciparum* (to be treated with ACTs) and *P. vivax* (to be treated with chloroquine) are both present (see above), and can lead to inappropriate or inefficient use of malaria medications. Referral systems are weak and pre-referral treatment is generally not available.

*Progress to date of PMI-supported activities*

PMI has procured 1,681,000 AL treatments and drugs for severe malaria and will continue this support using Year 2 funds. PMI will also support a review of the current malaria treatment guidelines. As part of this undertaking, a partner's forum 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 for discussion will include the use of ACTs in pregnant women, and artemisinin derivatives for pre-referral treatment and for treatment of severe disease in health facilities.

Similar to the other malaria commodities, despite Global Fund support, the commodity gap for ACTs will increase from 2011 onwards. The increasing gap will 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 FY09 funding, PMI will work with the ORHB, FMOH and other implementing partners to support training programs 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. PMI will also support in-service training programs for clinical officers and HEWs, through the well-established Integrated Refresher Training Program, which is implemented in collaboration with UNICEF.

Continuous intensive supervision and monitoring is the key to improved clinical case management. PMI will support intensive supervision and monitoring of District Health Office staff from the health centers and to the health center staff to health posts. This supervision is being integrated into new family planning/maternal, newborn and child health activities to be implemented with USAID/E support. The supervision will ensure that case management is implemented effectively and in line with FMOH diagnosis/treatment protocol. 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, which could 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 FY10* ($4,470,000)

- **Procurement of ACTs, pre-referral treatments and drugs for severe malaria:** ($4,170,000) PMI will support the procurement and distribution of 3,500,000 AL treatments ($3,970,000) and other antimalarial drugs (including drugs for severe disease and pre-referral care) ($200,000) to complement other partner efforts to close the FMOH-projected future gap in ACTs.

- **Support for supervision and monitoring of malaria treatment:** ($300,000) Support to supervision and monitoring of malaria treatment during FY09 will be reviewed. Whether in the event of an 'epidemic year' occurring or increased inroads in malaria morbidity and mortality, it is expected that the supervision and monitoring of case management activities will be sustained, so as to ensure that cases receive best-practice care.

- **IEC/BCC for case management (see IEC/BCC)** (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 for Oromia will be made available to the FMOH and other partners for roll-out in the other Regional States

## J. INTERVENTIONS: EPIDEMIC SURVEILLANCE 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 3 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 is 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. DDT for epidemic response is obtained from insecticide stocks held in the region (15% of DDT is theoretically held as a reserve each year) 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. Alternative systems may be explored, including schools and other networks in the community. Also, although District Health Offices and zonal health bureaus are instructed by national guidelines to have a 10-15% stockpile of in malaria commodities, this is often not feasible due to planning and funding restrictions or increased clinical demand for these supplies.

In 2009, the Public Health Emergency Management system (PHEM), which encompasses reporting from health posts, health centers and hospitals was established. This weekly vertical reporting system collects 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.

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 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 to date of PMI supported activities*

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 will start supporting the strengthening of the alert system and health worker trainings for early epidemic detection in FY09.

*Proposed USG component for FY10* ($200,000)

PMI will continue to provide support to the ESR in Oromia. In FY10, it expected that PMI will sustain as well as expand ESR activities to include additional zones and districts (including zones outside of Oromia). PMI will support planning at the district, zonal and regional levels for epidemic preparedness and response, and will also strengthen epidemic alert systems, including investigation of novel systems for epidemic detection such as school-based programs. This activity is primarily one of system strengthening. The Ethiopian health system has had a malaria epidemic surveillance and response system in place for many years, funded through their regular national and regional budgets. Currently, no assessment has been made with regard to the system's responsiveness or quality of operations. The aim of this activity is to strengthen the existing system through capacity building and improved information management systems, rather than contingency funding for commodities to control the epidemic.

