

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

PRESIDENT'S MALARIA INITIATIVE
MALARIA OPERATIONAL PLAN (MOP)
ETHIOPIA
FY 2009

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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 |
| FANC | Focused Antenatal Care |
| FBO | Faith-based organization |
| FMOH | Federal Ministry of Health |
| FSN | Foreign Service National |
| GFATM | 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 |
| 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 |
| PEPFAR | President's Emergency Plan for AIDS Relief |
| 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 |
| UNICEF | United Nations Children's Emergency Fund |
| USAID | United States Agency for International Development |
| USG | United States Government |
| 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 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, 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).

Malaria is ranked as the leading communicable disease in Ethiopia, accounting for approximately 30% of the overall Disability Adjusted Life Years lost. Approximately 75% of the country is malarious with about 68% (50 million) of the total population of 73 million living in areas at risk of malaria. An estimated 9.5 million clinical cases of malaria were reported annually from 2001-2005, with an annual average of 488,000 confirmed cases. Malaria causes approximately 70,000 deaths each year. Overall, malaria accounts for approximately 17% of outpatient consultations, 15% of admissions and 29% of in-patient deaths. However, as 36% of the population does not have access to health care service delivery, these figures may under-represent the true burden of malaria in the country.

PMI implementation in Ethiopia began in FY08 with a focus on the Oromia Regional State, the largest of the Ethiopia's 9 Regional States, covering a third of the country's landmass. In Oromia more than 17 million persons are at risk of infection; 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 received two grants from the Global Fund to Fight AIDS TB and Malaria (GFATM): Round 2 (2003 – 2008; \$ 73 million) and Round 5 (2005 – 2010; \$ 140 million). With this support the Government of Ethiopia's Federal Ministry of Health (FMOH) was able to dramatically scale-up its efforts in malaria prevention and control. Prime 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. Ethiopia's application for a GFATM Round 7 grant and a Round 2 Rolling Continuation Channel were not successful.

A Malaria Indicator Survey in 2007 indicated that the distribution of LLINs since 2005 significantly increased LLIN coverage in Ethiopia. In just three years, Ethiopia went from a household ITN coverage of less than 6% to almost 70% in intervention-targeted, malarious areas, a coverage figure only surpassed by Togo and Sierra Leone in sub-Saharan Africa. 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% (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. Using microscopy, prevalence of malarial infection was shown to be <1%. Whilst 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 large national epidemic in 2003. The low prevalence also means that there is little protective immunity in the population.

This PMI Year 2 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 2008. The activities PMI proposes to support complement the FMOH's National Malaria Strategic Plan for Malaria Prevention and Control 2006-2010, and build on investments made by the Government of Ethiopia and other partners over the past three years. While the focus is 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 country malaria guidelines and policies.

The proposed FY09 PMI budget for Ethiopia is \$19.7 million (FY08: \$19.8 million). 53% of this budget will be direct support for the procurement and distribution of commodities used for malaria prevention and control. The budget breakdown by intervention includes: procurement and distribution of LLINs (40% of the total budget); improved diagnosis, procurement and use of ACTs (28%); IRS activities (18%), information education communication / behavior change communication (IEC/BCC) activities (9%); and monitoring and evaluation (6%) activities to document program progress and impact.

To achieve PMI's goal and targets in Ethiopia, the following major activities will be supported:

Insecticide-treated Nets: Since 2005, approximately 20 million LLINs have been distributed to 10 million households nationwide with support from the GFATM, including 6.5 million LLINs in Oromia. In spite of this prodigious effort, the Malaria Indicator Survey shows coverage rates still below optimum; also, LLINs distributed since 2005 will have to be replaced from 2008 onwards. In FY09, PMI will provide 900,000 LLINs to support the FMOH in covering the LLIN 'gap' (an increase from 640,000 in FY08) by building on and strengthening routine distribution systems. Operationally, these will be delivered through Regional Health Bureau channels and through complementary activities, including networks of community-based and other non-government organizations.

Indoor Residual Spraying: PMI will support Ethiopia's long-standing and extensive IRS activities through a comprehensive range of activities, including strengthening operational planning (e.g. by improved targeting and quantification of areas for IRS operations); improving the IRS commodities' procurement, distribution and storage systems; training and supervision for IRS application and appropriate pesticide management; and monitoring and evaluation (e.g. by establishing a better operational reporting system). Monitoring and evaluation also include support for basic entomological monitoring, environmental compliance, and epidemiological impact. In FY09, PMI continues the support begun in FY08, where approximately 225,000 households in 23 highly malarious districts will have been sprayed. PMI will also continue supporting the Integrated Vector Management framework to build capacity for zonal- and district- level vector control specialists in basic entomological monitoring and improved IRS targeting.

Intermittent Preventive Treatment of Pregnant Women: Because of the generally low endemicity, but highly unstable and potentially explosive nature of malaria epidemiology in Ethiopia, relatively few pregnant women have asymptomatic malaria. Thus, IPTp is not a national strategy and the focus is rather on universal ITN coverage and prompt diagnosis and treatment of clinical cases. Whilst there will not be FY09 support for IPTp specifically, PMI will support improved pre-service training for management of acute malaria in pregnant women, support anemia management, and the malaria components of the Focused Antenatal Care services. PMI will also provide technical guidance to other USAID/Ethiopia health program activities, including a new bilateral cooperative agreement focusing on Family Planning / Reproductive Health and Maternal, Neonatal and Child Health, as well as various activities in HIV/AIDS focusing on pregnant women.

Case Management: PMI will support the review of the current malaria diagnosis and treatment guidelines, including the role and value of RDTs. PMI is committed to strengthening diagnostic capacity, including supplies, training, supervision and quality assurance/quality control. PMI will support pre- and

in-service training of health providers as part of an integrated package of overall health services delivery with on-going supervision and support, as well as an evaluative component to ensure trainings are indeed affecting quality of care related to malaria. PMI will support the procurement and distribution of ACTs and other anti-malarial drugs (including drugs for severe disease and pre-referral care). Four of the ten anti-malarial drug efficacy monitoring sites throughout the country will be supported by PMI in Oromia. PMI will also support 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 will support the Oromia Regional Health Bureau and its expanding system of health extension workers to promote early care seeking behavior and adherence to anti-malarial drug treatment. PMI will also support the Ethiopian Drug Assurance and Control Administration to ensure all malaria products entering the country meet quality standards.

Monitoring and Evaluation: There is a great 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 roll-out for routine collection of facility-based data, PMI will implement a surveillance sentinel-site system to capture indicators beyond routine surveillance data, and track morbidity and mortality to evaluate program progress and effectiveness. Funds are also budgeted for Oromia as part of a national Malaria Indicator Survey tentatively scheduled to be conducted between October and December 2009 as a follow-up to the survey conducted in 2007.

B. PRESIDENT'S MALARIA INITIATIVE

In June 2005, the United States Government (USG) announced the President's Malaria Initiative (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 artemisinin-based combination therapies (ACTs), insecticide-treated bed nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (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. Whilst the funding level for PMI in FY09 is expected to remain 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 of their existing national malaria control strategies and plans. Efforts will be coordinated with other national and international partners, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM), 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 will 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 km² and has a population of 27 million. Thus, in terms of geographical expanse and population, this state alone has almost the same population as Uganda whilst being more than twice its size.

This Malaria Operational Plan (MOP) for Ethiopia FY09 presents a detailed one-year implementation plan for the second year of the PMI in Ethiopia. This document builds on to the MOP FY08 [http://www.pmi.gov/countries/ethiopia_mop-fy08.pdf], which was developed in 2007. The MOP FY09 (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 (v) provides a description of malaria prevention and control activities that are envisaged to be supported by the PMI in Year 2 of the initiative in the country. The MOP FY09 was developed in close consultation with the Government of Ethiopia (GoE)'s Federal Ministry of Health (FMOH) NMCP, the Oromia Regional Health Bureau (RHB) and with participation of many national and international in-country malaria partners. The total amount of FY09 PMI funding requested for Ethiopia is \$19.7 million.

C. MALARIA SITUATION

The changing Ethiopia context: The preface to the FY08 MOP 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 the country's areas--- the near equal mix of *Plasmodium falciparum* and *P. vivax*, and the instability of malaria transmission and pattern of recurrent epidemics. There have been important changes in some of these elements over the past year.

Geographical focus and scale: PMI in Ethiopia focuses on Oromia. While just one of 9 Regional States, Oromia comprises 1/3 of the country's land mass 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 will concentrate in Oromia, overall systems support, training and communications materials will benefit the FMOH and, thus, the country as a whole.

Millennium Malaria Campaign 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 mass drug administrations with the ACT drug artemether-lumefantrine as a one-off activity. The mass drug administration was delivered through the health extension workers (HEWs), sometimes to just fever patients and sometimes to entire communities, without any malaria diagnosis. No data on the proportion of people treated with confirmed malaria or adverse drug reactions were collected. Although mass treatment of fever with artemether-lumefantrine and chloroquine are components of the national diagnosis and treatment guidelines, its use is limited to epidemic responses. The guidelines state that, in general, the treatment of malaria be guided by confirmed diagnosis whenever the situation permits. PMI and other stakeholders are engaging the GoE FMOH to refrain from using mass drug administration broadly and making sure that such approach will not be taken in the future.

The Malaria Indicator Survey, LLIN gaps and GFATM 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 Malaria Indicator Survey (MIS 2007). Results, provided in more detail below, indicated that the free distribution of LLINs significantly increased coverage in Ethiopia. In just three years Ethiopia increased household ITN coverage from less than 6% to almost 70% in program targeted areas, a figure only surpassed by Togo and Sierra Leone in sub-Saharan Africa. The survey also showed Oromia is lagging 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. Whilst 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). Compounding these lower than expected MIS 2007 results, Ethiopia was not successful in applying for GFATM Round 7 and R2 Rolling Continuation Channel support. This has significant repercussions on the future of national malaria control efforts. Gaps in all key malaria commodities (LLINs, insecticide, ACTs and RDTs) will be increasing from 2008 onwards as the FMOH GFATM Round 5 grant nears completion. LLINs distributed in 2005 will need to be replaced even as population growth and in-country population migration increases the number of households needing protection. These efforts will need sustained financial support from national and international malaria partners, including 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. Whilst 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, it also means that few individuals have protective immunity, and that malaria is ‘unstable’. There are early indications in 2008 of increased malaria transmission, with epidemic outbreaks reported in some parts of Southern Nations, Nationalities and Peoples’ (SNNP) and Oromia Regional States (note, no epidemic outbreak was reported by the FMOH in 2006 or 2007). This unstable and largely unpredictable malaria epidemiology makes surveillance as well as information and logistics management for antimalarial commodities of paramount importance.

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 (*kebeles*) (**Figure 1**).

Oromia has 297 districts divided into 17 zones and 9 ‘special towns’ (**Figure 2**). According to 2007 Oromia RHB 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 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 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 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 5 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 1,000,000 people; and the top tier is the specialized hospital for 5,000,000 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>]. HEWs are to focus on preventive services, except for malaria, where they can also treat. For malaria, HEWs are supposed to diagnose clinically suspect malaria cases with an RDT and provide them with artemether-lumefantrine (for *P. falciparum*) or chloroquine (for *P. vivax*); severe malaria cases are to be referred to the next appropriate health facility. HEWs are also supposed 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. There are currently discussions that HEWs may become more directly involved in managing IRS operations in their communities.

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.

