

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)

ZAMBIA

FY 2008

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EXECUTIVE SUMMARY

In December 2006, President George W. Bush announced that Zambia had been selected as one of 15 countries in a five-year, \$1.2 billion initiative to rapidly scale-up malaria prevention and treatment interventions in high-burden countries in sub-Saharan Africa. The goal of the President's Malaria Initiative (PMI) is to reduce malaria mortality by 50% in vulnerable groups: children under five years of age, pregnant women, and people living with HIV/AIDS. By the end of the initiative, this goal will be accomplished by achieving 85% coverage of groups at risk of malaria with four key interventions: artemisinin-based combination therapy (ACT), intermittent preventive treatment for malaria during pregnancy (IPTp), insecticide-treated mosquito nets (ITNs), and indoor spraying with residual insecticides (IRS).

Malaria is a major cause of morbidity and mortality in Zambia and the government considers control of the disease one of its highest priorities. According to reports from the Ministry of Health (MOH), there are approximately 4.3 million clinically diagnosed cases of malaria and 50,000 deaths annually in Zambia.

The most up-to-date information on nationwide coverage of key malaria prevention and control measures in Zambia comes from a Malaria Indicator Survey (MIS), conducted in May-June 2006. More than 44% of households own at least one ITN, and 23% of children under five and 24% of pregnant women reported that they had slept under an ITN the previous night. Approximately 62% of mothers took two or more doses of IPTp.

Zambia is the recipient of Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) malaria grants from Round 1 and Round 4, totaling over \$82 million. Both grants have suffered major delays in disbursements due to a change in the Principal Recipient from the Central Board of Health to the MOH. Zambia is submitting a Round 7 GFATM malaria grant proposal for \$37.5 million. Zambia has also applied for support through the newly established UNITAID initiative to fill anticipated gaps in ACTs for distribution at the community level. UNICEF has been a major supporter of ITN distribution and the World Health Organization (WHO) is a leading source of technical assistance to the MOH/National Malaria Control Center (/NMCC). Excellent opportunities also exist for partnering in malaria control efforts with large mining companies, such as Konkola Copper Mines. Other major donors include the Japanese International Cooperation Agency (JICA), the World Bank, and the Bill and Melinda Gates Foundation, through the Malaria Control and Evaluation Partnership in Africa (MACEPA) in Zambia.

The PMI Three-Year Strategy and Year One Implementation Plan for Zambia were based on an assessment visit carried out in March 2007 by representatives from USAID, the Centers for Disease Control and Prevention (CDC), WHO, UNICEF, and the Zambian MOH/NMCC, during which all national and international partners involved in malaria control activities in Zambia were interviewed. This was followed by a planning visit in May 2007, which brought together the MOH/NMCC and other partners to reach consensus on a detailed Year One implementation plan and Three-year strategy.

The PMI will support existing MOH/NMCC strategies and plans and will coordinate with international and national partners to complement their funding and efforts. Many of

Zambia's commodity needs are being met by other donors, including the GFATM, the World Bank, and JICA; PMI will aim to contribute to filling identified gaps, both commodity-specific and other, in the MOH/NMCC strategy for malaria control and prevention. To achieve the goals and targets of the MOH/NMCC and PMI in Zambia, the following major activities will be supported through the PMI during Year 1:

Insecticide-treated nets: Zambia has a four-pronged approach to ITN distribution, including regional mass campaigns to distribute free long-lasting ITNs (LLINs) to all households, provision of highly-subsidized nets to pregnant women and children under five through antenatal care clinics (ANCs), an equity program to provide free LLINs to vulnerable populations such as households with orphans and vulnerable children, people living with HIV/AIDS, and the poorest of the poor, and the sale of ITNs through the commercial sector. In Year One, PMI will procure 400,000 LLINs for distribution through ANCs to support the NMCC goal of 80% of households owning three ITNs. Other partners will procure approximately 300,000 ITNs; the combined effort is expected to bring nationwide household ownership of one or more ITNs to 65%. Although household ownership of ITNs is relatively high in Zambia, usage rates remain low; therefore, PMI will support a national and community-based information, education, and communication/behavior change communication (IEC/BCC) campaign to increase demand for, and correct usage of, LLINs.

Indoor residual spraying: Zambia has a well-established IRS program covering 15 of the country's 72 districts that has been supported by USAID, the World Bank, and the Government of the Republic of Zambia (GRZ). Under the PMI, the USG will continue to support IRS activities in these 15 districts by procuring insecticides and other IRS-related commodities and contributing to operational costs, including an environmental assessment, training of sprayers, monitoring and evaluation, provision of appropriate storage and waste disposal of insecticides, and IEC/BCC. By spraying at least 80% of the 700,000 targeted households in these 15 districts, about 30% of the total population will be protected from malaria.

Case management: Although clinical diagnosis is currently the basis for malaria treatment for patients of all ages at a majority of health facilities in Zambia, NMCC Guidelines for the Diagnosis and Treatment of Malaria recommend that laboratory diagnosis for malaria be performed on any patient with suspected malaria at hospitals and rural health centers where diagnostic services are available. Since the guidelines were issued, MOH/NMCC and partners have been actively working to expand the role and availability of malaria diagnostic services through improvements in microscopy and introduction of rapid diagnostic tests (RDTs) where microscopy services are not available. To support efforts to increase diagnostic capacity and quality, PMI will procure approximately 645,000 RDTs and help strengthen quality assurance of, and capacity for, microscopic diagnosis. In addition, PMI will procure additional ACTs and invest in strengthening the supply chain and logistics systems for malaria drugs to ensure reliable access and a steady supply. To ensure that ACTs are properly used and improve the quality of malaria treatment, PMI will support training and supervision at the health facility level, while continuing to support district-level efforts to provide prompt and reliable treatment through support to the district implementation basket. Finally, PMI will support increased demand for and correct use of ACTs through national and community-based IEC/BCC campaigns. Combined with investment from the GFATM, PMI

support in this area will result in over 30% of children under five with suspected malaria in Zambia receiving ACTs by the end of year one.

Intermittent preventive treatment of pregnant women: Despite high IPTp coverage levels, the recent MIS showed substantial gaps in two-dose IPTp coverage among poorer women, and women in rural areas. In order to increase demand for IPTp in these areas, PMI will support the strengthening of focused ANC in two provinces (14 districts) where uptake of IPTp is low as well as community-based and nationwide IEC/BCC efforts. In addition, PMI will support an evaluation of the efficacy of SP in pregnant women. Zambia is particularly well-suited for this study due to the existence of multi-year data on the efficacy of SP when used for treatment.