As per national guideline, health-service based data, ideally collected at the peripheral level, is imperative to monitor trends of malaria-related morbidity. As such, PMI will support the HEP to assist in an improved early detection system for malaria epidemics, so that any outbreaks can be halted or controlled quickly.

## 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 'Country Operational Plan' to ensure our respective plans complement and strengthen each other. While for PMI, these coordinated efforts will be specifically for Oromia, PEPFAR may be able to support some of the areas of common interest in other regional states where they has been significant PEPFAR support, such as Gambella and Amhara.

Thus, approximately 30% of PMI's budget is going to so-called 'wrap around' activities, 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 FY10* (Costs covered under other relevant sections)

- **IEC/BCC:** Both PMI and PEPFAR develop IEC/BCC activities that can achieve synergy between the two programs to increase preventive and curative malaria interventions using a range of different community-based and non-community-based approaches. With PEPFAR support, community-based, malaria-specific IEC/BCC interventions developed with PMI support are delivered by the USAID/E implementing partner at sites aiming to increase ANC attendance as well as strengthening ANC/prevention-of-mother-to-child transmission of HIV (PMTCT) service delivery in communities of Oromia. This contributes to an increased coverage/reach of malaria 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 to HIV/AIDS to expand these to include malaria diagnosis. A CDC/Ethiopia PEPFAR implementing partner, Columbia University's ICAP, is leading the implementation of malaria laboratory activities under a new PMI USAID/E award, using many of the systems (e.g. training modules, supervisory checklists, staff, equipment) established for the HIV/AIDS activities. These laboratory activities will also include USAID/E 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 trainings in Ethiopia are being implemented on an *ad hoc* basis, depending on programmatic needs and funding availability. In 2009, it is anticipated that training will be integrated addressing the training needs of all health teams of USAID/E HAPN office, including 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 systems and approaches (e.g. training modules for trainees and trainers) in this realm.

- **Pharmaceutical systems strengthening:** PEPFAR has been supporting the development of the country-wide PLMP as well as several activities strengthening procurement, delivery, storage, dispensary and tracking of HIV and non-HIV drugs. PMI is building upon these activities, by adding anti-malarial drugs to the scope of work of these activities, which will enable to track anti-malarial drugs within the existing system. existing mechanisms and approaches are not duplicated.

- **Policies and guidelines:** Several of the in-country malaria and HIV guidelines and strategies need to be developed, modified or updated in FY10. It is envisaged that respective policies and guidelines will include biological as well as programmatic information and guidance for malaria and HIV (e.g. for case management of malaria as a co-infection in HIV patients).

## L. NEGLECTED TROPICAL DISEASES

*Background*

Several neglected tropical diseases (NTDs) are prevalent in Ethiopia, including those that are targeted by USAID's initiative, i.e. intestinal helminths, filariasis, onchocerciasis, and schistosomiasis.

While for some of the NTDs up-to-date data exists because of operational program activities by either the FMOH or in-country stakeholders (e.g. the Carter Center), data for others is limited (e.g. filariasis and schistosomiasis). Nonetheless, both up-to-date and focal data suggest that the burden of NTDs is considerable, either as single infections or co-infections with prevalence of certain NTDs often exceeding 20-30%.

Only trachoma and onchocerciasis have large-scale intervention programs, including mass drug administration campaigns of amoxycillin (Zitromax ®), ivermectin and eye surgery. For those areas that are sympatric for malaria as well as filariasis and leishmaniasis it is likely that the malaria vector control interventions of IRS and LLINs will also have an impact on these other vector-borne diseases.

With non-PMI funds from FY06 USAID/E is currently supporting the Malaria Consortium to develop a malaria risk map for Oromia. The risk map will be developed using data from school-based malaria surveys. Leveraging that support, with additional funding support from the Wellcome Trust surveyed school children are also surveyed for helminths. While the work is still ongoing, survey work in 19 schools has shown that 568 of 2000 (28%) fecal samples collected were positive for helminths. It is anticipated that the results of that survey will also be used to develop a risk map for helminthes and, ultimately, may lead to specific NTD funding. The survey should be completed by mid 2010.