Malaria in Ethiopia and Oromia

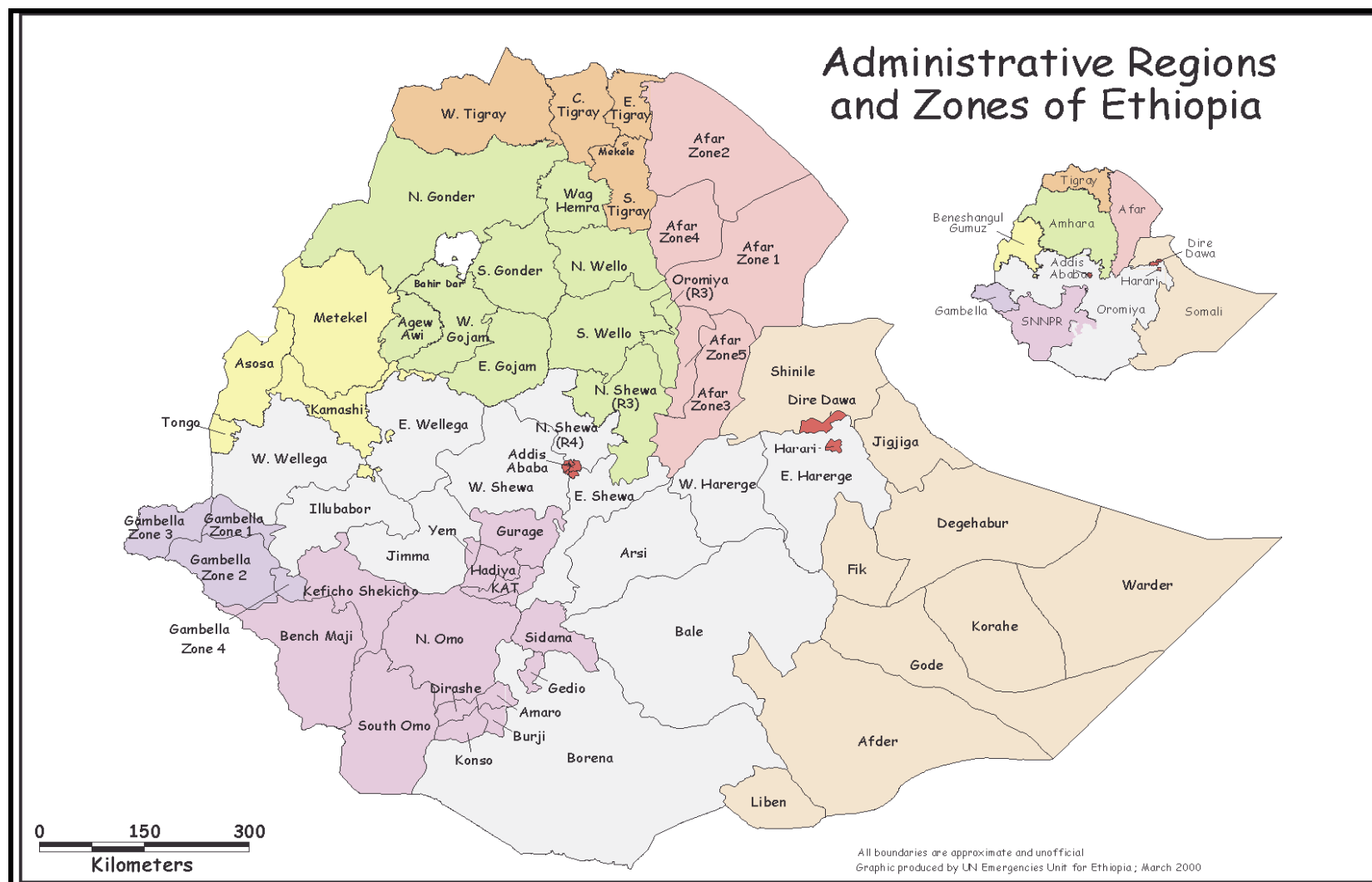
Epidemiology: Malaria in Ethiopia is highly unstable, with ‘epidemic years’ occurring every 5 to 8 years. The western, central and eastern highlands, as well as the highland-fringe areas along the Rift Valley are especially vulnerable to epidemic outbreaks. In the past two decades 48 ‘epidemic episodes’ occurred between 1986 and 1993, with severe outbreaks occurring in 1988, 1991, 1992, 1998, 2003, 2004 and 2005. Whilst no epidemic outbreaks were reported in 2006 and 2007, several outbreaks have already been reported in 2008, including in Oromia. As described in more detail below, in May 2008 Welisso district (approximately 2 hrs from Addis in Oromia), reported 600 suspected cases of malaria, 300 of which were confirmed to be positive for *P. falciparum* by RDTs (see also **Box 1** section **J.1.**).

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 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;
- 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.

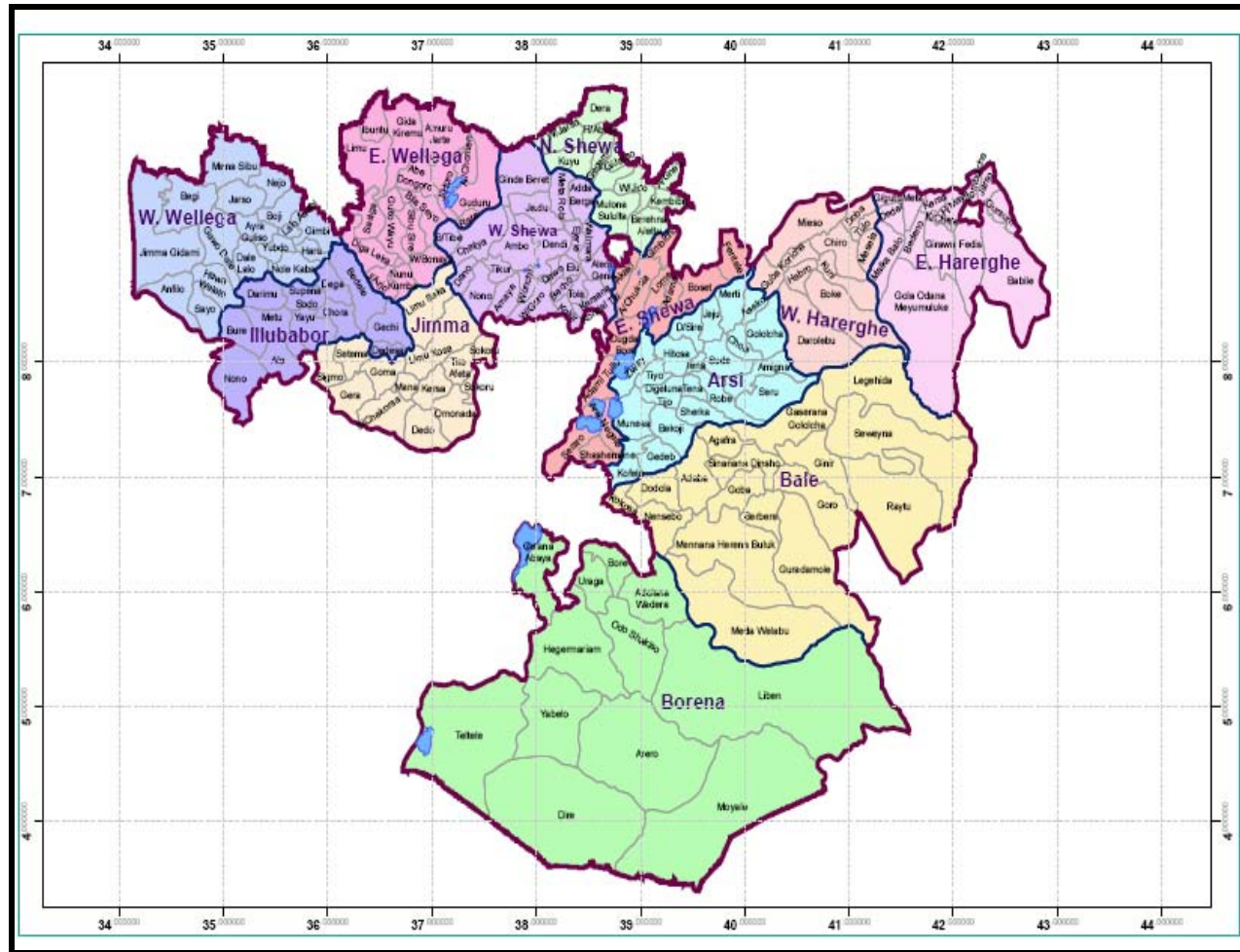
Additional stratification can be done based on annual rainfall (**Figure 3**).

Figure 1. Administrative Regional States and Zones of Ethiopia.



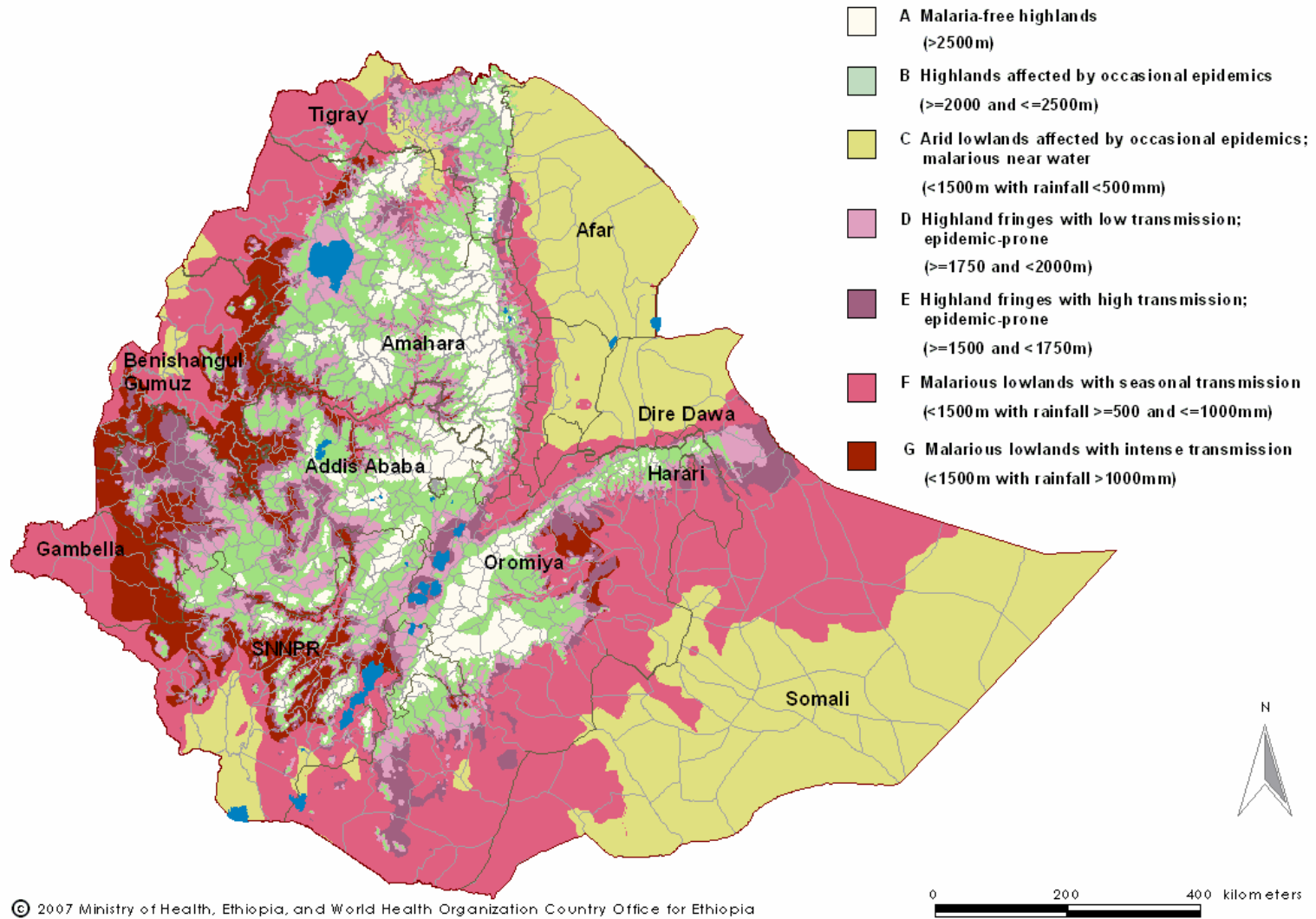
Note. Regional States are in different colors, zones in same colors. Ethiopia has 9 Regional States; additionally there are 2 'City Councils' (i.e. Addis Ababa, Dire Dawa).

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.



Burden of Disease: Malaria is the leading communicable disease in Ethiopia. The economic impact of malaria is probably far greater than for any other communicable disease 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, 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). Approximately 70,000 people die of malaria each year in Ethiopia.

Similarly, in Oromia malaria is 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%) communities, 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.

Accuracy of these malaria estimates has been a challenge. In a country with a poor health information system, the few data that are available are frequently unreliable. Recent surveys, described below, 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.1.3.** and **C.4.2.**). However, there are signs of increasing malaria transmission in the country, with several focal outbreaks reported in SNNP and Oromia Regional States in early 2008. It remains to be seen whether current outbreaks are an aberration limited in scale and scope, or whether they indicate that Ethiopia will experience one of the cyclical 'epidemic years'.

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 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 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.2.1.**, there are serious issues with insecticide resistance among these vectors that will have important implications for the vector control strategies

History and Current Status of Malaria Control in Ethiopia

1959 – 2003: In 1959, the Malaria Eradication Service was established with funding supported 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 to Fight AIDS, Tuberculosis and Malaria: Ethiopia is the recipient of two grants from the GFATM: Round 2 (2002 - 2008; \$73 million) and Round 5 (2005 - 2010; \$140 million). Despite a slow start and severe delays in commodity procurement after the award of the GFATM Round 2 grant, major progress has been achieved since 2005.

Nearly 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 a number of other international donors as well as NGOs, including UNICEF, the World Bank, the Carter Center, USAID and, beginning last year, 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 coverage of interventions, the GoE has estimated that it will need more than \$150 million for procurement and distribution of necessary commodities from 2008 to 2010 onwards (i.e. when the GFATM funding support will decrease and ultimately come to an end).

Organization of the National Malaria Control Program in Ethiopia: The NMCP in Ethiopia is staffed by members of the Malaria and Other Vector-borne Diseases Team and is placed under the FMOH's Communicable Disease Prevention and Control Department. The Team's responsibilities include 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.

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 Oromia RHB. 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 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. There is also to be a 'Malaria Team' at each of the District Health Offices. Programmatic challenges listed by the RHB 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.

Rationale for current allocation of control interventions: For FY09, PMI is sustaining activities initiated and supported in FY08 and adapting to the changing context of malaria in Ethiopia as described above in section C.1. The PMI budget for Ethiopia for FY09 is \$19.7 million, a slight decrease from FY08 (\$19.8 million). This equals to 72 cents per capita overall or \$1.07 if one just considers the population living in malarious areas in Oromia.

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.

Because the GoE was unsuccessful in obtaining further GFATM funding support, the LLIN, insecticide, RDT and ACT needs will increase from 2008 onwards if current GoE efforts to scale-up malaria prevention and control are to be expanded and/or sustained. Hence, for FY09, the PMI support for malaria commodities (i.e. primarily LLINs, insecticide, RDTs and ACTs) will increase from 46 to 53%. Finally, as it appears that in 2008 Ethiopia may be entering one of the cyclical 'epidemic years' that occur every 5 to 8 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 and the

National Strategic Plan for Malaria Prevention and Control 2006 - 2010 (NSPMCP)

[http://www.moh.gov.et/index.php?option=com_remository&Itemid=47&func=fileinfo&id=178]. Both strategic documents are in line with the RBM Abuja targets as well as the Millennium Development Goals to halve malaria morbidity and mortality by the end of 2010. Additional objectives as set forth in the HSDP III and NPMCP include:

- 100% access to effective and affordable anti-malarial treatment in malarious areas;
- 100% coverage of households in malarious areas with, on average, two ITNs per household;
- 60% coverage of households in malarious areas targeted for IRS; and
- Detect and contain 80% of malaria epidemics within two weeks of onset.