Monitoring and evaluation: The PMI includes a strong monitoring and evaluation component to measure progress toward the project goal and targets, and identify and correct problems in program implementation. The PMI monitoring and evaluation plan will be coordinated with the NMCC and other partners to share resources, ensure that critical gaps are being filled, and standardize data collection and reporting. Over the course of the Initiative, process and coverage indicators will be derived from representative community surveys of malaria intervention coverage indicators and measurements of all-cause under-five mortality. In the first year, PMI will provide support to ten existing sentinel sites that make up the malaria information system and potentially expand to new sites to collect and report appropriate malaria-related data on a regular basis.

Building NMCC capacity: To achieve PMI targets for coverage of ACTs, ITNs, IPTp, and IRS, the PMI will work with other partners to strengthen the capacity of the MOH/NMCC at the central, provincial, and district levels to plan, conduct, supervise, monitor and evaluate malaria prevention and control activities. Efforts will also be directed at improving coordination/communication between the MOH/NMCC and partners.

To launch the PMI in Zambia, support will be provided with Fiscal Year (FY) 2007 funding to the September-November 2007 IRS campaign in 15 districts that will cover approximately 700,000 households.

The proposed FY08 PMI budget for Zambia is \$15 million. Of this amount, 26% will support procurement and distribution of ITNs, 27% improved case management, 30% IRS, and 6% malaria in pregnancy activities. More than 2% will support monitoring and evaluation. Approximately 42% of the total budget will be spent on commodities.

ABBREVIATIONS and ACRONYMS

ACT – artemisinin-based combination therapy
 AIDS – Acquired Immuno-Deficiency Syndrome
 AL – artemether-lumefantrine
 ANC – antenatal clinic
 AS – artesunate
 BCC – behavior change communication
 CBO – community-based organizations
 CDC – U.S. Centers for Disease Control and Prevention
 CHAZ – Churches Health Association of Zambia
 CHW – community health worker
 CP – cooperating partner
 CQ – chloroquine
 DALY – disability-adjusted life year
 DHS – Demographic and Health Survey
 DHMT – district health management team
 EPI – expanded program on immunizations
 FANC – focused antenatal care
 FBO – faith-based organization
 GFATM – Global Fund to Fight AIDS, Tuberculosis, and Malaria
 GRZ – Government of the Republic of Zambia
 HIV – Human Immunodeficiency Virus
 HCP – Health Communications Partnership
 HMIS – Health Management Information System
 HSSP – Health Services and Systems Program
 IEC – information, education, communication
 IMCI – integrated management of childhood illnesses
 IPTi – intermittent preventive treatment of infants
 IPTp – intermittent preventive treatment of pregnant women
 IQC – indefinite quantity contract
 IRS – indoor residual spraying
 ITN – insecticide-treated net
 JHPIEGO – Johns Hopkins Program for International Education in Gynecology and Obstetrics
 JICA – Japan International Cooperation Agency
 JSI – John Snow Institute
 LLIN – long-lasting insecticide-treated net
 MACEPA – Malaria Control and Evaluation Partnership in Africa
 MIP – malaria in pregnancy
 MIS – Malaria Indicator Survey
 MOH – Ministry of Health
 MSL – Medical Stores Limited
 NMCC – National Malaria Control Centre
 NGO – non-governmental organization
 OR – operations research
 PEPFAR – President’s Emergency Plan for AIDS Relief

PLWHA – People Living With HIV/AIDS
PMI – President’s Malaria Initiative
PPE – Personal Protective Equipment
PSI – Population Services International
RBM – Roll Back Malaria
RDT – rapid diagnostic test
RFA – request for applications
RHS – reproductive health services
RTI – Research Triangle Institute
SFH - Society for Family Health
SP – sulfadoxine-pyrimethamine
SPA – Sector Programme Assistance
SWAp – Sector Wide Approach
TDRC – Tropical Disease Research Centre
UNICEF – United Nations Children’s Fund
USAID – United States Agency for International Development
USG – United States Government
WHO – World Health Organization
WHOPES – World Health Organization Pesticide Evaluation Scheme
ZIMMAPS – Zambia Integrated Management of Malaria and Pneumonia Study
ZMF - Zambia Malaria Foundation

THE PRESIDENT'S MALARIA INITIATIVE

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

The President's Malaria Initiative (PMI) began in three countries in 2006: Angola, Tanzania, and Uganda. In 2007, four countries were added: Malawi, Mozambique, Senegal, and Rwanda. In 2008, Zambia and seven other countries were added to reach a total of 15 countries covered under the PMI. Funding began with \$30 million in FY 06 for the initial three countries, \$160 million in FY 07 for the initial three countries plus four additional countries, and will increase to \$300 million in FY 08, and \$500 million in FY 10 in 15 countries.

In implementing the PMI, the USG is committed to working closely with host governments and within existing national malaria control 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 Malaria Booster Program, the World Health Organization (WHO), the United Nations Children's 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 sessions for the PMI, as well as subsequent evaluations, will be highly consultative and held in collaboration with the national malaria control program and other partners.

This document presents a detailed one-year implementation plan for the first year of the PMI in Zambia. It briefly reviews the current status of malaria control and prevention policies and interventions, identifies challenges and unmet needs if the goals of the PMI are to be achieved, and provides a description of planned Year One activities under the PMI. The document was developed in close consultation with the Ministry of Health/National Malaria Control Centre (MOH/NMCC) and with participation of most national and international partners involved in malaria prevention and control in the country. The total amount of PMI funding requested for Zambia is \$15 million for FY 2008.