*Proposed USG component for FY10* ($0)

## M. CAPACITY BUILDING WITHIN THE NATIONAL MALARIA CONTROL PROGRAM

*Background*

As Oromia is the largest Regional State in Ethiopia, fulfilling adequate human resource needs has been a major challenge. For example, only one third of the positions needed for the logistics sector are filled. Decentralization of the health care system places an additional management burden on the Zonal and District Health Offices.

While it is beyond the scope and the mandate of PMI to address the system-wide capacity issues, there are areas within the NMCP where capacity can be strengthened. The following system-wide information is intended to provide a context to the malaria program activities.

Major constraints during the implementation of the HSDP I and II included the shortage of skilled health

workers, high turnover and lack of motivation to retain health professionals in remote and inaccessible health facilities. Human resources are not evenly distributed in the different zones of the region, with severe shortages in the remote areas.

**Training of health professionals:** There are seven nursing colleges in the region providing training for a 3-year diploma program. Each school admits a minimum of 200 students per year. The health professional to population ratio is 1 physician to 68,951 people, which is lower than the WHO standard of 1: 10,000 for Africa; 1 nurse serves 9,309 people, also lower than the WHO standard of 1:5000 for Africa. The RHB has tried to increase the number of health professionals through trainings at the regional training centers and other colleges and universities. The RHB has a three year human resource development strategy and has begun expanding enrollment in the six nursing colleges as well as a private college. In the academic year 2005/2006 the number of nurses enrolled in the six nursing colleges was 1,500, compared to just 500 in previous years. The RHB has also enrolled 100 medical students separately in Jimma University to address the shortage of physicians.

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 (EIS) 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 E-FELTP will receive a Masters Degree in Public Health and Field Epidemiology. A steering committee has been operational since October, 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 (AFENET), through which it can exchange experiences and collaborate with similar programs of other countries in the region.

**Staff retention:** The RHB 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 through 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.

*Proposed USG support for FY10* (Costs covered under other relevant sections)

PMI will collaborate with other partners to strengthen the capacity of the RHB staff and others at the national, district and community levels to plan, implement, supervise, monitor and evaluate malaria prevention and control activities in FY08, FY09 and FY10. Skills strengthening will address needs in human resources and financial management, information technology and project management, as well as the malaria-specific technical skills. In addition, PMI will work with the FMOH and partners to help identify additional staffing resources to support the RHB and NMCP activities.

Through in-service training and quality assurance, PMI will help keep health providers in their current positions and location. While the RHB will concentrate on staff retention plans and incentive structures, PMI will support quality training and follow-up to identify bottlenecks in performance and identify strengths in implementation to continuously improve in-service and refresher trainings for malaria case management.

In FY08 and FY09, PMI will have placed technical experts of implementing partners in the RHB (either at regional, zonal or district level) to assist with malaria activities; it is envisaged that this support will continue in FY10. 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.

Key contributions will be made in training health workers and developing and strengthening capacity for supportive supervision. Support for training will include pre-service, in-service and refresher training of health workers in case management, laboratory diagnosis, IRS, commodity logistics, and interpersonal communication. In Year 3, 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 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 by providing ongoing technical assistance, mobilization of resources, and supporting epidemic response prediction and preparedness. The MCST provides a joint forum to share duties and responsibilities, avoid duplication and discuss priorities. PMI became members of the MCST in FY08.

Part of the MCST is the Technical Advisory Group (TAG), which includes the main malaria stakeholders in the country, i.e. FMOH, Carter Center, CNHDE, MACEPA, Malaria Consortium, PMI, UNICEF and WHO. The TAG 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. Currently, PMI is co-chairing the TAG.