National policy and guideline documents for Diagnosis and Treatment, Vector Control (including IRS and ITNs), and Epidemic Prevention and Control are available at:

[http://www.moh.gov.et/index.php?option=com_remository&Itemid=47&func=select&id=13].

Since some parts of Ethiopia are malaria-free, only certain areas are targeted to receive malaria interventions such as LLINs (i.e. mainly areas <2000 m). Areas are targeted for key anti-malaria interventions at different scales of the health system, especially by local health authorities and Regional / Zonal Health Bureaus, based on criteria such as altitude (**Figure 3**), morbidity data and history of epidemics. IRS is conducted only in selected villages within malarious areas.

E. CURRENT STATUS OF MALARIA INDICATORS

Demographic Health Survey 2005: A nationwide Demographic and Health Survey (DHS) carried out in 2005 showed that <6% of the households in Ethiopia owned a mosquito net whether treated or untreated; only 1% of households owned more than one net. Estimates for Oromia were even lower, with <3% of households owning any kind of net and only 0.5% of households owning more than one net. Overall, urban households (11%) were more likely than rural households (5%) to own a net. During the DHS 2005 survey, the estimates of ITN use were very low, with, nationally, 2% and in Oromia, 1% of children <5 years of age having slept under a mosquito of any kind the previous night. Use of a mosquito net by pregnant women was even lower. In this survey of more than 10,000 children <5 years of age, 19% had a fever within the previous two weeks of (19% in Oromia), but <1% received an anti-malarial drug within 24 hours.

Other Recent Malaria Surveys: From December 2006 to January 2007, a household cluster survey was conducted by the Carter Center in the Regional States of Amhara, Oromia and SNNP to estimate the burden of malaria and trachoma in surveyed areas.

Of 11,601 people surveyed, the overall prevalence of a positive blood slide (any species) was 4.1% (95% CI 3.4 to 4.9). The highest prevalence of 5.4% was in SNNP, followed by Amhara (4.6%) and Oromia (0.9%). Of all infections, 57% were due to *P. falciparum*. Positive malaria slides were found in all surveyed areas of Amhara, ranging from 2.4% to 6.1%. Similarly, positives were seen in all surveyed areas of Oromia and SNNP except one. In Oromia, prevalence ranged from 0% to 1.9%; in SNNP, prevalence ranged from 1.1% to 9.9%.

There was no significant difference in malaria prevalence (for either species or overall) by gender or age group. The age-specific prevalence was 4.6% in children <5 years of age; 4.2% in 5-14 year olds; 3.8% in 15-49 year olds and 4.4% in those aged >50 years. There was a declining trend in malaria prevalence from 7.3% at <1000m to 3.2% between 2500 and 3000 m.

It was estimated that 37.0% (95% CI 31.1-43.3) of households possessed at least one mosquito net

(treated or untreated). Only 19.6% (95% CI 15.5-24.5) of households owned at least one LLIN. The mean number of nets of any type was 0.6 (95% CI 0.5-0.7) per household and of LLINs 0.3 (95% CI 0.2-0.4) per household.

Overall, 27.8% (95% CI 23.5 – 32.7) of people of all ages slept under a net the previous night and 15.3% (95% CI 12.0-19.2) slept under an LLIN. The proportions were only slightly higher for children <5 years of age (31.8% and 17.4% for nets and LLIN, respectively) and pregnant women (35.9% net; 18.9% LLIN). There was no observed difference in net use by gender.

From September to December 2007, the Academy for Educational Development (AED) carried out a household-based survey in Amhara and Oromia. Of 857 households (including 531 in Oromia) household ownership of at least one ITN was 88% in Oromia; 59% of nets owned reportedly had someone sleeping under them the prior night, with net utilization appearing to be associated with whether a net was purchased or received for free (for Oromia, 69% of nets paid for were used, compared with 58% of free nets) or whether a household was located in an urban (60%), sub-urban (50%) or rural area (60%). The percent of all children <5 years of age who had slept under a net the prior night was 64%; and for pregnant women it was 55%. Overall ITNs were used in 71% of houses that received IRS and 61% that had not received IRS.

Malaria Indicator Survey 2007: The MIS 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 DHS 2005, the survey reflects 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. This scale-up coincides with a substantial decrease in malaria prevalence. Of note, **Tables 1 and 2** report national data for areas <2000 m and <2500m; whereas, data reported for Oromia includes all areas \leq 2500 m).

The MIS 2007 also shows gaps in the scale-up of malaria interventions, clearly indicating needs for a comprehensive IEC/BCC approach to (i) maximize use of distributed 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.

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

| <i>Indicator</i> | <i>National (< 2000 m)</i> | <i>National (< 2500 m)</i> | <i>Oromia (< 2500 m)</i> |
|---|------------------------------------|------------------------------------|----------------------------------|
| Percent households with at least one LLIN | 65.3 | 53.1 | 41 |
| Percent households with more than one LLIN | 36.6 | 29.5 | 21.4 |
| Percent children < 5 years of age sleeping under an ITN the previous night | 41.5 | 33.1 | 24.3 |
| Percent pregnant women sleeping under and 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 anti-malarial | 11.9 | 9.5 | 6.6 |
| Percent who took an anti-malarial drug same or next day | 4.8 | 3.9 | 1.3 |
| Percent children with fever who sought treatment from facility/provider same/next day | 16.3 | 15.4 | 16.4 |
| Malaria prevalence by microscopy <i>P. falciparum</i> | 0.7 | 0.5 | 0.1 |
| Malaria prevalence by microscopy <i>P. vivax</i> | 0.3 | 0.2 | 0.2 |

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

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

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 2010, PMI will assist 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 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 TWO

In Year 1 of PMI in Ethiopia, emphasis included: (i) initiating PMI activities as outlined in the MOP FY08 and 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) have been, to a large extent, focused on a selected number of highly malarious, administrative zones: East Shoa, Arsi, West Arsi, Jimma and West Hararge. In Year 2, these activities will be sustained, with many activities expanded to additional zones and districts within Oromia Regional State.

Prevention

- In Year 2, 900,000 LLINs will be procured and distributed free of charge through multiple channels. This increase from the 640,000 LLINs procured and distributed in Year 1 is necessary because of the lower than expected coverage rates indicated in the MIS 2007 as well as the increasing 'gap' in LLINs following the unsuccessful GoE application for additional GFATM funding support. As detailed below in the LLIN gap analysis (Table 3), the additional 900,000 LLINs in FY09 plus the 640,000 from FY08 could bring coverage rates up to about 78%. Disbursements will be linked to improved tracking and program information management at district, zone and regional level;
- Comprehensive IEC/BCC activities, primarily aiming at increasing LLIN utilization and access/use of case management services established in Year 1 are expected to continue and to be

expanded to additional districts throughout the region in Year 2;

- In Year 2, 450,000 structures (approximately 225,000 households) will be sprayed in 23 districts of 3 administrative zones (East Shoa, Arsi, West Arsi), about the same number sprayed in Year 1. 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;

Treatment

- PMI is supporting the procurement and distribution of 750,000 of RDTs in Year 2, an extension of about the same levels as in Year 1. Like LLINs, RDT investments will be linked to close monitoring of their exact use and value to the program;
- In Year 2, 750,000 treatment doses of ACTs including pre-referral and severe malaria treatments will be procured and distributed to all government health facilities in Oromia. This is an increase from the 500,000 treatment doses from Year 1. Again, this increase is done because of the increasing 'gap' in ACTs following the unsuccessful GoE application for additional GFATM funding support;
- PMI will continue to strengthen and expand the coverage of the Ethiopian Health Nutrition Research Institute (EHNRI)'s Regional Reference Laboratories (RRLs) for training and improved quality of malaria laboratory diagnosis;
- Quality assurance and quality control (QA/QC) systems to improve the accuracy and usage of microscopic diagnosis and RDTs established in Year 1 will be scaled-up to additional zonal and district health facilities in Year 2.

H. INTERVENTIONS: PREVENTION

Insecticide-treated Nets (ITNs)

Current status:

As reflected in recent surveys, there has been a tremendous increase in ITN and LLIN ownership since 2005 in Oromia, with households owning at least one ITN/LLIN increasing from less than 3% to 41%. Still, this is far from optimal and greater efforts are needed to improve LLIN ownership and especially usage.

Distribution channels: Large-scale ITN distribution began in Ethiopia in 1998. Between 2000 to mid 2005, 1.8 million nets were distributed by in-country partners including UNICEF and WHO. The program raised national awareness, but coverage was low compared to the large population at risk. Ethiopia embarked on an ambitious LLIN scale-up starting with 2.5 million LLINs from the GFATM in 2005, with a target of 20 million free LLINs to be distributed before the Ethiopian Millennium in September 2007 (the target being defined as, *on average, two LLINs for each of the estimated 10 million households considered to be at risk for malaria*). As of December 2007, nearly 20 million LLINs have been distributed through the FMOH and partner support including from UNICEF, the Carter Center, the World Bank and GFATM. Approximately 6,720,000 of these LLINs were distributed in Oromia (note, at the time of the MIS 2007 only 16.7 million nets had been distributed and the FMOH now estimates that, due to population growth, 11 million households should have been targeted for ITN distribution rather than the originally planned 10 million).

There are at least three main delivery channels for free LLINs in Ethiopia:

- Enhanced Outreach Strategy (EOS): part of a UNICEF-supported program, EOS targets over 10

million children and pregnant women with an integrated package of child survival interventions every 6 months. The package includes measles immunization, vitamin A supplementation, de-worming, growth monitoring and LLINs. In 2006, 1 million LLINs were distributed through EOS and an additional 600,000 were distributed through EOS campaigns in 2007 in Somali, Afar and SNNP Regional States;

- Routine distribution through health facilities, especially antenatal clinics; and
- Door-to-door distribution by HEWs and other community-based agents.

Distribution channels also include full-priced ITNs through the commercial sector, subsidized ITNs and LLINs through discount vouchers and social marketing. The free distribution of LLINs is targeted to communities at risk for malaria (<2000 m), in general leaving the non-malarious urban areas for the commercial sector, targeted subsidies and social marketing (the 2007 NetMark survey indicated that about 5% of nets in rural areas were purchased, 71% of the nets in urban areas were purchased from the commercial sector). Despite the free distribution of LLINs, the FMOH expresses hope that the commercial sector could remain engaged in net distribution in order to provide a diversity of product and an option for long-term access to LLINs. As malaria burden decreases, and household economies improve, in the future some communities could 'graduate' from free to commercially available or socially marketed LLINs. There are currently discussions and assessments taking place to produce LLINs locally. ITN distribution through social marketing has been carried out in Ethiopia, notably through Population Services International (300,000 ITNs distributed in 2006) and, with USAID/E support, through AED (more than 75,000 ITNs distributed in 2007).

Net replacement: The strategy for replacing nets once high coverage is achieved is under discussion, with the FMOH and PMI lead partners in developing the net replacement strategy. This will likely be through the HEWs and other community-based agents, and through health facilities, especially antenatal clinics. Developing and supplying a robust routine system for continued LLIN access is an extremely important, but underdeveloped, area where PMI will play a critical role.

Net type: The vast majority of nets distributed since 2005 are the white, rectangular, family-size, polyester Permanet[®] (Vestegaard-Frandsen, Denmark) LLINs; when not available, conventional nets with KO-Tab 123[®] (Bayer, Germany) (approximately 1 million) have also been used as well as nets bundled with conventional (not long-lasting) insecticides (e.g. the regular KO Tab). It is reported that the majority of nets acquired through the commercial sector, either subsidized or full-price are conical nets (see MOP FY08 for total number of nets distributed in the country).

According to an AED survey large nets are preferred by the population, with conical nets preferred by just over half and rectangular nets by 41% of respondents. About 89% of respondents prefer colored nets; turquoise and green were equally popular in urban and rural areas, while white was more popular in urban and population of the upper socio-economic strata. Improvements in net utilization are critical for malaria prevention. PMI will analyze results from net preference surveys and work with the GoE and other partners to ensure that net preferences are taken into account when procuring nets. This should help to improve acceptability and use of the nets among various populations, taking into account differences in urban and rural populations as well as socio-economic status.

LLINs distribution and projected gaps: Prior to 2005, most nets were treated with the conventional KO Tab. In the absence of re-treatment, this resulted in 100% 'loss' of maximum effectiveness after one year. From 2005 onwards all nets distributed were LLINs (mostly Permanets[®]), with an assumed lifespan (i.e. time until nets will be non-effective/usable due to the loss of the residual efficacy of nets or wear-and-tear) of three years. Also, with a population growth rate of 2.9%, it is estimated that each year 300,000 additional households in malarious areas of Oromia will have to be targeted for LLIN distribution.

Whilst the GoE and FMOH have implemented a tremendously ambitious scale-up of LLIN distribution since 2005, it is clear that unless substantial financial support is received in 2008, the LLIN ‘gap’ will start to increase from 2008. New nets will be required to (i) replace nets distributed before 2005 that are no longer effective due to the loss of residual insecticidal efficacy or wear-and-tear; and (ii) to cover households not previously targeted for LLIN distribution (e.g. due to net population growth) (**Table 3**).