MALARIA SITUATION IN ZAMBIA

Zambia is a land-locked country in southern Africa, bordered by Malawi, Mozambique, Zimbabwe, Namibia, Botswana, Angola, Democratic Republic of Congo, and Tanzania. It has



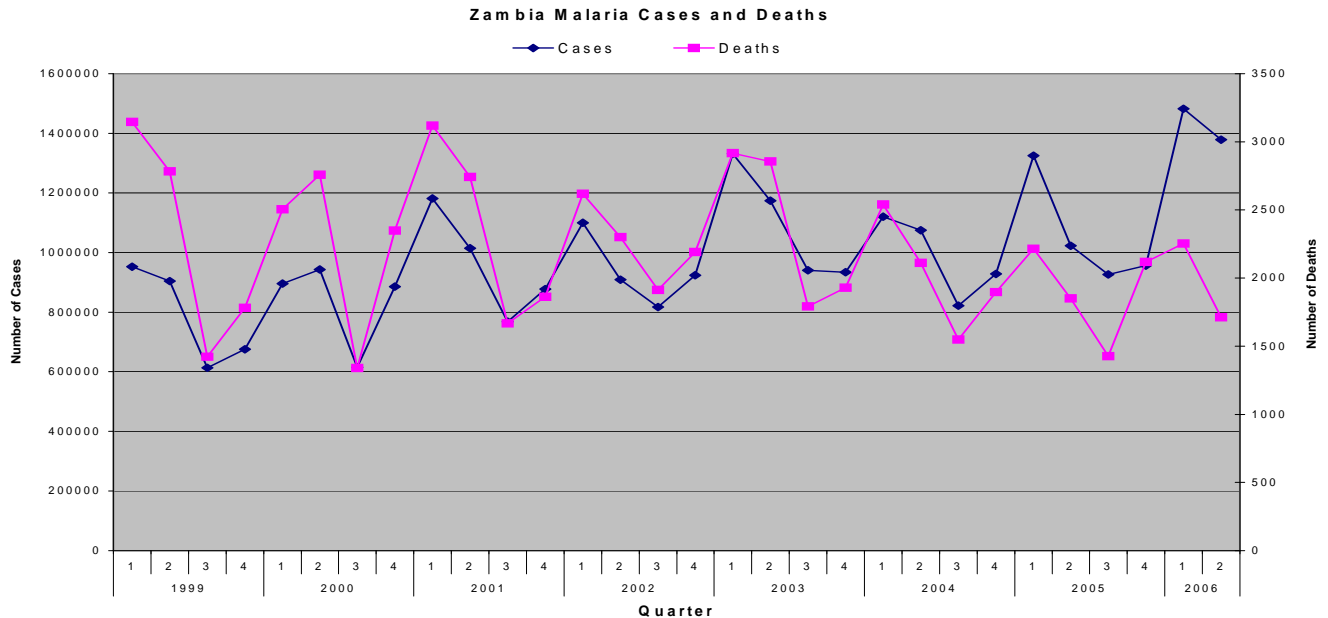
a population of approximately 11.5 million, 45% of whom are below the age of fifteen. Zambia's key development trends are generally positive: under-five mortality has fallen from 191 per 1000 in 1992 to 168 per 1000 in 2002, 85% of children complete primary school, and overall poverty has been declining. Despite these positive trends, Zambia continues to face major challenges. Sixty-eight percent of the population is below the national poverty line. HIV/AIDS is a major problem for all sectors with an estimated 15.6% of adults infected. Maternal mortality continues to be high at 729 per 100,000 live births and literacy rates remain low among females and rural dwellers.

Malaria transmission in Zambia occurs throughout the year with the peak during the rainy season, which occurs between November and April. *Plasmodium falciparum* accounts for more than 90% of all infections. *Anopheles gambiae* is the major malaria vector. All nine provinces of Zambia are endemic for malaria with 90-100% of the population at risk. Unstable malaria transmission mainly occurs in the districts on the higher altitude plateau, specifically Mpika, Serenje, Mkushi, Kapiri Mposhi, Chibombo, Mazabuka, Monze, Choma, and Lusaka. This is due to breaks in transmission of malaria during the cold, dry season, resulting in lowered malaria immunity, unstable transmission, and predisposition to outbreaks.

Approximately 4.3 million clinically diagnosed cases of malaria and 50,000 deaths are reported annually in Zambia by the MOH, although these figures probably underestimate the true number of cases considerably. The 2006 National Malaria Indicator Survey (MIS) showed that 22% of children under five had malaria parasitemia and 13% suffered from severe anemia. Luapula Province has the highest percentage of children under five with malaria parasites (38%), followed by Northern Province (36%) and Central Province (24%), while Lusaka, Southern, and Copperbelt provinces have the lowest (1%, 9%, and 11%, respectively). Zambia was the first country in tropical Africa to adopt ACT with artemether-lumefantrine (AL) for first-line treatment of malaria; SP is still recommended as an alternative first-line treatment in patients who cannot tolerate AL, those weighing less than 5 kg, when and where AL is unavailable, and for routine use in IPTp. The MIS also revealed that 29% of children under five had a fever in the last two weeks, and only 4.5% sought treatment from a facility/provider within 24 hours.

As seen in the figure below, the number of malaria cases reported in Zambia has increased during the last 25 years, probably due to the spread of drug resistance, reduced vector control, decreased access to health care, the spread of HIV infections, and poverty. In 2004, the total number of reported under five deaths dropped to its lowest level in six years, but malaria still

accounted for 45% of outpatient visits, 45% of hospital admissions, 47% of overall disease burden among pregnant women, and 50% of disease burden among children under five years of age. Malaria also has a serious economic impact on Zambia, accounting for 6.8 million Disability Adjusted Life Years, or DALYS, lost. This is higher than the figure for acute respiratory infections (5.4 million) or HIV/AIDS (3.2 million).



Zambia currently has two malaria grants from the GFATM Round 1 and Round 4; the Principal Recipients for both are the Churches Health Association of Zambia (CHAZ) and the MOH. The MOH (Central Board of Health, at the time) signed Round 1, Phase 1 in 2003 for \$17,852,600 and Round 4, Phase 1 in 2005 for \$14,450,063. CHAZ signed its grants during similar time periods and its phase one grants are for \$852,600 and \$5,829,887 respectively. Assuming that Round 4, Phase 2 is approved, Zambia's GFATM funding for malaria will end in 2010.

Both grants focus on the scale-up of LLINs, the introduction and scale-up of ACTs, and the reintroduction of IRS. Round 1 is more commodities-focused, while Round 4 has a greater balance between funding for commodities and operational costs and includes integrated vector management. These grants fund the majority of the public sector ACTs and a substantial portion of the LLINs.