*Progress to date of PMI supported activities*

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

*Proposed USG component for FY10* (Costs covered under other sections)

Activities that have started in FY08 and FY09, and will be continued to be implemented with PMI FY10 support will further strengthen in-country coordination by a series of annual micro-planning workshops for each major set of PMI activities outlined in the MOP. These workshops will ensure that (i) materials, guidelines, policies, strategies are reviewed, updated, modified and/or developed; (ii) activity 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 as well as avoid duplication of malaria prevention and control activities.

## O. PRIVATE SECTOR PARTNERSHIPS

N/A

## P. MONITORING AND EVALUATION

*Background*

The 2010-2015 National Strategic Plan for Malaria Prevention and Control aims to achieve malaria elimination within specific geographical areas with historically low malaria transmission and near zero malaria transmission in the remaining malarious areas of the country by 2015. A national M&E plan for malaria control was recently drafted in order to coordinate the collection, analysis, and management of malaria data to inform programmatic decisions and to assess whether these goals have been achieved.

Currently a paper-based system of data collection at health facility level exists, 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 (GAVI), aims to provide one standardized set of health indicators nationally. There are two malaria-specific indicators (disaggregated by age):

- 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 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 to date of PMI supported activities*

Formalized M&E activities for malaria prevention and control as well as tracking malaria commodities are just now beginning. Recognizing that such M&E activities are vital in order to optimally target program resources and to be aware of the extent to which malaria activities are effective, PMI supported M&E efforts through the MEASURE III Leader Award. However, given funding and logistic issues resulting from the award process, implementation of M&E activities have largely been delayed. Funds allocated for these efforts from previous years will used to initiate activities in FY10.

**Malaria risk maps:** PMI is supporting the Malaria Consortium to develop a detailed malaria risk map. This map will be able to identify areas at risk for malaria, including epidemic-prone areas, based on the best available data, and can identify areas where pre-elimination is feasible based on program coverage and epidemiological and ecological conditions. The risk map will also provide coverage and impact indicators stratified by transmission zones. Malaria risk mapping is critical, first to improve targeting PMI and other program resources, and second to track progress at the community level.

*Proposed USG component for FY10* ($900,000)

PMI plans to strengthen and support malaria M&E activities in Oromia and build upon the accomplishments of the planned FY09 activities. 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.

- **Sentinel Sites ($300,000):** PMI will establish a surveillance system based on sentinel sites. This will enable Oromia to capture malaria indicators beyond the limited routine indicators in the HMIS and track morbidity and mortality to evaluate program effectiveness in real time. These sites are to be placed in areas known to be highly malarious (i.e. at elevations <2000m and with substantial numbers of malaria cases). The list of sites will be finalized during the work plan development and include a range of health facilities (i.e. hospital and health centers).

  In developing these sentinel sites, PMI will:

  - Review existing data collection and health management systems (e.g. clinic, laboratory, pharmacy) of participating facilities;
  - Standardize the patient record form to include all required information for comprehensive M&E of program activities;
  - Create a database that parallels information gathered from the patient record form; this database should allow for data to be entered at the individual level and aggregated for reporting purposes;
  - Train designated health facility personnel responsible for data collection and reporting; training will include a description of health facility-based surveillance, recording procedures, quality control procedures, and data reporting as well as highlight consistent use of a diagnostic algorithm;
  - Implement, with the assistance of partners, the surveillance system in selected sites and provide technical assistance as needed; obtain data from the sentinel sites and assess the quality of data collected;
  - Generate reports containing aggregate indicators and disseminate to partners monthly.

The information derived from these sites will continue to play a critical role in PMI/E, the FMOH, and other partners being able to determine trends and levels in various malaria program processes and the overall malaria situation. The data collected from these sites will help to inform programmatic decision-making, predict demand for services and service provision needs, describe broad trends across the selected facilities, and contribute to a standard set of indicators for malaria surveillance. This will allow stakeholders to compare the burden of malaria, utilization of services, adherence to clinical algorithms, and availability of pharmaceutical and laboratory supplies among the sites within Oromia.