Table 3. ITNs (LLINs) Gap Analysis for Ethiopia FY2009.

| | <i>National</i> | <i>Oromia</i> |
|--|-----------------|---------------|
| Total ITNs in country as of 2008 (best data estimate) | 20,502,898 | 6,717,454 |
| Total ITNs Gap to Reach 85% Existing Vulnerable Population | 908,483 | 532,564 |
| 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 85% coverage in 2009 | 7,014,612 | 2,274,010 |
| Number of ITNs in 2009 from Other Funding Sources | 925,724 | - |
| PMI Contribution for ITNs in 2009 | 900,000 | 900,000 |
| Remaining ITN Gap for 2009 | 5,188,888 | 1,374,010 |

Thus, there will be an estimated national LLIN gap of about 5.2 million in 2009, including in this analysis an estimated a gap of 1.37 million for Oromia. The FMOH has submitted a GFATM Round 8 Proposal to include more than 8 million LLINs (3.3 million for 2009). PMI is helping to fill the gap with a contribution of 640,000 LLINs in FY08 and 900,000 LLINs in FY09. This could bring the total ITNs in Oromia up to 8.25 million or a coverage of about 78%

IEC/BCC and support to community-based organizations: Communications and orientation with families and community-based networks will be an essential component of PMI support. Technically, based on evidence from the 2007 MIS, the two major areas where PMI will focus its IEC/BCC efforts are prevention with LLINs, addressed here, and with care seeking and treatment, addressed in a later section on case management.

Operationally, all IEC/BCC will be implemented as a unified element, and includes support to the RHB Health Education Unit and the FMOH’s Health Education Center (HEC). This activity will also channel significant support to community-based organizations, women’s groups, churches, NGOs and other networks of civil society. There are a number of community-based organization networks working in the education and health sector, including one hosted by the Christian Relief Development Agency (CRDA) and the U.S.-based NGO Consortium The CORE Group, and another, the Coalition against Malaria in Ethiopia (CAME), hosted by the Malaria Consortium.

While the rapid scale-up in LLIN distribution has been impressive, Ethiopia does not have a tradition of net use. A comprehensive IEC/BCC approach is required to improve and maintain appropriate use. The 2007 MIS showed moderate utilization of LLINs (at altitudes <2000m, 60.1% of children in houses that owned at least one ITN slept under one the previous night; similarly, at altitudes <2000m, 65.7% of

pregnant women in houses that owned at least one ITN slept under one the previous night). To date, efforts to improve usage 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 PSI.

Taxes and tariffs: Ready-made nets, ITNs and LLINs had been subject to a 5% tariff rate and 0% VAT, with United Nations agencies and NGOs exempt. Insecticides for net treatment were taxed 10% tariff rate and 12% VAT, with again UN agencies and NGOs exempt. Polyester yarn was taxed at 34%. At a consultative meeting with Ministries of Finance and Health, manufacturers, retailers and other partners held in August 2007, it was announced that the remaining 5% tariff on ITNs would be removed and the insecticide rate dropped from 10% to 5%; as of January 2008 the 5% tariff on ITNs has been removed.

Logistics/procurement system: UNICEF has been requested by the FMOH to undertake nearly all malaria commodity procurements on behalf of the GoE using GFATM Round 2 and 5 as well as World Bank funds (note, initial LLIN procurements were undertaken by FMOH, but ran into severe bottlenecks). Most ITNs have been imported into Ethiopia within six months of ordering, with some shipping times as low as three months. For large consignments (e.g. GFATM), containers have been shipped directly to the regional capital, reducing and simplifying storage and logistics.

UNICEF, USAID/E and other partners are providing support to establish an improved procurement and logistics system, known as the Pharmaceutical and Logistics Master Plan (PLMP). The aim is to establish new distribution hubs that have supplies readily available on request from the District Health Offices. Supplies would no longer be stored at regional and zonal levels, eliminating two stages in the distribution chain. This should result in more efficient logistics and enable more of a 'pull' system, based on actual district needs, rather than the current 'push' system. A series of district level micro-planning meetings, with technical assistance from UNICEF, have been conducted to develop distribution, transport and human resource plans, and finalize budgets.

UNICEF has supported the FMOH and RHB to establish a national ITN database, recording the number of ITNs distributed in each village. This is possible in Ethiopia, since a substantial proportion of communities (except in some pastoralist areas) have well-established household registers and community recording systems. All families receiving ITNs are recorded in the community-based ITN register book. Most ITNs in a particular community will have been distributed at about the same time and thus are about the same age. These data, the community, number of nets, number of households and date distributed are then compiled by each District Health Office for all communities that received ITNs. These are then sent to the RHB and onto the federal level, where the records are entered in the national community-level ITN database. The ITN database is now being combined with HEP database that also records health post data, information on the HEWs, and other logistical and health variables. This data base is not yet interfaced with a Geographic Information System (GIS) (which would include altitude data), nor integrated with epidemiological data, or IRS information. Nevertheless, it will serve as an excellent foundation to build for the operation of M&E systems (see below).

Progress to date of PMI supported activities:

In FY08 PMI will have procured and distributed 640,000 LLINs through multiple channels. With USAID funds obligated prior to PMI, there was support for the development of a viable commercial market through targeted subsidies using vouchers, which in some areas entailed 100% subsidy. These were intended to target the delivery of the LLINs, reduce logistics burden on the public sector, and importantly, stimulate the retail sector to stock and sell LLINs. The AED NetMark Plus project will end at the end of 2008 – FY08 PMI funds will be used to carry out a comprehensive end-of-project evaluation, which will

provide information for the future role of commercial-sector strategies in Ethiopia and elsewhere.

The recent scale-up of LLIN distribution by the GoE has been a remarkable logistical achievement, unrivalled in sub-Saharan Africa. As shown by the MIS 2007, use of LLINs is at national level -at best-moderate (see section **E.** and **Table 1**). Clearly, the FMOH's focus in GFATM supported activities was on procurement and delivery of malaria commodities, which to some extent has caused other supportive activities to be neglected. Ensuring high utilization of LLINs is the next step. The FMOH has now made IEC/BCC activities to maximize access and use of distributed malaria commodities, including LLINs, one of the main priority areas. In line with the MIS 2007 results and the FMOH's strategy, PMI will provide support through a multi-channel, community-level, IEC/BCC approach to improve correct and consistent use of LLINs in FY08. IEC/BCC materials developed in collaboration with in-country partners will include improved information and knowledge on the benefits of LLINs in malaria prevention, improved awareness on ITN replacement, and its correct and consistent use. IEC/BCC will be packaged with community-based activities delivered through the mass-media campaigns, HEWs, NGOs and community-based structures including churches and schools, and radio listener groups. In FY08 these activities initially focused on East Shoa, Arsi, West Arsi and Jimma zones; school activities are being piloted in twenty schools; and sixteen radio listener groups targeted. Additional IEC/BCC activities will focus on case management, i.e. early and accurate diagnosis and prompt malaria treatment. PMI will also carry out activities to investigate the feasibility of including the private sector in malaria IEC/BCC activities.

Proposed USG component for FY09: (\$7,850,000)

LLIN routine distribution: (\$5,850,000) Due to the pressing need in covering the GoE gap for LLINs from 2008 onwards (section **H.** and **Table 3**), PMI will increase its support for the number of bednets procured and distributed from 640,000 to 900,000 LLINs in FY09. The LLINs will be distributed free through a range of ITN distribution channels including health facilities and HEWs, schools and churches, NGOs, food security and other social welfare programs. 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 partners.

IEC/BCC and support to community mobilization: (\$2,000,000) In FY09 IEC/BCC approaches and activities developed, piloted and implemented in FY08 will be expanded to cover additional administrative zones and districts throughout the region. The exact mix and form of the activities (e.g. community-based IEC/BCC, school-based IEC/BCC, and radio listener groups) will be adapted based on lessons learned and preliminary impact results from Year 1. Due to the low literacy levels in Ethiopia, PMI will work with partners to ensure that the appropriate methods are used to maximize contact to the end user. IEC/BCC activities will be integrated where appropriate, and PMI will work with other IEC/BCC partners to ensure that messages are consistent and culturally appropriate.

The 2005-2010 NSPMCP aims to provide 100% of households with targeted IEC/BCC on all key malaria messages to increase access and use of interventions. This will be a critical component to improving the use of LLINs and prompt and appropriate care seeking for children <5 years of age with fever; as stated in the MOP, the recent MIS data shows these percentages to be very low (**Table 1**). PMI will support this plan through activities including the establishment of partnerships with the FMOH, RHB, HEC and other in-country partners for consensus building and refresher training of zonal and district level health professionals in malaria IEC/BCC. In addition, sub-awards will be granted to NGOs, community-based organizations (CBOs) or faith-based organizations (FBOs) for capacity building and implementation of selected malaria IEC/BCC activities.

Approximately two-thirds of total program funds will be used for intensive, community-focused activities, including sub-grants to, and capacity building by the implementing partner of NGOs, CBOs,

FBOs, and local government entities. At least three sub-grants will be awarded to partners. The awards will complement PMI's larger IEC/BCC malaria program and align with the IEC/BCC strategy and plan of action developed following a partners' micro-planning meeting in FY08.

There are approximately 6,000 villages (communities) in Oromia, and a majority of these villages are in remote areas. Intense efforts will be focused on strengthening the link between HEWs, who provide mostly curative services, and the Community Health Promoters (CHP), located in the communities and provide outreach and interpersonal contact among households. PMI will collaborate with NGOs such as The Malaria Consortium, with support of zonal and district health staff, the Coalition Against Malaria in Ethiopia (CAME), which strengthens the capacity of civil society and partners to mobilize political support and increase resource allocations for malaria.

Approximately one-third of the funds will be used for combined communication channels including mass-media (especially radio, which is widely available in rural areas) and listening groups as reinforcement of community delivered messages. These messages will parallel those used for intensive interpersonal efforts between HEWs and various community volunteers, and among the NGO/CBO/FBO sub-grants.

Indoor Residual Spraying

Current status:

IRS has a long history in Ethiopia, and remains a key component of the national malaria control strategy. The NSPMCP in Ethiopia (2001-2005) called for DDT to be used as the primary insecticide in IRS. Where DDT resistance in the vector population has developed malathion is used. At present, approximately 20% of malaria endemic areas targeted for IRS, but the GoE would like to increase this coverage to 60% in 2008. In preparation for this scale-up, the FMOH is in the process of procuring 1,600,000 kg DDT 75% WDP (using USAID/E FY06 and 07 funds) and disbursing \$ 2 million of GoE funds for operational costs from the central level to regions to complement the operational costs allocated by the respective district councils. Of these resources mobilized at national level, 681,175 kg of DDT 75% WDP and \$US 761,016 operational cost is earmarked for Oromia.

Following the decentralization of IRS, IRS operations are 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. In FY08, it is expected that the number of villages covered by IRS will increase for two reasons: (i) PMI will support spraying more than 400,000 unit structures (approximately 225,000 households); and (ii) increased efforts of the FMOH to provide funds to scale-up IRS coverage in targeted areas from currently 30% to 60%. At the present time only DDT (not malathion or the pyrethroids) are used in Oromia. Spraying is conducted by contract spray men (not women) who receive six-day training. IRS is implemented by squads of four spray men and a porter, supervised by a squad leader. Squad leaders may be either contract workers or employees of the district health department. Each district employs approximately five spray squads during a 50-day period immediately prior to the start of rainy season. Limited motorized transportation requires

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 sprayman using 8-liter Hudson X-Pert® sprayers. Costs associated with IRS are reported by the Oromia RHB to be approximately 20 to 30 Birr (\$3-4) per house. This does not however include protective equipment, environmental compliance upgrades and other training, supervision and technical assistance costs associated with IRS in other PMI focus countries.

Challenges and limitations to IRS identified in the national strategic plan include the timing and quality of IRS, development of resistance in vector populations, limited funds for insecticides, pumps and spare parts, vehicles and operational funds, re-plastering of houses, and environmental compliance. Although the GFATM is providing funds for IRS training in 40 districts, there is a critical need for expansion of training for effective and compliant implementation and management 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 for insecticides. Besides DDT, malathion has also been used to a lesser extent in IRS. More than 3,000 tons of pesticides are imported annually, predominantly for agricultural use. From 1996 to 2002, Ethiopia imported or purchased 2,701 tons of insecticides and distributed 2,418 tons to regions or other institutions; 90% of this insecticide was DDT. During this period, 7,401 tons of temephos were distributed for larval control. The quantity of insecticides used / projected to be used in Ethiopia from 2002 to 2008 is shown below (Table 4).