Other major donors include the Japanese International Cooperation Agency (JICA), the World Bank, and the Bill and Melinda Gates Foundation, through the Malaria Control and Evaluation Partnership in Africa (MACEPA) in Zambia. JICA's support includes donations of ITNs and LLINs (distributed to pregnant women through ANCs), antimalarial drugs, laboratory equipment and reagents, and vehicles and motorcycles, as well as support to IRS activities. MACEPA, established in 2004, is a nine-year, \$35 million project intended to demonstrate the impact of full implementation of malaria control interventions and establish a proven, flexible model for national malaria control program scale-up. MACEPA's support to the MOH/NMCC in Zambia includes technical assistance for monitoring and evaluation of

malaria interventions including biannual Malaria Indicator Surveys, support for emergency procurement and distribution of LLINs in 2006, and an integrated IEC/BCC initiative that is to be developed in the coming year.

The World Bank has designated Zambia a Malaria Booster Project Country and between 2006 and 2010 the Bank will provide \$20 million for malaria control and prevention. Of this amount, approximately \$14 million will be spent by 2007. The project has three major components. The first component, strengthening the health system to improve service delivery, has supported both operational and insecticide costs for the 2006-2007 IRS campaign. It will also provide funds through the district basket and procure and distribute one million LLINs in the Northern and Southern provinces in 2007. The second component, Community Malaria Booster Response, provides small grants to communities working to scale-up malaria control and prevention interventions. The final component provides funding to strengthen the capacity of the MOH/NMCC to provide technical leadership and coordination of the implementation of national programs.

Key Donor Roles: Areas of Support to NMCC Program

Program Area	GFATM Rounds 1 & 4	World Bank	MACEPA	JICA	WHO	UNICEF
ITNs	X	X	X	X		X
IRS	X	X	X			
IPTp						
Diagnostics	X					
ACTs	X					X
IEC/BCC	X	X	X			X
M&E	X		X		X	
Health Systems Strengthening		X				
Program Management		X	X		X	X

The Zambian Sector Wide Approach, or SWAp, plays an important role in ensuring efficient and effective mobilization and utilization of financial resources from the Government and donors, or Cooperating Partners (CP), as they are called in Zambia. A key element of the SWAp is that all CP are active members of the Health Sector Advisory Group and other SWAp coordinating mechanisms regardless of their sector funding modalities.

Under the SWAp, the health sector is funded through a number of different modalities, including the District Basket, which was developed in the 1990s as a response to the National Health Strategic Plan focus on the district as the key level for delivery of health care. The basket approach (pooled funding mechanism) allows Cooperating Partners to provide direct support to the MOH while also targeting their funding to an area of interest and/or commitment. The District Basket, also known as Sector Programme Assistance or SPA,

provides monthly grants to fund district health services for the community through the District Health Office. Currently, about \$3.35 million is distributed monthly among all 72 districts based on allocation criteria including population size and density, disease burden, and classification as rural or urban. These grants provide support for services at all levels: district hospital, health centers, and health posts (where they exist), and in the community. Districts use these funds for operational costs related to the delivery of health services, including utilities, rent, fuel, travel allowances for outreach activities, supervision, employment of non-civil service staff, and emergency purchases of drugs and medical supplies.

In 1999, USAID signed a Sector Programme Assistance agreement with the Ministry of Finance and National Planning that was grandfathered into legislation that permitted the use of Child Survival and Health funds for program assistance. The USG provides \$1 million in funding to the district health grant account (District Basket). Monitoring of the district grant account is done through the MOH's Monitoring and Evaluation Committee, of which the USG is a member. This investment is assisting the MOH/NMCC to develop and roll-out national policies and protocols, train health workers, provide commodities and equipment and supplies, and support supervision and monitoring are all dependent on a functioning health system at the district level and below.

NATIONAL MALARIA CONTROL PLAN AND STRATEGY

The Zambian National Malaria Control Program has a well-conceived and ambitious Five-Year Strategic Plan for 2006 - 2010 that builds on the National Malaria Strategic Plan for Malaria Control developed by the national RBM Partnership with the MOH. The Plan shows considerable commitment to rapid scale-up of malaria interventions and has the overarching goal of reduction of malaria incidence by 75% by the end of 2011, ultimately contributing to the reduction of all-cause mortality by 20% in children under five. Specific targets for December 2008 include:

- 1) At least 80% of people sleep under an ITN in eligible ITN areas of every district (eligible areas are areas not covered by IRS);
- 2) At least 85% of people sleep in sprayed structures in eligible areas of the 15 selected districts;
- 3) At least 80% of women have access to the package of interventions to reduce the burden of malaria in pregnancy. The package of interventions will include a full three-dose course of IPTp, an ITN, and anemia reduction.
- 4) At least 80% of suspected malaria patients are correctly diagnosed; and
- 5) At least 80% of malaria patients in all districts are receiving prompt and effective treatment according to the current drug policy within 24 hours of onset of symptoms.

The National Malaria Control Plan also addresses the need to strengthen national, provincial, and district-level capacity to manage, plan, and implement malaria programs, address human resource needs, ensure that there is an established planning and forecasting framework for projecting funding needs and tracking health expenditures, develop capacity at all levels of the health systems to manage storage and distribution of malaria commodities, and reinforce coordination among partners. In addition, the plan notes the importance of robust IEC/BCC

efforts to increase awareness and demand for malaria control and treatment services among households.

MOH/NMCC and partners are convinced that providing AL in health facilities alone would not achieve high enough coverage of prompt effective first-line treatment, especially in remote communities. The MOH/NMCC plans to introduce AL into community health worker (CHW) kits in a coordinated effort with the expansion of community Integrated Management of Childhood Illness (c-IMCI). The strategy planned by NMCC is to strengthen community management through orientation of the 5,040 who have already been trained on c-IMCI to correctly use RDTs and ACTs. The planned phased introduction of RDTs and ACTs at the community level will be as follows: nine districts in Year 1; 28 districts in Year 2; and all 72 districts in Year 3.

Overview of the Health System

Since 1992, the GRZ has been implementing health sector reforms aimed at decentralizing health service delivery to the district and hospital levels and focusing on preventive rather than curative care. The reforms have focused on improving primary health care and implementing a basic health care package of carefully selected high-impact interventions offered through the public health system. This package has ten priority areas, one of which is malaria. Services included in this basic health care package are provided free-of-charge or on a cost-sharing basis depending on the location and level of the system. In rural and poor districts in Zambia, these services are free.

The MOH provides the technical and management oversight of all public health facilities. At the provincial and district level, Provincial Health Offices serve as an extension of the MOH while the District Health Management Teams (DHMTs) have the fiscal authority to manage the district health centers and are the main implementers of vertical programs such as IRS.