- **Routine Information Systems:** PMI will need to evaluate the quality of the revised HMIS data and that historically collected under the old system, as the indicators being captured may reflect different information at varying points of service. PMI will also assess the completeness and timeliness of recording and reporting, identify obstacles and roadblocks and describe the current use of the information at each tier of the health system. Based on these assessments, PMI will provide recommendations on how data quality can be improved and provide guidance to the RHB to better utilize this data. This data will be utilized for resource allocation, program activities, and policy-making at all levels of the health system down to the health center

- **ITN database ($100,000):** In 2007 a national ITN distribution was carried out across Ethiopia, whereby each household in malarious parts of the country was to receive two such nets. A total of about 20 million nets were to be distributed to about 10 million households. Unfortunately there is no

process in place to carry out an adequate job of tracking the recent distribution or future distributions. The MIS 2007 found a very high percentage of households in malarious areas reporting that they had no ITNs and far fewer had two or more ITNs. To address this discrepancy, PMI will support development of an ITN tracking system in order to effectively track future ITN distributions and explain the existing discrepancies between the ITNs distributed and the percentage of houses reported to be in possession of ITNs. Although this database will be Oromia-specific, the model developed will also be made available for application throughout Ethiopia.

- **DHS:** The Ethiopia DHS is carried out every five years, the last DHS occurred in 2005 with the next one scheduled for 2010. The DHS is a nationally representative, population-based sample surveys undertaken to collect data on a wide variety of demographic and health indicators. Importantly, the DHS is designed to produce data that are comparable over time, and with the MIS. However, as the DHS is implemented during the dry season, certain indicators (e.g. LLIN use) may not be comparable with the MIS which is implemented during peak malaria transmission. Although, the DHS 2010 will not collect parasitemia data, it will collect anemia data along with the inclusion of a malaria module. The DHS includes a household register for the ascertainment of the age, sex, and relationship to the head of household for all individuals within selected households. The 2005 DHS included a sample of 14,645 households and it is expected that the 2010 DHS will have a similar sized sample. As such, an Oromia-specific estimate will be obtained.

- **MIS ($500,000):** PMI will support a follow-up MIS in Ethiopia. Although the National M&E plan recommends a MIS every 2-3 years, given the scheduled 2010 DHS, the next MIS will be provisionally scheduled for 2011. Unlike the DHS, the MIS will include biomarkers to assess parasite prevalence. As with the MIS 2007, this survey will be nationally representative, but will over-sample Oromia to provide an Oromia-specific estimate. PMI will continue discussions with GoE counterparts on the timing of the MIS and how this will be compatible with either a partial or full malaria module in the 2010 DHS

## Q. STAFFING AND ADMINISTRATION

Current PMI team is comprised by four USAID/E staff members: one U.S. resident Personal Service Contract Malaria Advisor, one Foreign Service National (FSN) Senior Malaria Advisor, one FSN Program Assistant, and one CDC Malaria Residential Advisor. All PMI staff is part of a single inter-agency team led by the USAID/E Mission Director and the Chief of the Health, AIDS, Population and Nutrition Office. Additionally, PMI shares a number of USAID/E support staff with other USAID/E offices, e.g. Financial Controller, Executive Officer, 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/E Mission Director or the HAPN Office Chief.

*Proposed USG component FY10* ($1,000,000)

The current PMI staffing structure will continue in FY10. However, because of the breadth and work load of now fully established PMI activities as well as the expected scale-up and geographical expansion of PMI activities, one additional USAID/E FSN Malaria Advisor will be hired to support the PMI team in managing established and future activities. Candidates for these positions will be evaluated and/or interviewed by PMI/E, with the final recruitment decision made by USAID/E.