Table 4. Insecticide amount used in Ethiopia 2002 - 2008.

| <i>Insecticide</i> | <i>Amount by Year</i> | | | | | |
|--------------------|-----------------------|------------------|-------------|-------------|-------------|-------------|
| | <i>2002-2003</i> | <i>2003-2004</i> | <i>2005</i> | <i>2006</i> | <i>2007</i> | <i>2008</i> |
| DDT 100% | 5,680 kg | 3,839 kg | - | - | - | - |
| DDT 75% | 390,926 kg | 357,872 kg | 703,335kg | 600,000kg | 816,202kg | 1,600,000kg |
| Malathion | 52,216 kg | 37,200 kg | 4322kg | - | - | - |
| Deltamethrin | 45 kg | 103 kg | - | - | - | - |
| Permethrin | 268 lt | 244 lt | - | - | - | - |
| Temephos | 180 lt | 160 lt | - | - | - | - |

Adami Tulu pesticide processing plant: Since 2001, the state-owned Adami Tulu pesticide processing plant in Oromia Regional State has formulated pesticides, including DDT, from imported technical-grade active ingredient. The plant supplies DDT to the FMOH at a cost of 41 Birr/kg (approximately \$ 4.65). Import duties and tariffs on insecticides are not paid by the Adami Tulu plant. The Adami Tulu plant also formulates malathion, endosulfan, diazinon, fenitrothion and dimethoate. Production capacity is presently limited to the formulation of 1,500 tons each of powder and liquid every year but capacity can be increased to 9,000 tons. The plant has a quality control laboratory. While DDT is produced exclusively for malaria vector control, the remaining insecticides are provided for agricultural and veterinary uses; each insecticide targeted for specific pests. Malathion is used for both mosquito and agricultural pest control. Insecticides produced at the Adami Tulu plant are presently not exported. Pyrethroids (permethrin and deltamethrin) have been imported for mosquito net impregnation and are used for tsetse fly control as well. Discussions have taken place to locally manufacture LLINs.

Insecticide susceptibility studies: A total of 16 insecticide susceptibility tests using the standard WHO protocols and DDT diagnostic dosages were carried out from 1986 to 1995 in eight areas in the country.

These have been summarized in detail in the MOP FY08. Of note is that resistance to DDT in six areas averaged 22% (range: 5% to 33%) with focal areas of high resistance to DDT. In the most recent study 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. This surprising and very important finding is being closely monitored. Resistance status will be a critical factor in pesticide choice in the different areas to be sprayed.

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.

GoE activities in larval source management: In addition to IRS, the FMOH and Oromia RHB 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 is the main vector control strategy in most urban areas of Oromia. In Oromia, between 2002 and 2007, more than 900,000 m² of breeding sites were either filled or drained. In spite of these considerable efforts, there is very little capacity to effectively target, monitor and evaluate these activities. The FMOH and RHB 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 Oromia RHB has also identified low community participation as a challenge to the larval control efforts.

While the first two years of PMI in Ethiopia does not support procurement and application of larvicides, PMI is building entomological monitoring capacity to guide these investments. This capacity building is being implemented within the framework of Integrated Vector Management' (IVM), defined as 'a rational decision-making process for the optimal use of resources for vector control'. As described below, the former WHO-supported Africa Regional Malaria Reference Training Center in Adama, Oromia, has a basic, functional insectary, classrooms and laboratories for both entomological and parasitological training.

Progress to date of PMI supported activities:

The Ethiopia IRS program is extensive and in need of support across a wide range of activities, including improved targeting of areas to be sprayed; IRS activity planning and quantification of IRS commodities; procurement, distribution and general commodity logistics; training of IRS personnel; implementation and supervision of IRS activities including improved pesticide management and environmental compliance; and M&E. M&E is especially important given the need for pesticide management and resistance monitoring. PMI will support measuring entomological and epidemiological impact as well as monitoring environmental compliance for safe use and disposal of insecticides, especially DDT. PMI supports the IVM framework to build capacity for zonal and district vector control specialists to conduct basic entomological monitoring to guide control strategies.

In FY08 PMI completed a Supplemental Environmental Assessment for the use of IRS pesticides, including DDT, and initiated systems to ensure compliance with USAID environmental regulations and international standards. In FY08, PMI is supporting 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 is being procured by non-PMI, USAID/E funds from FY06 and FY07. PMI supported the Oromia RHB's micro-planning meeting for IRS activities and implementation and evaluation of IRS in

the region. This includes targeting, mapping and information management related to IRS with a focus on three administrative zones (i.e. East Shoa, Arsi, West Arsi) and 23 districts. The FY08 target is to cover 400,000 unit structures (approximately 225,000 households). Spray operations are scheduled to start in July 2008. Operations also include support for implementation and supervision activities for the 3 zonal and 23 district offices, support for environmental compliance, safe handling of pesticides by applicators, and maintenance of IRS equipment. PMI will support the review of current training materials and methods and potentially adapt materials being developed regionally. IEC/BCC activities will focus on materials development, training and dissemination specific to IRS.

Improving capacity for entomological monitoring, including insecticide resistance, targeting and evaluating impact of vector control operations is critical. In FY08, PMI will support the refurbishment of the Adama Malaria Reference Training Center in Oromia, including the insectary and entomological laboratory. This facility, once a WHO-supported regional training center for East Africa, will be revitalized to support entomological capacity in Oromia and other regions of Ethiopia. Entomological monitoring (including vector identification, insecticide resistance monitoring, and bioassays) supports the ITN and IRS activities and the identification and mapping of productive vector breeding sites will support ongoing GoE efforts for larval control. Entomological monitoring of the IRS activities will also be used to evaluate the established strategy of 'Barrier Spraying', where villages on the periphery of lakes with anopheline breeding receive annual applications of IRS to prevent the spread of vectors to the surrounding areas. Ten sentinel sites for entomological surveillance will be established; some of these sites may overlap with the malaria sentinel surveillance sites.

While Ethiopia has been implementing IRS activities for decades and is a signatory of the Stockholm convention, environmental compliance has been identified as a primary gap. In FY08 PMI will support the existing quality control laboratory at the Adami Tulu pesticide plant and costs for environmental assessments compliance, training, and support for safe handling, storage and transport of DDT (e.g. evaporation tanks for DDT will be constructed at district level and a tracking system for DDT sachets will be set up).

Proposed USG component for FY09: (\$3,550,000)

FY09 PMI support for IRS operations in Oromia is expected to be at the same level as in FY08, with approximately the same number of targeted households. There will, however, be changes within this overall budget, with less for capital equipment (e.g. spray pumps and parts) and more for insecticides, which, in FY08, were purchased with non-PMI USAID/E FY06 and FY07 funds. The exact levels for each component will be determined after evaluating the FY08 IRS operations, which should be completed by August 2008.

Procurement of IRS equipment and insecticide: (\$2,000,000) Additional spray pumps, spare parts kits and replacement personal protective equipment are estimated at about \$400,000. Insecticides, DDT and possibly other classes of insecticide are currently budgeted for \$1,600,000 for FY09. The exact allocations between equipment and insecticides will be adjusted upon completion and review of the FY08 spray season.

IRS Operations: (\$1,300,000) In FY09, PMI will support the RHB in planning, implementation and evaluation of IRS in Oromia. The target number of households will be approximately 225,000, the same as FY08. This will be adjusted according to epidemiological, operational and costing information available during post-spray evaluation in 2008 and the micro planning in early 2009. Operations will also include significant support for improving pesticide management practices.

Entomological capacity building and monitoring services: (\$150,000) In FY09 PMI will primarily

support entomological surveillance activities at established sites, with activities being continued and strengthened at those sites. It is envisaged that additional sites will be established both in Oromia (with PMI support) and in other Regional States of the country (by the FMOH). Many of the capital expenses will have been addressed in FY08, the FY09 budget will focus on expansion of sites, training and operations.

Quality control at the Adami Tulu pesticide plant: (\$50,000) In FY09, PMI will continue to support improving the safe formulation, use and disposal of DDT at the Adami Tulu plant. PMI will support the existing quality control laboratory at the plant and costs for environmental compliance training, and support for safe handling, storage and transport of DDT. Particularly, PMI will work with the implementing partner to include a tracking code in the DDT sachet manufacturing process, so that a more rational tracking system for insecticide from production to end-use can be established.

Environmental compliance monitoring (\$50,000) In FY09, an external environmental compliance assessment of Ethiopia IRS activities will be performed. Monitored will be insecticide production, distribution, use, storage and disposal as well as insecticide tracking systems and/or tools. Technical assistance will be provided to explore collaboration with Ethiopia's Environmental Protection Agency (EPA), the Ministry of Agriculture, the Food and Agriculture Organization (FAO), the United Nations Environmental Program (UNEP), and others, to coordinate environmental compliance activities, including the feasibility of establishing an incinerator (with non-PMI funds).

Malaria in Pregnancy Including Intermittent Preventive Treatment (IPTp)

Current status:

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 ANC from health professionals 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 24.8% receiving ANC 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. *Hence, IPTp is not part of the Ethiopian National Malaria Control Strategy* (and thus not included in the MIS 2007).

Given this situation, the FMOH focuses more on scaling-up universal ITN coverage and treatment of clinical cases.

Progress to date of USG supported activities:

Although IPTp itself is not currently part of the Ethiopian malaria control strategy, in FY08 PMI is supporting Focused Antenatal Care Services (FANC), Safe Motherhood and Adolescent Reproductive Health through an emphasis on anemia management, and 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 FY08, PMI will also support a policy review 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:

(\$0) While over the past year, malaria in pregnancy was often discussed with the FMOH, the conclusion remains that IPTp is not appropriate, given the epidemiology of malaria in Ethiopia, i.e. with the low malaria prevalence shown in the MIS 2007, there will be very few pregnant women infected with malaria and even lower numbers seen at health care service delivery points. Hence, for FY09, no specific PMI budget will be allocated for IPTp activities. However, 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, 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). Throughout FY09, PMI will continue to assess the issues of malaria in pregnancy in Ethiopia, considering the scale-up of malaria prevention and control interventions as well as the health extension program.

I. INTERVENTIONS: CASE MANAGEMENT

Diagnostics

Current status:

The mix of parasite species, with 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.

Under the HSDP III and the NSPMCP, the FMOH's objective is to ensure universal access for malaria diagnosis and treatment within 24 hours of onset of fever by 2010. Malaria diagnosis and treatment algorithms depend on the level of the four-tiered health care system. The current recommendation stresses the importance of microscopic examination of clinically suspected malaria cases to be generally implemented at regional/referral hospitals, district hospitals and health centers. In health facilities where microscopy is not available (i.e. primarily health posts and some health centers) use of malaria RDTs will complement clinical diagnosis. From 2001- 2005, the estimated number of clinical malaria cases was 9.4 million while the annual average number of confirmed cases was about 500,000, i.e. <6% of all cases.

Laboratory-based diagnostic services are currently available to only about 34% of the population served at health centers and hospitals. The service is expected to increase with the expansion of health services under HSDP III (e.g. through HEW) - how this increase will affect the malaria morbidity and mortality trends is so far unclear.

Diagnostics at Health Centers and Hospitals: The Ethiopian Health and Nutrition Research Institute (EHNRI) has the mandate to oversee microscopy QA/QC for laboratory services including malaria. However, to date, there has been no national, systematic evaluation of microscopy quality. With PEPFAR support, EHNRI has started to implement QA/QC activities for HIV/AIDS and tuberculosis through a network of Regional Reference Laboratories (RRLs). The RRLs are to represent the regional 'hubs' for QA/QC, to which samples are sent and whose staff perform regional laboratory trainings as well as facility supervision. So far, this system has focused on HIV and tuberculosis rather than malaria.

In Oromia, one RRL in Adama has been empowered with performing malaria diagnostics QA/QC for the districts (two additional RRLs are being strengthened but have yet to become fully operational). Both positive and negative slides are sent periodically to this laboratory for review, but it is unclear how

consistent this practice is and what the follow-up of such QA/QC activities are. Further investigation is required to determine whether or not this process has led to quality improvement in the services being provided.

Diagnostics at Health Posts: Malaria diagnosis at the health post level is based most often on clinical assessment rather than RDT as recommended in the national malaria diagnosis guidelines. A positive RDT for *P. falciparum* has clear action whereas a negative RDT may result in referral, treatment with chloroquine (under the assumption that the patient has *P. vivax* malaria) or examination for other causes of fever. There is no national policy for health post workers to follow IMCI guidelines. The lack of clarity around diagnosis and treatment algorithms at health posts, combined with the absence of essential IMCI drugs beyond oral anti-malarials, has led to variation in practices for management of febrile illness at this level of the health care system. The current RDT used in Ethiopia is the Paracheck-Pf® (Orchid Biomedical Systems), which detects only *P. falciparum*. There have been no systematic investigations assessing this tool's test performance efficacy (i.e. in terms of sensitivity and specificity), reliability and effectiveness (i.e. as a determinant for prescribing practices) under field conditions in Ethiopia. Operational research to address this knowledge gap is currently planned by USAID/E with non-PMI funds.

Progress to date of PMI supported activities:

At national as well as at Oromia level, the health infrastructure is currently undergoing rapid expansion under the sector-wide development plan implemented under HSDP III. To determine the availability of laboratory infrastructure and capacity for malaria diagnosis at all levels of the health care system a rapid assessment of the laboratory capacity will be carried out in FY08; particular attention will be paid to unmet needs, quality and current effectiveness. At present, little operational data is available on the performance and needs of laboratory diagnostic services, as a whole and with regards to malaria. Building upon the laboratory baseline assessment, PMI will support in FY08 the review of the current policies and guidelines around malaria diagnostics, especially RDTs. A clear diagnostics policy will be the foundation for procurement, training and QA/QC activities in FY08 and FY09 described below

QA/QC is a critical part of diagnostic services, especially for microscopy, but for RDTs as well. In FY08, PMI will assist with the design, establishment and implementation of a QA/QC system for maintaining diagnostic quality. In collaboration with the PMI implementing partner, the Oromia RHB and other partners (e.g. EHNRI and RRLs), PMI will establish a QA/QC system, which will include internal (e.g. provision and implementation of standard operating procedures and checklist) as well as external facility (e.g. delivery and cross-checking samples or slides from facilities) QA/QC, regular supervisory visits and on-the-job training by laboratory experts at the appropriate level, and comprehensive reporting of collected QA/QC data. Initial activities will focus on five administrative zones, i.e. East Shoa, Arsi, West Arsi, Jimma and West Hararge. Whilst most of the QA/QC activities will focus on hospitals and health centers, the QA/QC system will also be piloted in health posts. There, the system will ensure quality of diagnosis with RDTs through microscopic confirmation. This activity will build on existing laboratory systems and infrastructures established through PEPFAR funding support. Strengthening the laboratory capacity at hospital, health center and health post level as well as the establishment of a malaria diagnosis QA/QC system will be completed by comprehensive training of clinical and non-clinical health professionals at the various sites.