Government-run health facilities, which provide the majority of the health care in Zambia, operate at several levels. Malaria control interventions are delivered at all levels:

- Health posts and community outreach,
- Health centers, and
- Level 1 hospitals, Level 2 hospitals, and Level 3 hospitals.

Summary of Existing Health Facilities in Zambia

Type/Level	Total
Hospitals	99
Level 1	76
Level 2	18
Level 3	5
Health Centers	1,215
Urban	232
Rural	983
Health Posts	104
Total	1,418

Source: Health facility Census 2005

The DHMT provides overall planning, coordination, and monitoring of malaria activities. Ideally, a health post should cover 500-1000 households and all households should be within five kilometers of a health facility. While 3,000 health posts are planned nationwide, only 20 are currently commissioned. Health centers, staffed by a clinical officer or nurse, are to serve a catchment area of 10,000 residents. Each district should have a hospital, staffed by one or more physicians; however, currently 19 districts have no hospital.

Other than the MOH, CHAZ, parastatal organizations, private clinics, and traditional healers also provide health care in Zambia. According to a World Bank assessment, CHAZ provides as much as 30% of overall health care in Zambia through a network of 129 functional units across the country (including 32 mission hospitals, 69 mission-affiliated rural health centers, and 28 church-based community health programs). CHAZ also supports health programs, pharmaceutical services, and institutional development activities, and leverages resources for the collective procurement of drugs and other health related commodities for its member facilities. Private mining companies provide preventive and curative medical services for their workers and dependants, as well as surrounding communities in some cases. Several of the larger mining companies, such as Konkola, have been carrying out IRS for many years within and around their compounds.

CURRENT STATUS OF MALARIA INDICATORS

The most up-to-date information on current status of malaria control indicators comes from a nationally representative MIS that was carried out in 3,000 households in 58 of the 72 districts in the country in May-June 2006, just following the major malaria transmission season. Resulting estimates of malaria control indicators are below. In addition to the figures below, it should be noted that the MOH/NMCC has focused its IRS activities on 15 of the country's 72 districts. In those districts, 34% of all urban households had been sprayed in the previous 12 months (however, this percentage does not represent coverage of targeted households but coverage of all urban houses in districts where IRS was conducted; operational coverage rates are presented later in this report). Twenty-nine percent of children under five had had a fever within the previous two weeks. Of these, 58% took an antimalarial drug, while 37% took an antimalarial drug within 24 hours of the onset of their symptoms. Thirty-three percent of children treated received SP, and 13% received artemether-lumefantrine (AL, Coartem[®]).

Estimates of Malaria Indicators: 2006 Zambia MIS (preliminary)	
Indicator	Estimates
Proportion of children under five years old with fever in the last two weeks who received treatment with an antimalarial according to national policy within 24 hours of onset of fever	37%
Proportion of children under five years old with fever in the last two weeks who received treatment with an ACT within 24 hours of onset of fever	13%
Proportion of households with at least one ITN	44%
Proportion of children under 5 years old who slept under an ITN the previous night	23%

Proportion of pregnant women who slept under an ITN the previous night	24%
Proportion of women who received 2 or more doses of IPTp during their last pregnancy in the last 2 years	62%
Proportion of targeted houses adequately sprayed with a residual insecticide in the last 12 months (Source)	N/A

GOAL 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 Zambia to achieve the following targets in populations at risk for malaria:

- >90% of households with a pregnant woman and/or children under five will own at least one ITN;
- 85% of children under five 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 under five will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the last 6 months;
- 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and
- 85% of children under five with suspected malaria will have received treatment with an ACT within 24 hours of onset of their symptoms.

EXPECTED RESULTS – YEAR ONE

Prevention:

- Approximately 700,000 LLINs will have been distributed by partners (of which PMI will contribute 400,000) to pregnant women and children under five. This is expected to bring nationwide household ownership of one or more ITNs to 65%.
- At least 85% of houses in geographic areas targeted for IRS during Year One will have been sprayed (urban and peri-urban areas in 15 districts, covering approximately 700,000 households).

Case Management:

- Approximately 1,000,000 treatments of AL will have been purchased and used to maintain supply of ACTs to health facilities nationwide. Combined with investments from the Global Fund to Fight AIDS, TB, and Malaria, these efforts are expected to result in over 30% of children under five with suspected malaria receiving ACTs.
- To help fill the gap in diagnostic supplies and support the NMCC’s recommendation of parasitological diagnosis for all patients with suspected malaria, approximately

645,000 rapid diagnostic tests (RDTs) will have been purchased to ensure steady supply to health facilities.

- Focused antenatal care (FANC) will have been strengthened in selected districts where current uptake of IPTp is low, increasing the proportion of women receiving two or more doses of IPTp.

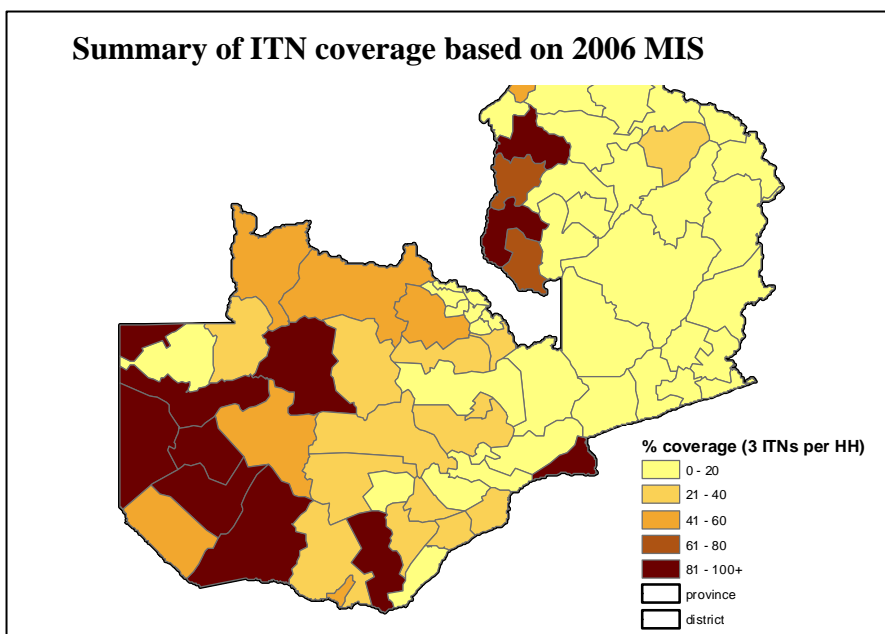
INTERVENTIONS: PREVENTION

Insecticide-Treated Nets

Current Status, Challenges, and Needs

Zambia has identified ITNs as a key part of its malaria control strategy and is working to scale-up coverage. The NMCC's five-year strategic objective is to have 75% of all persons sleeping under an ITN in eligible ITN areas by 2008 and for 80% of households to have a minimum of three LLINs. Eligible areas include those areas not covered by the IRS campaign. An ITN Technical Working Group meets regularly to coordinate net distribution activities.