## R. TABLES

Table I - Timeline of Activities
Table II – Planned Obligations
Table III – Budget Breakdown by Intervention
Table IV – Budget Breakdown by Partner

**Table I**

**President's Malaria Initiative – *Ethiopia***
**Year 3 (FY10) Timeline of Activities**

| ACTIVITY | 2010 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC |
| Purchase LLINs | | | | | | | | | | | | |
| Purchase RDTs | | | | | | | | | | | | |
| Purchase ACTs | | | | | | | | | | | | |
| Purchase IRS equipment and supplies | | | | | | | | | | | | |
| LLIN distribution and replacement | | | | | | | | | | | | |
| Entomologic monitoring | | | | | | | | | | | | |
| Quality control/ environmental compliance: Adami Tulu | | | | | | | | | | | | |
| IRS training of sprayers and procurement | | | | | | | | | | | | |
| IRS campaign | | | | | | | | | | | | |
| Epidemic response detection | | | | | | | | | | | | |
| Develop and disseminate IEC/BCC messages for net use, case management, ANC utilization, IRS | | | | | | | | | | | | |
| Develop and disseminate messages for LLIN use | | | | | | | | | | | | |
| Strengthen drug management system | | | | | | | | | | | | |
| Training in lab diagnostics | | | | | | | | | | | | |
| Training clinical officers and health extension workers | | | | | | | | | | | | |
| Supportive supervision for lab diagnostics and case management; QA/QC for microscopy and RDTs | | | | | | | | | | | | |
| Maintenance and expansion of sentinel sites | | | | | | | | | | | | |
| HMIS support | | | | | | | | | | | | |

**Table II**

**President's Malaria Initiative – *Ethiopia***
**Planned Obligations for FY10 (**$31,000,000)

| Proposed Activity | Mechanism | Budget | Commodities | Geographic area | Description of Activity | Page Reference |
|---|---|---|---|---|---|---|
| **PREVENTIVE ACTIVITIES** | | | | | | |
| LLIN distribution | UNICEF | 10,000,000 | 10,000,000 | Oromia | Provide 1,500,000 free LLINs through health facilities, HEWs and other networks | |
| LLIN distribution | tbd | 150,000 | | Oromia | Potential for private sector distribution, TA on net disposal, net strategy development, TA on routine distribution | |
| IEC/BCC for LLINs, IRS, case management | AED *C-Change* | 1,000,000 | | Oromia | 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 (CBO support) | tbd | 500,000 | | Oromia | CBO implementation of various IEC/BCC approaches; collaboration with RHB, HEC and in-country partners | |
| Procurement of insecticide | IRS IQC Global Task Order | 3,000,000 | 3,000,000 | Oromia | Procurement of insecticides | |
| Procurement of IRS equipment | IRS IQC Global Task Order | 1,750,000 | 1,750,000 | Oromia | Spray equipment and personal protective gear | |
| IRS operations | IRS IQC Global Task Order | 2,750,000 | | Oromia | Training, implementation and supervision support for IRS operations including capacity for targeting IRS, with GIS and other information management | |

| Proposed Activity | Mechanism | Budget | Commodities | Geographic area | Description of Activity | Page Reference |
|---|---|---|---|---|---|---|
| **PREVENTIVE ACTIVITIES** | | | | | | |
| Entomological monitoring and capacity-building | IRS IQC Global Task Order | 300,000 | | Adama | Sustaining capacity for entomological monitoring for vector control, including Adama training facilities | |
| Pesticide management | IRS IQC Global Task Order | 50,000 | | Adami Tulu | Support strengthening environmental compliance capacity including DDT distribution chain from Adami Tulu plant to final use and disposal | |
| Environmental compliance | IRG | 50,000 | | National | TA support for review of environmental compliance of PMI supported activities | |
| IVM transition and OR | IVM | 300,000 | | tbd | Support to GoE to transition to IVM; Operational research to assess the efficacy of larval control to reduce transmission | |
| Incinerator (pending EO approval) | tbd | 330,000 | | Adami Tulu | Facilitate establishment of incinerator for pesticides. | |
| **Subtotal Prevention** | | **20,180,000** | **14,750,000** | | | |
| **MALARIA IN PREGNANCY** | | | | | | |
| | | | | | | |
| **Subtotal Malaria in Pregnancy** | | | | | | |