With the ultimate goal of all malaria cases being diagnosed by either microscopy or RDTs, there is a gap in supply of RDTs for Oromia for 2008 with what is currently available from other sources (e.g. GFATM and the World Bank's Protection of Basic Services Program). Based upon the diagnostics policy review carried out in FY08, including a review of the value of RDTs for improved prescribing practices, PMI will support the procurement and distribution of 600,000 RDTs in FY08. These RDTs will complement

those currently in the pipeline and funding available from other partners (note, similar to other main commodities such as LLINs and insecticide, unless the GoE will be successful in applying for GFATM funding support in 2008, the gap for RDTs will be consistently increasing from 2008 onwards). PMI and other in-country stakeholders have been successful in advocating the FMOH for the use of multi-species RDTs in the future and currently diagnostic guidelines / strategies are being revised to reflect this change.

A comparative evaluation of the field applicability among health workers with several brands of RDTs will be implemented by The Malaria Consortium in 2008 using existing USAID FY07 funds. Brands to be evaluated will include both Paracheck (currently used by the FMOH), Parascreeen (used in the MIS 2007) and 1-2 other brands of multi-species RDTs, which will be compared in terms of sensitivity, specificity but more importantly storage stability; ease-of-use and test acceptance.

As part of the health care service delivery expansion, many former health stations will be upgraded to become health centers. This transition will necessitate the purchase of microscopes and associated reagents to conduct microscopy. Additionally, existing data also shows that many health facilities have non-functional equipment that would be used for malaria diagnosis. In FY08, following the findings of the initial laboratory assessment, PMI will support the upgrading of laboratories and replacement of non-functional equipment

Proposed USG component for FY 09: (\$1,590,000)

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: (\$560,000) In FY09, PMI will continue to support the malaria diagnosis QA/QC diagnostic activities established in FY08, ensuring that they are fully operational and taking advantage of “best practices” and technical support from across all PMI countries. It is envisaged that these above-mentioned activities will be expanded to include additional health facilities, particularly health centers and health posts in additional administrative zones and districts.

Procurement of RDTs: (\$750,000) Depending on the review of the effective use of RDTs to improve actual prescribing practices along with the projected FMOH gap analysis, it is envisioned that as in FY08 PMI will procure and distribute 600,000 RDTs in FY09.

Procurement of lab equipment/supplies: (\$250,000) In FY09, as the laboratory support services expand to other administrative zones and districts in Oromia, additional health facilities will be upgraded. The details of the number of health facilities, microscopes and other laboratory equipment necessary for malaria diagnosis will be determined through health facility needs assessments. The projected budget support is expected to be \$250,000.

Pharmaceutical Management

Current status:

Ethiopia has received significant support through GFATM enabling a rapid roll-out of ACTs to all levels of the health system. GFATM support resulted in 3.8 million doses of artemether-lumefantrine procured and distributed in 2005, 5.2 million doses in 2006 and 4.1 million doses scheduled for 2007.

Parallel to the roll out of the new Health Management Information System (HMIS), the FMOH is implementing the PLMP, which will result in the establishment of a new health commodities supply system (HCSS) for Ethiopia. Three components of the HSDP III (i.e. health service delivery and quality of care; access to services; and pharmaceutical services) depend on the establishment of an effective and efficient HCSS/PLMP. The PLMP is complex, with some components focusing on policy and legislative issues, such as governance and coordination, and some on the mechanics of the system, such as quantification, storage, inventory control and transport. With this level of complexity, and with the large number of partners it is unclear when this system will be fully operational. In the meantime, the FMOH is making do with several procurement channels to prevent commodity bottlenecks and stock outs. UNICEF has been the major partner for procuring malaria-related commodities, particularly those purchased with GFATM funding.

These logistics management problems extend through the entire chain of the system, from the federal level, through the regional states, zones, to health centers and health posts.

Progress to date of PMI supported activities:

PMI is providing support to the FMOH and RHB malaria program to procure, quantify and distribute various malaria commodities, including anti-malarial drugs. This support is done in the context of the nascent HCSS/PLMP, which itself is receiving significant funding support from PEPFAR and other partners.

In FY08, PMI will support the logistics management of anti-malarial drugs at hospital, health center and health post level, ensuring that these health facilities (i) have and dispense anti-malarial drugs; (ii) have anti-malarial drugs that are not expired; (iii) document dispensing anti-malarial drugs and have a functional stock reporting system; (iv) implement a stock out system, which would ensure continuous supply of anti-malarial drugs from district or zonal supply hubs; and (v) ensure that they have adequately trained staff to implement a comprehensive drug management system. These activities will be added onto existing PEPFAR supported activities, systems and infrastructure established since 2007.

Also, in FY08, PMI will support the Ethiopia Drug Administration and Control Authority (DACA) in its mandate to ensure all malaria products entering the country meet quality standards as well as ensuring drugs, once in-country, are of high quality. PMI will support DACA in its effort to track and report malaria treatment associated adverse drug reactions as well as assist monitoring drug quality at end-user sites.

Proposed USG component for FY09:(\$800,000)

Strengthening of anti-malarial drug management: (\$600,000) In FY09, PMI will continue the FY08 support to the FMOH and RHB malaria program to procure, quantify and distribute malaria commodities in the public sector as well as in FY09, portions of the private sector. Support to this element may include the placement of a resident advisor specifically to support malaria drug logistics management. Ongoing support at health facility level to ensure anti-malarial drug availability, per protocol dispensing and reporting of stock-outs will also be continued; it is also expected that in FY09 additional health facilities in other administrative zones of Oromia will be supported.

Strengthening of drug quality monitoring: (\$200,000) FY09 activities will continue to support DACA to ensure the quality of anti-malarial drugs in both the private and public sectors throughout Ethiopia. As drug quality monitoring is a national-level regulatory function that will necessitate sampling from ports of entry and market routes beyond a single region, this will be the one area where PMI support will support operations expanding beyond Oromia. It is projected that funding for this activity will be the same as

FY08.

Treatment

Current status:

P. falciparum and *P. vivax* are the two dominant parasite species in Ethiopia with relative frequencies of 60% and 40%, respectively; cases due to *P. ovale* and *P. malariae* are rare. In malaria epidemics, *P. falciparum* is the dominant parasite species causing severe illness and death. The high treatment failure rates of chloroquine for the treatment of uncomplicated falciparum malaria were documented through a nationwide study conducted in 1997/98. This led to a treatment policy change that recommended the use of sulfadoxine-pyrimethamine (SP) as the first line drug for the treatment of uncomplicated *falciparum* malaria and chloroquine for the treatment of *vivax* malaria.

SP resistance is wide-spread in Ethiopia, as documented in a nationwide study conducted in 11 sentinel sites in 2003 showing a mean treatment failure rate of 35.9% (range 21.7-53.4%) at 14-days follow-up and 71.8% (range 53.8 – 85.7) at 28-days follow-up. An *in vivo* therapeutic efficacy and safety study on artemether-lumefantrine was also conducted in 4 sites, with no treatment failure cases and drug side effects reported after a follow-up period of 14 days. EHNRI did *in vivo* clinical efficacy monitoring study on artemether-lumefantrine in 2007, but the results await final analysis and dissemination.

Treatment guidelines: 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 artemether-lumefantrine. If severe malaria is 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. As outlined above, a positive RDT for *P. falciparum* mandates clear action, but a negative RDT may result in referral, treatment with chloroquine or examination for other causes of fever. There is no national policy for HEWs to follow IMCI guidelines. While national guidelines recommend pre-referral quinine as above, this drug is not part of the drug list provided to the HEW at health posts. In epidemic affected areas, IM artemether is recommended for pre-referral treatment but is not currently available in country.

At the health center level and above, the first-line treatment of *P. falciparum* malaria is artemether-lumefantrine. For infants <5 kg of body weight and pregnant women, oral quinine should be administered 3 times a day for 7 days as the first line treatment. For the treatment of malaria due to *P. vivax*, *P. malariae* or *P. ovale*, the first-line drug is chloroquine. In malaria-free areas and where compliance can be insured, in order to eliminate hypnozoite forms (relapsing stages) of *P. vivax* from the liver, primaquine may be administered daily for 14 days starting after chloroquine treatment is completed. However, the guidelines state that in malarious areas where there is a high risk of re-infection, the main purpose of treatment should be to bring about clinical cure rather than radical cure and administration of primaquine is not recommended. Parenteral quinine is used for the treatment of severe and complicated malaria. There are detailed guidelines on patient management including salient clinical features and management of complications.

ACTs were introduced after a policy change requiring their use for treatment of *P. falciparum* cases was adopted in July 2004. The introduction of artemether-lumefantrine and the phasing out of the old drugs was estimated to take up to two years given the remaining supplies of SP and the initial limited supplies of the new drugs. SP was never removed from any level of the health system and is reported to remain in use, a suspicion that was confirmed during the recent MIS 2007 showing that SP still was being dispensed

in 1% of children taking anti-malarial drugs within 24 hrs of fever/convulsion onset (note, all of the SP dispensed was reported to have been dispensed in private health facilities).

Improving access to prompt and effective treatment through the Health Extension Program: Access to prompt and effective treatment is recognized as major challenge in Ethiopia. The DHS 2005 found that while 18.7% of children <5 years of age had experienced fever in the two weeks preceding the survey, only 3% of these received an anti-malarial drug. In a household survey performed using the EPI two-stage cluster survey methodology in Oromia, while 71% of mothers recognized that fever was a warning sign that indicated a child should be taken to a health facility, less than 50% actually sought treatment for their child in the preceding two weeks when fever was present (note, these figures have not changed drastically, as evidenced in the MIS 2007).

In addition, the 2004 household survey indicated that of those households that accessed health services 12 months prior to the survey, 82% sought access at a fixed government facility (including slightly more than 10% sought service through health posts or outreach services), while 18% sought access through the private sector (including 10% to an NGO service delivery site).

In response to this poor access, the FMOH embarked on an ambitious Health Extension Program (HEP) created under HSDPII (now HSDP III). This initiative plans to reach universal health coverage by 2009, primarily through building health posts staffed by two HEWs. The plan is to build 15,000 posts, staffed by 30,000 HEWs among the 626 districts. Each health post will serve approximately 5,000 people. Of the planned 30,000 HEWs, there are currently 28,000 HEWs deployed throughout the country (7,500 in Oromia), representing 93% of the FMOH target.

There are 36 technical/vocational training centers throughout the country that provide the one year HEW training, including a practicum. Upon deployment, the HEWs received medical supplies, posters, curriculum, teaching materials and lecture notes. Each HEW receives training in 16 'health packages' or thematic areas [<http://cnhde.ei.columbia.edu/training/index.html>]. On the job training, in-service training and the development of updated guidelines takes place at both the national and regional levels.

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 difficult in an environment where *P. falciparum* (to be treated with ACTs) and *P. vivax* (to be treated with chloroquine) are present (see above). Referral systems are weak and pre-referral treatment is generally not available.

According to the HSDP III, in addition to the HEWs, 9,667 village malaria control workers have been trained to enhance community participation for prevention, including environmental management, ITNs and IRS. The Oromia RHB has developed a plan to expand this cadre to approximately 20 per community. The RHB is also planning two rounds of integrated refresher trainings as well as training of trainers.

Supervision and monitoring: Since 2005, the GoE has implemented a tremendous scale-up in malaria prevention and control activities. However, as recently shown in nationwide and health-facility surveys as well as site visits, this scale-up has put a significant strain on an already fragile health sector infrastructure. Thus, whilst it can be said that targeted numbers have been met (e.g. 20 million bednets distributed to achieve high household coverage of ITNs; 30,000 HEWs deployed to the peripheral level), supportive structures and systems to enhance scale-up effectiveness and quality have been neglected. For example, 3 years after starting the deployment of HEW, the FMOH is just now training a cadre of district 'supervisors' that will support the HEWs. Also, a solid evidence-base to monitor and evaluate the impact of the scale-up has been lacking.

Thus, PMI will be supporting several activities to strengthen supportive structures and systems. This includes supervising health professionals vis a vis malaria case management; developing standardized malaria curricula for a range of health cadres; implementing refresher training workshops, as well as establishment of a strong M&E framework through sentinel surveillance sites and support for the MIS. This will allow for comprehensive M&E of programmatic processes to focus inputs and achieved impact on malaria morbidity and mortality.

Progress to date of PMI supported activities:

FMOH and partner gap analysis for Oromia indicates the total need to be approximately 500,000 treatment courses of ACTs, plus drugs for 50,000 severe malaria cases and 50,000 courses of pre-referral drugs. In FY08, PMI will procure 500,000 treatment doses of ACTs, pre-referral treatment and drugs for severe malaria. In FY08 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 anti-malarial drugs as well as implementation strategies with particular emphasis on the unique challenges of the malaria epidemiology in Ethiopia. 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 (LLINs, insecticide and RDTs), it is expected that the commodity gap for ACTs will increase from 2008 onwards, whether or not the GoE will be successful in applying for GFATM funds this year. 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 undermine efforts to respond to potential epidemics (e.g. one of the FMOH approaches to respond to epidemics being mass drug administration).