According to the 2006 MIS, 44% of households own one ITN and 19% of households have more than one ITN; rural and urban populations have similar levels of ITN ownership (45% of urban and 44% of rural households, respectively, own one ITN). Ownership varies greatly by geographic region. In Western Province, where a major net distribution campaign recently took place, ITN ownership was found to be 73%, while Lusaka, Northern, and Copperbelt Provinces reported the lowest household ownership of at least one ITN (35%, 33%, and 40%, respectively). Lower ownership in these areas can be partially explained by the lack of mass distribution campaigns in these regions and the presence of IRS in peri-urban and urban areas of Lusaka and Copperbelt Provinces.



While net ownership is increasing rapidly, utilization remains low. The MIS found that only 23% of children under five and 24% of pregnant women had slept under an ITN the previous night. There are slight geographical and urban-rural differences in utilization, with usage among children under five in urban areas slightly higher than that in rural areas (26% compared to 21%) while among pregnant women, rural women were more likely than their urban counterparts to sleep under ITNs, (27% vs.18%). Regional usage in children varied from 11% in the Central province to 33% in the Southern province. Among children under five, those from wealthier quintiles were more likely to have slept under an ITN. There was no difference in utilization by wealth quintile among pregnant women.

Net Distribution Strategies:

To increase coverage and utilization of LLINs in Zambia, the NMCC has adopted a four-pronged net distribution strategy:

- Regional mass campaigns to distribute free LLINs to all households;
- Highly-subsidized nets to pregnant women and children under five through ANCs;
- An equity program to provide free LLINs to vulnerable populations such as households with orphans and vulnerable children, people living with HIV/AIDS, and the poorest of the poor; and
- Sales of LLINs through the commercial sector.

Net Distribution Strategy

Approach	Target population	Target areas	Method	Current Donors
Mass Distribution	All households	Provinces and districts selected yearly	Free distribution of three nets per household	World Bank, GFATM, UNICEF
Malaria in Pregnancy/ANC distribution	Pregnant women and children under five	Whole country except Lusaka and Copperbelt Provinces	Sold for \$0.75 to target populations at health care centers	USAID, GFATM, JICA
Equity	Vulnerable populations	62 districts	Free distribution by home-based care workers	USAID, Global Business Coalition, Zambia Malaria Foundation, UNICEF
Commercial	Those who can afford nets	Urban centers	Sold in shops and markets	Commercial partners

Mass campaigns: As a means of rapidly scaling-up LLINs nationally, MOH/NMCC has been conducting regional mass distribution campaigns of free LLINs to all households. In general, these mass campaigns have targeted those areas that are not receiving IRS, are

disadvantaged, and have a high malaria incidence. To date, these campaigns have been funded via the GFATM grants, the World Bank Booster program, and MACEPA.

In 2007, three additional provinces will be targeted, distributing 1.32 million LLINs. With the support of the World Bank, the NMCC will receive 1 million LLINs that will be distributed to Northern and Southern Provinces. The LLINs for Northern Province have already been ordered and will arrive in May 2007. The balance of the World Bank-supported LLINs is targeted for Southern Province and should arrive in June. The GFATM will fund the procurement and distribution of 460,000 ITNs to Eastern Province and planning for this campaign has already started. At the end of the 2007, only Lusaka, Copperbelt, and Central Provinces, which have been the focus areas for IRS, will not have benefited from a province-wide campaign.

In 2008, with GFATM Round 4 phase 2 funds, both CHAZ and the MOH will procure and distribute additional LLINs. The NMCP will procure approximately 200,000 LLINs for distribution in 16 districts. CHAZ will also distribute an additional 100,000 LLINs using faith-based organizations (FBOs).

Distribution through ANCs: The second major distribution method of LLINs in Zambia is the sale of highly subsidized LLINs through ANC clinics targeting pregnant women and children under five, often referred to as the “malaria in pregnancy” (MIP) program. This program, implemented for the MOH/NMCC by the Society for Family Health (SFH) with support from USAID, sells Permanets® under the brand name “Mama Safenite®.” Since 2001, the program has sold over 788,000 LLINs nationally and 244,000 in 2006 alone.

Health workers at 1,212 rural health facilities nationally sell Mama Safenite nets for 3000 kwacha (about \$0.75 each). SFH procures and distributes these LLINs to the districts through its national distribution network. SFH estimates that its distribution costs are approximately \$0.50 per net. At the district level, the DHMT is responsible for the distribution of these nets to the ANCs and no formal support is provided from SFH for this effort. Within the district, the program operates as a revolving fund where the district retains 1,500 kwacha for its operational costs (500 kwacha for the DHMT and 1,000 kwacha for the health center) and 1,500 kwacha is remitted to SFH for procurement of more LLINs. The MOH/NMCC is currently exploring making these LLINs free at ANC, but a final policy decision has not been made.

This program is accompanied by a mass media/IEC campaign to increase the utilization of these nets and to promote the purchase of the Mama Safenite net and the broader use of ITNs generally. SFH uses communication tools such as radio, posters, community drama focusing on mosquito-avoidance, and correct and consistent usage. However, limited funding has constrained the scope and the consistency of the IEC campaign and to date no direct house-to-house promotion has been done.

In 2007, this program will be expanded and will receive approximately 600,000 LLINs for distribution (366,000 from JICA and 239,333 through USAID). USAID plans to provide funding for 400,000 LLINs in 2008. The JICA nets will only be distributed in the ten districts that have sentinel sites (Chibombo, Chingola, Chipata, Samfya, Chongwe, Kaputa, Isoka,

Mwinilunga, Kalomo, and Senanga). In 2008, a similar quantity of nets will be needed to maintain this successful program.