| Proposed Activity | Mechanism | Budget | Commodities | Geographic area | Description of Activity | Page Reference |
|---|---|---|---|---|---|---|
| **CASE MANAGEMENT** | | | | | | |
| Support for quality assurance system for microscopy and RDTs | ICAP | 970,000 | | Oromia | Support RHB, EHNRI and RRLs to improve laboratory services and QA/QC for microscopy and RDTs at health facility level | |
| Support for quality assurance system for microscopy and RDTs | MCDI *IMAD* | 30,000 | | Oromia | TDYs for technical assistance of main PMI-supported malaria diagnostic activities | |
| Procurement of RDTs | UNICEF | 1,850,000 | 1,850,000 | Oromia | Procurement and distribution of 1,500,000 RDTs to support FMOH/RHB efforts to scale-up RDT use at health facility level | |
| Procurement of lab equipment/supplies | JSI *Deliver* | 200,000 | 200,000 | Oromia | Procurement of laboratory equipment and supplies (e.g. microscopes), and including logistics systems support | |
| Procurement of ACTs, pre-referral treatment and drugs for severe malaria | UNICEF | 3,970,000 | 3,970,000 | Oromia | Procurement of 3,500,000 ACT treatment dosages; rectal artesunate and severe malaria treatment and supplies | |
| Procurement of chloroquine, pre-referral treatment and drugs for severe malaria | UNICEF | 200,000 | 200,000 | | Procurement of 2,000,000 treatment dosages of chloroquine and quinine | |
| Pre/In-service training clinical officers and HEWs in diagnosis and treatment | *tbd* | 0 | | Oromia | In/pre-service training of clinical officers and HEWs for improved diagnosis and treatment including rational use of drugs | |
| Provide systems support for ongoing supervision and monitoring of malaria treatment | IFHP | 300,000 | | Oromia | Support for supervision for in-patient, out-patient and community-based management of malaria; collaboration with Zonal and District Health Offices | |

| Proposed Activity | Mechanism | Budget | Commodities | Geographic | Description of Activity | Page Reference |
|---|---|---|---|---|---|---|

| | | | | area | | |
|---|---|---|---|---|---|---|
| **CASE MANAGEMENT** | | | | | | |
| Strengthening of drug management system capacity | MSH *SPS* | 800,000 | | Oromia | Strengthening of drug management system, quantification and procurement; distribution management; and health facility drug availability and management | |
| Strengthen drug quality monitoring | USP *DQI* | 400,000 | | Oromia | Support to DACA for monitoring of post marketing anti-malarial drug quality | |
| **Subtotal Case Management** | | **8,720,000** | **6,220,000** | | | |
| **EPIDEMIC RESPONSE** | | | | | | |
| Epidemic surveillance and response | IFHP | 200,000 | | Oromia | 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 | |
| **Subtital Epidemic Response** | | **200,000** | | | | |
| **MONITORING AND EVALUATION** | | | | | | |
| Training Zonal Health Officers in Data Management | MEASURE III | 0 | | Oromia | Improve recording and reporting of routine malaria service utilization | |
| Sentinel site development | MEASURE III | 300,000 | | Oromia | Maintain 10 sentinel sites, establish additional sites | |
| Malaria Indicator Survey | *tbd* | 500,000 | | Oromia | Malaria Indicator Survey in 2011; funds for FY10 will be used for planning and potentially implementation. | |