Currently, the Carter Center is providing accelerated pre-service training in five universities in Ethiopia for health officers through the Ethiopian Public Health Training Initiative (EPHT I/II), which includes a malaria module for the diagnosis and management of malaria at the health center level. In FY08, PMI will work with the RHB, FMOH and other implementing partners to support these or similar 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 the FMOH and RHB for the in-service training programs for clinical officers and HEWs, through the well-established Integrated Refresher Training Program, which is implemented in collaboration with UNICEF. In November 2007, USAID/E FY07 funds supported refresher training on malaria prevention and control for more than 2,500 HEW prior to their deployment throughout Oromia, as a 'PMI Jumpstart Activity'.

Continual, intensive supervision and monitoring is the key to improved clinical case management, ensuring that following confirmatory diagnosis, clinical cases are treated appropriately. This becomes particularly important in a context of decreasing malaria morbidity. Thus, with the scale-up of malaria interventions it is expected that the proportion of fever cases due to *Plasmodium* infection will decrease. Confirmatory diagnosis and following the FMOH diagnosis/treatment algorithm is crucial to (i) sustain the impact on malaria morbidity and mortality made by the scale-up of malaria interventions since 2005; (ii) decrease the likelihood of development of *Plasmodium* anti-malarial drug resistance; and (iii) minimize the wastage of anti-malarial drug treatment (financial) resources on patients with fevers due to other causes.

The GoE decided that there is a need for an additional cadre of supervisors to oversee the HEWs. In FY08 these supervisors (1 per 10 HEWs) are in a one-year training program and will be deployed in 2009. 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 in FY08, the supervision being integrated in new family

planning / maternal, newborn and child health activities to be implemented with USAID/E support starting mid 2008. The supervision will ensure that cases management is implemented effectively and per FMOH diagnosis/treatment protocol. The support to supervision will also provide a platform for M&E of the rapid HEW expansion. PMI, along with other partners, will assist in reviewing the quality and competency of the cadre of supervisors, and help support refresher trainings and other approaches, e.g. coaching, which could further improve the capacity of the supervisors. Funds will include support to training materials and checklists as well as transportation and other costs to ensure the supervision is actually taking place. In FY08, PMI is also supporting a quantitative/qualitative study to document the extent and nature of adherence (including barriers and methods to improve adherence), which will help guide IEC/BCC approaches.

Proposed USG component FY09:(\$2,950,000)

Procurement of ACTs, pre-referral treatment and drugs for severe malaria: (\$1,500,000) In FY09, PMI will support the procurement and distribution of 750,000 treatment doses of ACTs and other anti-malarial drugs (including drugs for severe disease and pre-referral care) to complement other partner efforts to close the upcoming gap in ACTs.

Pre-/in-service training for clinical officers and Health Extension Workers in diagnosis and treatment: (\$700,000) By FY09 pre-/in-service training activities will be well underway. Student and teacher training materials specific for malaria will have been reviewed, updated, modified and/or developed. The focus in FY09 will be to scale-up the training to include more locations and students, particularly to train them in the updated national malaria guidelines and strategies produced in FY08. Both pre- and in-service training for malaria will be integrated into overall training for health professionals, with significant support from other USAID/E's Health, AIDS, Population and Nutrition Office.

Provide support for supervision and monitoring of malaria treatment: (\$750,000) Depending on the review and evaluation of support to supervision and monitoring of malaria treatment during FY08, level of funding is expected to remain about the same for FY09. 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): In conjunction with other IEC/BCC efforts for LLINs and IRS, PMI will continue to support the RHB and FMOH to promote early care seeking, adherence to anti-malarial drugs and other issues around case management, as part of the unified effort for capacity-building. PMI will support community-based organizations such as women's groups, traditional healers, churches, schools and NGOs to build their capacity to deliver messages to hard to reach populations, expanding beyond the initial areas targeted in FY08.

J. INTERVENTIONS: EPIDEMIC SURVEILLANCE AND RESPONSE

Current status:

Malaria epidemics in Ethiopia have been documented since the 1930s. One of the most notable occurred in between June and December of 1958 which was responsible for an estimated 3 million clinical cases of malaria, 150,000 deaths, covering 100,000 square miles, between 1,600 and 2,150 m elevation. 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. Currently, a malaria risk map based on which evidence-based, planned decision for epidemic prevention, detection and response could be made, does not exist for Ethiopia. In the interim, the FMOH and RHB stress early detection through data collected at the health facility. As mentioned, the last major epidemic year was 2003; there are early indications in 2008 of an upturn in transmission. It is imperative that PMI help the FMOH be more pro-active and prepare for potential epidemic outbreaks.

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 5 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 (**Box 1**). The guidelines recommend mass drug administration 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 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 management are insufficient. Most districts have inadequate epidemic preparedness plans and lack sufficient contingency funds to respond. This prohibits effective management of epidemics particularly at the district level. Lack of skilled health personnel and poor coordination and

Box 1. An outbreak in Welliso in May 2008.

The following is illustrative of a typical 'epidemic response' and narrates events occurred in May 2008 in Welliso. Two RHB staff, one South West Shoa Zonal office staff and two Amaya district staff traveled to the kebeles near Welliso to investigate a reported outbreak of malaria. Initially 600 suspected malaria cases were tested with RDTs with more than 300 testing positive for P. falciparum. This number is in excess of normal expectation for the place and time of the year. The investigation team determined that the outbreak was confined to the villages located near the permanent water bodies located in the district. They conducted mosquito indoor resting collections to determine vector density and concluded that it was low. The group agreed on the presence of an outbreak in the area as well as low mosquito density; emergency IRS was not implemented. The final decision was to give mass febrile treatment throughout the community with CoArtem. To implement this, the team recruited four nurses from the district health facilities to work alongside the HEWs to provide treatment for all febrile cases in the community (including house to house delivery)

The response report concluded: Number of districts affected-2; No of villages affected by the epidemic- 16; Population living in the epidemic area- 103,212; Population treated at community level to date- 2157 (by HEWs and assigned nurses); Population examined for malaria using RDTs by HEWs and nurses- 1157

The cost for this single exercise was about \$6,000:

(i) \$16/day RHB and Zonal experts= \$192; (ii) \$11/day driver= \$44; (iii) \$8/day district experts=\$64 \$ 6/day nurses; stayed 20 days in the field = \$480; (iv) assuming 2000 RDTs; 3000 treatment doses of CoArtem and \$200 fuel costs=\$US 5200, the rough estimate would be = \$US 5980.

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% stock in malaria commodities, this is often not the case due to planning and funding restrictions in each fiscal year.

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 FY08; supportive supervision will be provided to ensure that health facilities / zonal and district health offices are following the FMOH ESR guidelines, tabulate and analyze data as well as disseminate data to lower and higher levels of the reporting cascade. While related to the routine surveillance and HMIS, the epidemic alert systems will require a different time frame and reporting structures for 'detection' and contingency planning for the 'response'.

Proposed USG component for FY09: (\$600,000)

PMI will continue to provide support to the ESR in Oromia.

Epidemic Detection and Response: (\$600,000) In FY09, it is expected that PMI will sustain activities started in FY08 as well as expand ESR activities to include additional zones and districts. 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. PMI will also provide, where necessary, contingency funds for response, including personnel, transport and supplies should that be necessary. 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 is to strengthen the existing system through capacity building and improved information management systems and not for contingency funding for commodities to control the epidemic. Some of the money may go to operational cost for the investigation and control of the epidemics but not for the procurement of drugs or insecticides. Indicators used to justify the investment will be the number of epidemic outbreaks detected and controlled within two weeks of onset.

K. HIV/AIDS AND MALARIA

Current status:

Malaria and HIV are two important health issues in Ethiopia. While biologic interactions between HIV and malaria are recognized, there are still untapped opportunities for programmatic synergies. Ethiopia is in a unique position to ensure synergies are maximized and any joint programming benefits those at most risk. PMI is currently working with PEPFAR colleagues, as they develop their Ethiopia 'Country Operational Plans' to ensure our respective plans for 2008 and now 2009 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 regions where they have a significant presence, such as Gambella and Amhara.

Proposed USG component for FY09: (Costs covered under other relevant sections)

IEC/BCC: Both PMI and PEPFAR will jointly prepare 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. It is intended that through PEPFAR support, community-based IEC/BCC interventions developed through PMI will be used by the implementing partner to increase ANC attendance as well as ANC/prevention-of-mother-to-child transmission of HIV (PMTCT) service delivery in communities of Oromia.

Coordination of laboratory support: To date, most of the laboratory strengthening in Ethiopia has been supported by PEPFAR (primarily through CDC) and GFATM HIV grants. PMI will build upon the existing structures and mechanism that have been developed and established through PEPFAR and GFATM support to expand these to include malaria diagnosis. Thus, a previous PEPFAR partner is going to lead 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. Additionally, it is envisaged that, in the future, 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-/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 2008, it is anticipated that training will be integrated addressing the training needs of all health teams of USAID/E, 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 will build 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. Again, this will ensure that past, current and future USG investments are maximized and that 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 FY09. 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. CAPACITY BUILDING WITHIN THE NATIONAL MALARIA CONTROL PROGRAM

Current status:

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 1500, 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 is scheduled to begin 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 will be 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 Ministry of Health (MOH). 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 are to be hired by June 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 FY09: (Costs covered under other relevant sections)

Recognizing the scope and the mandate to directly support malaria interventions, 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 and FY09. 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 to 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 place technical experts of implementing partners in the RHB (either at regional, zonal or district level) to assist with malaria activities. 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 2, 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). PMI will also work with in-country partners to ensure that malaria prevention and control activities for Oromia are covered; while supporting this region, the country as a whole will benefit from the initiative.

M. COMMUNICATION AND COORDINATION IN-COUNTRY PARTNERS

Current status:

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.

Progress to date of PMI supported activities:

In FY08, the PMI staff became members of the MCST, coordinating investments and activities with the other partners and actively engaging more partners, especially CSOs, in the overall malaria control and community development efforts. PMI has also been instrumental in the development and finalization of two GFATM 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 FY09:

Activities that have started in FY08 and will be continued to be implemented with PMI FY09 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.

N. PRIVATE SECTOR PARTNERSHIPS

N/A

O. MONITORING AND EVALUATION

Current status:

Ethiopia's FMOH is about to undertake radical changes in the country's HMIS. A new system has been under development for many months and is scheduled to start being rolled out in several of the largest

administrative regions of the country in 2008. The intention is for HMIS information to be utilized for resource allocation, program activities, and policy-making at all levels of the health system down to the health center. An essential component of the new system will be training of staff at all levels of this system. Tulane University will be responsible for training 40,000 health staff at health facility level in the coming months. All staff who will utilize the system (which includes almost all health staff, not just those whose positions are dedicated to the HMIS) is required to take this training.

Parallel to the roll out of the new HMIS, the FMOH is also moving forward with implementing the PLMP, which will result in the establishment of a new HCSS for the country (see above). Whilst the PLMP has several core components focusing on more legislative issues (e.g. policy and legislation, governance, coordination and harmonization), some components are critical for the logistics process itself (e.g. quantification and forecasting, logistics management information system, procurement, storage and inventory control, transport). It is unclear when the PLMP/HCSS will be fully operational and so in the meantime, the FMOH is using several procurement channels to prevent commodity bottlenecks. For malaria-related commodities, the major partner, particularly for commodities procured and distributed through GFATM support, has been UNICEF, who as developed two database to monitor the flow of malaria commodities, the LLIN and HEP databases:

LLIN database: UNICEF has been assembling a database on the distribution of LLINs throughout Ethiopia. So far this database includes about 11 million of the 20 million LLINs that have been distributed to households nationally by the FMOH and other malaria partners.

HEP database: A national HEP database is being established, led by UNICEF. This database lists all health facilities in the country and summarizes and tabulates a range of facility-specific characteristics including infrastructure, human resources and capacity, equipment, clinical and laboratory materials and drugs.

Formalized M&E activities for malaria prevention and control as well as tracking malaria commodities have yet to be put into place in Oromia or nationally. Such activities are vital in order to optimally target program resources and to be aware of the extent to which malaria activities are effective. This is especially important in light of the 2007 MIS results indicating a lower than expected coverage from the reported disbursed LLINs.

Evaluation of PMI will be based on the impact on mortality and morbidity for children less than 5 years of age and indicators that correspond to the coverage targets for specific interventions. Evaluation data will be collected through regularly scheduled nationally-representative household surveys, such as the DHS and Multiple Indicator Cluster Survey (MICS), and MIS. The timing and coordination of these surveys will be harmonized with Ethiopian and international stakeholders including GFATM, UNICEF, WHO and PMI. Health facility surveillance in sentinel sites will track a set of prospective malaria indicators related to inpatient and outpatient care. PMI M&E will focus on program outputs reported by the RHB and implementing partners, local governments, contractors, and grantees carrying out specific activities with quality control by USAID and CDC. Data collection and reporting will complement national M&E plans and efforts by the NMCP.

Progress to date of PMI supported activities:

The ability to accurately record and report routine data on case management is critical for improving the program with data for decision making and resource allocation. In 2008 the HMIS is undergoing complete retooling with phased implementation in Oromia. Even though the new HMIS will yield only a small number of malaria indicators, PMI will need to evaluate the quality of this 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 assess the operational definitions for the malaria indicators and will determine change in the new HMIS system. 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 activity will not be funded in FY09 unless the recommendations from the 2008 assessment require further support.