Equity program: The third distribution channel is the “Equity Program” which was started in 2003 as a means of increasing access to ITNs for particularly vulnerable groups such as orphans and vulnerable children, people living with HIV/AIDS (PLWHA) and their caregivers, refugees, and other vulnerable groups. In 2006, this channel distributed approximately 20,000 LLINs. In 2007, this program will see an enormous expansion through a World Vision-led consortium of NGOs supporting HIV/AIDS home-based care that will distribute approximately 500,000 LLINs to these vulnerable populations. The LLINs are being procured with a \$2.5 million donation from the Global Business Coalition, and the USG (PEPFAR and PMI). This consortium of NGOs will use its network of over 13,000 home-based care volunteers to distribute these nets to over 167,000 vulnerable households in 62 districts nationally. Distribution will commence in June 2007 and should be completed in August. The Zambia PEPFAR program may continue to fund this program in future years.

Commercial sales: The fourth distribution method is via the commercial sector. While not as vibrant as in other countries, the commercial sector in Zambia sells about 35,000 LLINs a year. The major commercial partners are Melcome Marketing and EcoZed Limited. Long-lasting ITNs are sold for about 35,000 kwacha (about \$8-9) and conventional nets at 10,000 kwacha and above (about \$2-3). It is generally accepted that the commercial market needs to continue and be promoted to ensure long-term access of LLINs and replacement of old nets.

Finally, there are other minor distribution outlets for nets including employer-based programs, distribution for use in health facilities, school health programs, mining companies, etc. Currently, these programs make up a very small percentage of the total number of nets distributed.

Taxes, tariffs, and type of net

Regardless of the distribution channel used, the GRZ has eliminated all taxes and tariffs on ITNs and net retreatment kits. This policy has helped reduce the price of ITNs in the commercial sector and has helped reduce administrative costs associated with the ANC distribution program. The national policy also endorses the use of LLINs over ITNs or bundled nets, but they allow the following brands of LLINs and bundled ITNs: K-O Net®, Iconet®, Fenet®, Permanet®, Olyset®, and Octonet®. Of these only Permanet and Olyset brands are LLINs. As of the writing of this report, the MOH had not determined if they would allow the use of the newly WHOPES-approved Inceptor® LLIN. The MOH/NMCC policy specifies that the nets should be knitted, multifilament polyester (not monofilament like fishing lines) which are easier to treat than cotton nets. The nets should be at least 100 deniers as 70 denier tears more easily.

Projected ITN need, 2008-2010

To reach the MOH/NMCC coverage target of 80% of households owning at least three nets, approximately four million ITNs must be in circulation in Zambia. If all of the 3.1 million LLINs are distributed as in 2007, there will be more than five million LLINs in the country and it is likely that the MOH/NMCC will achieve its target. In 2008, mass distributions efforts are expected to focus on Copperbelt, Central, and Lusaka Provinces while other

distributions will be through the MIP program. To sustain this high coverage, the following table summarizes the projected needs for LLIN procurement in out years.

Summary of Estimated ITN needs (in '000s) 2007-2010

Year	2006	2007	2008	2009	2010
Nets distributed (<i>planned</i>)	1800	3100	300	TBD	TBD
Target (80% of eligible households have 3 nets) ¹	4100	4100	4200	4250	4300
Cumulative nets in country (as of start of year)	2000	3800	TBD	TBD	TBD
Nets needed to be replaced ²	TBD	TBD	1130	1800	3100
Nets needed to reach/maintain target based on those that will need to be replaced			830	1000	3100

¹ Target based on a population of 12 million people and 5 persons per household in eligible households, i.e. those not included in the IRS target areas.

² It is assumed that a LLIN will last 3 years. Anecdotal evidence suggests that due to heavy use in Zambia, they may last fewer than 3 years.

Information, Education, and Communication (IEC) for ITNs

Low net utilization rates indicate a need for a comprehensive and sustained national IEC/BCC campaigns on the correct and consistent use of ITNs. Currently, most IEC/BCC campaigns in the areas of net ownership are in conjunction with an event such as a mass distribution campaign or Africa Malaria Day. In recent years, the MOH/NMCC, with the support of the USAID-funded Health Communications Partnership (HCP), has tried to strengthen this part of its program and has recently issued its malaria communications strategy which outlines the approaches and messages it will take to improve the utilization of ITNs and this is a high priority in the 2007 NMCC Action Plan. The communication priorities are to: 1) increase awareness of the modalities available to receive both free and highly-subsidized LLINs; 2) build skills on how to use a net every night and how to care for nets; and 3) change attitudes, beliefs, and behaviors which may hinder the use of ITNs. They plan to promote these messages through community drama, health talks, posters, t-shirts, flyers, radio, television, newspapers, and debates. In 2007, the MOH/NMCC is shifting its focus from posters and written materials to the greater use of mobile video units and drama clubs and community-based approaches.

Proposed USG Component: (\$3,811,000)

Despite the extensive efforts of other donors including the GFATM, in 2008 there will still be a gap of 830,000 LLINs to ensure that 80% of all households own three ITNs. Additionally, while net ownership is high, net usage remains relatively low. By 2008, most of the country's provinces would have benefited from mass distribution campaigns, and PMI will instead focus on contributing to a steady supply of LLINs through the routine ANC distribution

channel, while funding efforts to increase demand for, and correct usage of, LLINs. The PMI will contribute to increased ownership and correct usage of nets by:

- Procuring approximately 400,000 LLINs for distribution through the ANC (“Mama Safenite”) program (\$2,450,000);
- Supporting the distribution and social marketing of these nets, including provision of transportation to districts, marketing of LLINs, advertisements on their proper use, etc. (Note: funding may need to be reallocated to cover additional distribution costs if the MOH/NMCC decides to distribute these LLINs free of charge) (\$786,000);
- Supporting a national IEC/BCC campaign to increase the demand for, and the correct and consistent use of, ITNs. This campaign will look at reasons why nets are not being used and reach targeted populations through radio and television advertisements, print media, and community interpersonal approaches, such as community drama (this effort is part of an integrated IEC/BCC campaign covering ITNs, ACTs, and IPTp) (\$250,000); and
- Supporting a small grants program to non-governmental organizations (NGOs) and FBOs that work at the community-level through interpersonal and community-based approaches to encourage the correct and consistent use of LLINs (integrated campaign covering ITNs, ACTs, and IPTp). PMI partners will assist MOH/NMCC to identify and train NGOs to provide direct interpersonal communication for malaria control interventions that is consistent with the nationwide media campaign and other efforts of the MOH/NMCC (\$325,000).