| Proposed Activity | Mechanism | Budget | Commodities | Geographic area | Description of Activity | Page Reference |
|---|---|---|---|---|---|---|
| **MONITORING AND EVALUATION** | | | | | | |
| Program tracking tools and skills strengthening | MEASURE III | 100,000 | | Oromia | Maintenance of program tracking tool database, IT infrastructure | |
| **Subtotal Monitoring and Evaluation** | | **900,000** | | | | |
| **IN-COUNTRY MANAGEMENT AND ADMINISTRATION** | | | | | | |
| TDY | CDC | 50,000 | | | 2 two-week trips: one for sentinel site supervision and one for strategic guidance to epidemiological work | |
| USAID TDY core-funded | USAID | 0 | | | | |
| In-country staff; Admin. Expenses | CDC | 300,000 | | | Salaries, benefits of in-country CDC PMI staff (1) | |
| In-country staff; Admin. Expenses | USAID | 650,000 | | | Salaries, benefits of in-country USAID PMI staff (1 PSC/2 FSN), support staff (1 FSN), vehicle | |
| **Subtotal Management Administration** | | **1,000,000** | | | | |
| **TOTAL** | | **31,000,000** | **20,970,000** | | **Commodities (**67.65%) | |

**Table III**

**President's Malaria Initiative – *Ethiopia***
**Year 3 (FY10) Budget Breakdown by Intervention** ($31,000,000)

| Area | Commodities $ (%) | Other $ (%) | Total $ |
|---|---|---|---|
| Insecticide-treated Nets | 10,000,000 (85.84) | 1,650,000 (14.16) | 11,650,000 |
| Indoor Residual Spraying | 4,750,000 (55.69) | 3,780,000 (44.31) | 8,530,000 |
| Case Management | 6,220,000 (71.33) | 2,500,000 (28.67) | 8,720,000 |
| Intermittent Preventive Treatment | - | - | - |
| Epidemic Response | - | 200,000 (100.00) | 200,000 |
| Monitoring and Evaluation | - | 900,000 (100.00) | 900,000 |
| In-country Administration | - | 1,000,000 (100.00) | 1,000,000 |
| **Total** | 20,970,000 (67.65) | 10,030,000 (32.35) | 31,000,000 |

**Table IV**

**President's Malaria Initiative – *Ethiopia***
**Year 3 (FY10) Budget Breakdown by Partner** ($31,000,000)

| Partner Organization | Geographic Area | Activity | Budget |
|---|---|---|---|
| AED *C-Change* | Oromia | IEC/BCC for LLINs, IRS, case management | $1,000,000 |
| CDC | | In-country staff; Admin. Expenses, TDYs | $350,000 |
| ICAP | Oromia | Support for quality assurance system for microscopy and RDTs | $970,000 |
| IFHP | Oromia | Provide systems support for ongoing supervision and monitoring of malaria treatment; Epidemic surveillance and response | $500,000 |
| IRG | National | Environmental compliance | $50,000 |
| IRS IQC Global Task Order | Oromia, Adama, Adami Tulu | Procurement of insecticide; Procurement of IRS equipment; IRS operations; Entomological monitoring and capacity-building; Pesticide management | $7,850,000 |
| IVM | tbd | IVM transition and OR | $300,000 |
| JSI *Deliver* | Oromia | Procurement of lab equipment/supplies | $200,000 |
| MCDI *IMAD* | Oromia | Support for quality assurance system for microscopy and RDTs | $30,000 |
| MEASURE III | Oromia | Training Zonal Health Officers in Data Management; Sentinel site development; Program tracking tools and skills strengthening; | $400,000 |
| MSH *SPS* | Oromia | Strengthening of drug management system capacity | $800,000 |
| tbd | Oromia, Adami Tulu | LLIN distribution; IEC/BCC for LLINs/ACTs management (CBO support); Incinerator (pending EO approval); Pre/In-service training clinical officers and HEWs in diagnosis and treatment; Malaria Indicator Survey | $1,480,000 |
| UNICEF | Oromia | LLIN distribution; Procurement of RDTs; Procurement of ACTs, pre-referral treatment and drugs for severe malaria; Procurement of chloroquine, pre-referral treatment and drugs for severe malaria; | $16,020,000 |
| USAID | | In-country staff; Admin. Expenses; USAID TDY core-funded | $650,000 |
| USP *DQI* | Oromia | Strengthen drug quality monitoring | $400,000 |
| **Total** | | | **$31,000,000** |