While assisting with HMIS roll-out in FY08, PMI will also establish a surveillance system based on sentinel sites. This will enable Oromia to capture malaria indicators beyond the 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). It is anticipated that six of the sites will be established in most of PMI's initial focal zones (i.e. East Shoa, Arsi, West Arsi, and Jimma). The other four sites are expected to be located in the zones of East Wellega (Nekempt District), West Wellega, East Hararge, and Borena. 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.

In addition to this epidemiological data from the HMIS and the sentinel sites, effective management, especially in a region as large and heterogeneous as Oromia, depends on program data related to LLINs, IRS, drugs and laboratory supplies. In FY08, PMI will have supported the establishment of databases and data collection activities that enhance their ability to monitor malaria program components. PMI will also support the necessary information on technology infrastructure and training and ensure that the information is used to guide program decision-making. To facilitate the collection and utilization of data, PMI will support skills training on such topics including finance and human resource management, project management, computer skills, for appropriate staff at each level.

In FY08 PMI will support the review and analysis of existing dataset on malaria morbidity and mortality, which due to shortages in M&E capacity, have not been reviewed or analyzed.

Proposed USG component for FY09: (\$1,150,000)

PMI plans to strengthen and support malaria M&E activities in Oromia and build upon the accomplishments of the planned FY08 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. Linked to national structures, regional support will include training on data management and utilization, conducting special household surveys, and the establishment and continuing support for sentinel sites.

Training Zonal Officers in Program Management: (\$100,000) As M&E and program management capacity is built at the district level, there will be linked training and capacity building for malaria teams in the Zonal Health Offices. Beginning with the four primary target zones in FY08, the training and support will expand to other zones and districts.

Sentinel surveillance site system maintenance and development: (\$250,000) In FY09, PMI resources will be used to ensure that the existing sites created in FY08 are fully operational. In addition, consideration for new sites will be undertaken to expand the coverage of the sentinel site network in Oromia.

Malaria Indicator Survey: (\$300,000) PMI will support a MIS in Oromia, provisionally scheduled for the first quarter of FY09 (i.e. MIS 2009). This will be part of a larger national survey potentially involving donors and implementing partners of MIS 2007, including UNICEF, WHO, The Carter Center and PATH/MACEPA. As for the MIS 2007, this survey will be nationally representative, but will over-sample Oromia to provide regionally representative data, providing a bi-yearly measurement for PMI interventions as well guide program design necessary to achieve PMI's goals and targets. In June 2008 discussions are ongoing whether MIS 2009 will go ahead as originally scheduled or be pushed to 2010 (as a DHS is planned in 2010). Should the survey be pushed to 2010, funds for this activity in FY09 will be reprogrammed.

Program tracking tools and skills strengthening: (\$500,000) FY09 resources will ensure that the information management tools and capacity-building activities (e.g. using data for decision making) in FY08 are refined and expanded to additional administrative zones and districts.

The tools and skills strengthening for improved program management at the regional, zonal and district malaria offices include:

- *Tracking of insecticide-treated nets.* A large proportion of the overall malaria program resources are being used for the purchase and distribution of LLINs. To ensure these resources are being effectively spent, it is important that donors and organizations supporting malaria program activities have a reliable means of tracking and mapping disbursements. It is possible that tracking would be carried out only for Oromia, but using a model that could be applied throughout Ethiopia.
- *Tracking of Indoor Residual Spraying (IRS).* IRS is another large area of investment. Currently, the IRS implementing partner tracks areas planned and actually sprayed. This needs to be expanded and incorporated into regional, zonal and district management systems and linked to other program, epidemiological and geographical data. The IRS tracking system will first be implemented in the three IRS focus zones and then expanded to all malarious areas of Oromia.
- *Identifying/Tracking Malarious Areas.* Malaria risk mapping is critical, first to improve targeting PMI and other program resources, and second to track progress at the community level. The implementing partners will continue to support an ongoing monitoring system to report malaria cases and categorize the degree of malaria prevalence. This will provide an up-to-date listing of malaria risk in specific locations and an indication of the length of time since malaria was confirmed in areas that are deemed malaria-free.
- *Other processes and products.* Several other processes and commodities are important components of malaria prevention and control. The implementing partner may be asked to

implement processes to monitor such things as: the distribution, availability, and use of RDTs; the use and availability of ACTs and other anti-malarial drugs.

P. STAFFING AND ADMINISTRATION

Current status:

Current PMI team is comprised by three USAID/E staff members: one U.S. resident Personal Service Contract Malaria Advisor, one Foreign Service National Malaria Advisor and one Foreign Service National Program Assistant. An additional direct hire Malaria Residential Advisor of the CDC is expected to join in the coming months. 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 (HAPN) 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 teams work 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 Mission Director or the HAPN Office Chief.

Proposed USG component FY09:

Current PMI staffing structure will continue in FY09. It is expected that the CDC Residential Advisor will join PMI at the end of FY08.

Depending on breadth and work load of PMI activities once fully established, additional FSN USAID/E may be hired to support the PMI team in managing established and future activities. Candidates for these positions will be evaluated and/or interviewed jointly by USAID and CDC, and both agencies will be involved in hiring decisions, with the final decision made by USAID/E.

Q. TABLES

Table 1 - Timeline of Activities

Table 2 – Planned Obligations

Table 3 – Budget Breakdown by Intervention

Table 4 – Budget Breakdown by Partner

Table 2

**President's Malaria Initiative – Ethiopia
Planned Obligations for FY09 (\$19,700,000)**

| Proposed Activity | Mechanism | Budget | Commodities | Geographic area | Description of Activity | Page Reference |
|---|------------------|-------------------|--------------------|------------------------|---|-----------------------|
| PREVENTIVE ACTIVITIES | | | | | | |
| LLIN distribution | UNICEF | 5,850,000 | 5,850,000 | Oromia | Provide 900,000 free LLINs through health facilities, HEWs and other networks | 26 |
| IEC/BCC for LLINs; case Management; and CBO support | C-Change | 2,000,000 | | Oromia | Implementation of various IEC/BCC approaches; collaboration with RHB, HEC and in-country partners; sub-awards to NGOs, CBOs, FBOs | 26 |
| Procurement of IRS equipment | IRS IQC | 2,000,000 | 2,000,000 | Oromia | Procurement of insecticides, spray equipment and personal protective gear | 30 |
| IRS operations | IRS IQC | 1,300,000 | | Oromia | Training, implementation and supervision support for IRS operations including capacity for targeting IRS, with GIS and other information management | 30 |
| Entomological Monitoring and capacity-building | IRS IQC | 150,000 | | Oromia | Sustaining capacity for entomological monitoring for vector control, including Adama training facilities | 31 |
| Pesticide management | IRS IQC | 50,000 | | Oromia | Support strengthening environmental compliance capacity including DDT distribution chain from Adami Tulu plant to final use and disposal | 31 |
| Environmental compliance | IRG | 50,000 | | Oromia | External environmental compliance assessment of IRS activities | 31 |
| Subtotal Prevention | | 11,400,000 | 7,850,000 | | | |
| 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 | 560,000 | 50,000 | Oromia | Support RHB, EHNRI and RRLs to improve laboratory services and QA/QC for microscopy and RDTs at health facility level | 34 |
| Support for quality assurance system for microscopy and RDTs | IMAD | 30,000 | | Oromia | TDYs for technical assistance of main PMI-supported malaria diagnostic activities | 34 |
| Procurement of RDTs | DELIVER | 750,000 | 750,000 | Oromia | Procurement and distribution of 650,000 RDTs to support FMOH/RHB efforts to scale-up RDT use at health facility level | 34 |
| Procurement of lab equipment/supplies | DELIVER | 250,000 | 250,000 | Oromia | Procurement of laboratory equipment and supplies including logistics systems support | 34 |
| Strengthening of drug management system capacity | SPS | 600,000 | | Oromia | Strengthening of drug management system, quantification and procurement; distribution management; and health facility drug availability and management | 35 |
| Strengthen drug quality monitoring | DQI | 200,000 | | Oromia | Support to DACA for monitoring of post marketing anti-malarial drug quality | 36 |
| Procurement of ACTs, pre-referral treatment and drugs for severe malaria | UNICEF | 1,500,000 | 1,500,000 | Oromia | Procurement of 750,000 ACT treatment dosages; rectal artesunate and severe malaria treatment and supplies | 39 |
| Pre/In-service training clinical officers and HEWs in diagnosis and treatment | Carter Center follow on TBD | 700,000 | | Oromia | In/pre-service training of clinical officers and HEWs for improved diagnosis and treatment including rational use of drugs | 39 |
| Provide systems support for ongoing supervision and monitoring of malaria treatment | New FP/MNCH procurement | 750,000 | | Oromia | Support for supervision for in-patient, out-patient and community-based management of malaria; collaboration with Zonal and District Health Offices | 39 |
| IEC/BCC for case | C-Change | Covered above | | Oromia | In conjunction with other IEC/BCC and | 39 |

| | | | | | | |
|--|--|------------------|------------------|--|--|--|
| management (note costs covered under ITNs) | | in LLIN section | | | community-based activities specifically for early care seeking and compliance. | |
| Subtotal Case Management | | 5,340,000 | 2,550,000 | | | |

| EPIDEMIC RESPONSE | | | | | | |
|------------------------------------|-------------------------|----------------|--|--------|--|----|
| Epidemic surveillance and response | New FP/MNCH procurement | 600,000 | | 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 | 40 |
| Subtotal Epidemic Response | | 600,000 | | | | |

| MONITORING AND EVALUATION | | | | | | |
|---|-------------|---------|--|----------|--|----|
| Training Zonal Health Officers in Data Management | MEASURE III | 100,000 | | Oromia | Improve recording and reporting of routine malaria service utilization | 46 |
| Sentinel site development | MEASURE III | 250,000 | | Oromia | Maintain 10 sentinel sites, establish additional sites | 46 |
| Program tracking tools and skills strengthening | MEASURE III | 500,000 | | Oromia | Maintenance of program tracking tool database, IT infrastructure | 46 |
| Malaria Indicator Survey | TBD | 300,000 | | National | Malaria Indicator Survey | 46 |
| | | | | | | |

| Proposed Activity | Mechanism | Budget | Commodities | Geographic area | Description of Activity | Page Reference |
|---|-----------|---------|-------------------|-----------------|--|----------------|
| IN-COUNTRY MANAGEMENT AND ADMINISTRATION | | | | | | |
| TDY for Monitoring and Evaluation | CDC | 24,200 | | | 2 two-week trips: one for sentinel site supervision and one for strategic guidance to epidemiological work | |
| TDY for Entomologic Support | CDC | 24,200 | | | 2 two-week trips to support implementation of entomological monitoring | |
| In-country staff; Admin. Expenses | CDC | 500,000 | | | Salaries, benefits of in-country CDC PMI staff (1) | |
| In-country staff; Admin. Expenses | USAID | 661,600 | | | Salaries, benefits of in-country USAID PMI staff (1 PSC/1 FSN), support staff (1 FSN), vehicle | |
| | | | | | | |
| | | | 10,400,000 | | Commodities (52.79%) | |

Table 3**President's Malaria Initiative – Ethiopia
Year 2 (FY09) Budget Break down by Intervention (\$19,700,000)**

| Area | | Other \$ (%) | Total \$ |
|-----------------------------------|------------------------|-----------------------|-------------------|
| Insecticide-treated Nets | 5,850,000 (75) | 2,000,000 (25) | 7,850,000 |
| Indoor Residual Spraying | 2,000,000 (56) | 1,550,000 (44) | 3,550,000 |
| Case Management | 2,550,000 (48) | 2,790,000 (52) | 5,340,000 |
| Intermittent Preventive Treatment | - | - | - |
| Epidemic Response | - | 600,000 (100) | 600,000 |
| Monitoring and Evaluation | - | 1,150,000 (100) | 1,150,000 |
| In-country Administration | - | 1,210,000 (100) | 1,210,000 |
| Total | 10,400,000 (53) | 9,300,000 (47) | 19,700,000 |

Table 4**Year 2 (FY09) Budget Break down by Partners**

| Partner Organization | Geographic Area | Activities | Budget (\$) |
|-------------------------|-----------------|---|-------------|
| C-Change | Oromia | IEC/BCC for LLINs; Case Management CBO support with subgrants to NGOs/FBOs /CBOs | 2,000,000 |
| Carter Center follow-on | Oromia | Pre/In-service training clinical officers and HEWs in diagnosis and treatment | 700,000 |
| FP/MNCH | Oromia | Provide systems support for ongoing supervision and monitoring of malaria treatment Epidemic surveillance and response | 1,350,000 |
| ICAP | Oromia | Support for quality assurance system for microscopy and RDTs | 560,000 |
| Deliver | Oromia | Procurement of RDTs Procurement of lab equipment/supplies | 1,000,000 |
| 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 | 850,000 |
| SPS | Oromia | Strengthening of drug management system capacity | 600,000 |
| IRS IQC | Oromia | Procurement of IRS equipment IRS operations Entomological Monitoring and capacity-building Pesticide management | 3500000 |
| UNICEF | Oromia | LLIN distribution Procurement of ACTs, pre-referral treatment and drugs for severe malaria | 7,350,000 |
| DQI | Oromia | Strengthen drug quality monitoring | 200,000 |
| IRG | National | Environmental compliance | 50,000 |
| TBD | Oromia | Malaria Indicator Survey | 300,000 |

*Table does not include technical assistance visits nor administrative/management costs for USAID/CDC.