Indoor Residual Spraying and other Vector Control Measures

Current Status, Challenges, and Needs

Indoor residual spraying (IRS) in the major urban and peri-urban areas of Zambia was re-established in 2003 after a hiatus of thirty years. The success of the IRS program implemented by Konkola Copper Mines, which began in 2002 and significantly reduced morbidity and mortality in mining towns in Copperbelt Province, provided the impetus for the MOH and NMCC to re-instate the IRS program in Zambia.

The predominant vector in Lusaka province and the southern areas of Zambia is *Anopheles arabiensis*, with increasing proportions of *A. gambiae* s.s. in the northern higher rainfall districts (500 mm in southern Zambia versus 1,200 mm in northern Zambia). *Anopheles funestus* is likely to be a major vector near the many bodies of water (rivers, reservoirs, lakes, swamps) throughout Zambia, and is responsible for perennial year-round malaria transmission. In contrast, *A. arabiensis* and *A. gambiae* s.s. densities rise after the cool dry season, initially in areas near water, and then widely across most areas, peaking during the rainy season from November to April. Near perennial water, these “rainy season” vectors supplement transmission of malaria by *A. funestus*. Thus, IRS ideally should be conducted starting from September to December, before and at the beginning of the rainy season.

The national strategy has been to prioritize IRS to urban and peri-urban areas. There several advantages to this strategy, including that large numbers of households are concentrated in

relatively small areas, making logistics simpler. Many of these urban/peri-urban households have modern plastered walls, where retention of insecticide is likely to be greater compared to rural thatched or mud/pole walled structures (rural structures are often abandoned and new huts built as frequently as every three-six months, especially in the vast wetland areas of Zambia). An exception to the peri-urban/urban strategy is the IRS program in Kazungula district, a rural district with very few modern structures. This district was selected as part of a cross-border scheme with Namibia and Botswana, where malaria incidence has been kept low through effective, sustainable IRS campaigns. The insecticides used in the IRS program are deltamethrin, lambda-cyhalothrin, and alpha-cypermethrin for use on walls of modern houses with cement plaster and paint, and dichloro-diphenyl-trichloroethane (DDT) for mud or pole/grass walled homes.

The MOH/NMCC has responsibility for coordinating and managing the IRS program nationally; DHMTs are responsible for implementation in their districts, although the extent of decentralization of IRS to the DHMTs is being debated. Given the limited resources of each DHMT, central level planning and support to the DHMTs is essential to ensure a successful IRS program.

The first MOH-organized spraying campaign was conducted in the 2003/4 malaria season in five districts. This was scaled up to eight districts in the 2004/5 season and 15 districts in the 2005/6 season. In the 2005-2006 campaign, 236,759 out of the 281,489 houses targeted were sprayed, constituting an estimated 11% of households in the country.

In the 2006/7 campaign, the MOH/NMCC expanded the scope of this program within the 15 districts, and targeted 700,000 households and aimed for 70% coverage. Additional funding from the World Bank for operational costs and USAID for insecticide and technical assistance was provided for this scale-up to supplement GRZ funds of \$250,000. The World Bank covered \$650,000 in operational costs while USAID provided technical assistance and environmental assessments, supported the training of the spray operators, and procured the majority of the insecticide (DDT, lambda-cyhalothrin, and alpha-cypermethrin). However, due to poor mapping of different structures, there was a shortfall of lambda-cyhalothrin midway through the campaign. Fortunately, the World Bank was able to make an emergency procurement of \$500,000 of lambda-cyhalothrin to fill the gap. These last minute funding changes as well as other operational issues resulted in the campaign starting in November, almost three months late.

By the end of the spraying campaign in April 2007, 592,346 households were covered. This represents coverage of 85% of targeted houses. The denominator used for IRS coverage is the number of eligible households in a selected area, although these areas are yet to be fully mapped. Eligible households areas are defined using the following criteria: occupied houses, population density, and capacity to handle effective operations in conformity with national IRS guidelines. However, the definition of “eligible” areas and households may have resulted in inaccurate measurement of the denominator used and therefore the aforementioned coverage results may not be correct. MACEPA and the USAID bilateral project, Health Systems and Services Project (HSSP), are currently supporting a geographical information system (GIS) mapping program. It is expected that by the next spray season in 2007/8, ten

districts will be mapped and five more will be completed the following year. This should alleviate some of the problems with the denominator and the insecticide quantification.

Number of Households Sprayed in 2005-2007

District	Number of households sprayed in 2005/6	Number of households sprayed in 2006/7
Chililabombwe	11,189	4,823
Chingola	4,569	4,635
Chongwe	6,417	15,398
Kabwe	19,366	28,157
Kafue	8,997	15,702
Kalulushi	6,151	10,741
Kazungula	4,682	16,470
Kitwe	35,061	56,427
Livingstone	31,448	29,882
Luanshya	8,624	21,355
Lusaka	42,195	217,870
Mazabuka	6,067	30,425
Mufulira	11,250	12,184
Ndola	30,425	59,771
Solwezi	10,318	14,037
Private sector*		54,469
TOTALS	236,759	592,346

*This represents spraying through mining companies and Zambia Sugar Company

During the 2007/2008 campaign, the MOH/NMCC will focus on improving its operations in the current 15 districts. USAID has committed to procuring the insecticide (both DDT and pyrethroids) through the IRS Indefinite Quantity Contract (IQC) for the campaign, and continued implementation and technical support. Funding is still needed for additional environmental assessments and environmental safeguards. Prior to the re-introduction of DDT, no baseline studies on either vector resistance or susceptibility to DDT or the existence of DDT in the environment were conducted. Without such data, it will be difficult to determine if DDT resistance is rising as a result of IRS. Also, the lack of baseline data on the existence of DDT in the environment prior to its reintroduction will make leakage monitoring difficult. The 2007 Action Plan includes such studies but they are currently unfunded.

In addition, according to both the USG environment regulations and those laid out by the Environmental Council of Zambia, the IRS program has not adequately addressed issues of insecticide storage, personal protective equipment and sprayers, or the disposal of waste. Currently, in some districts, appropriate storage and shower facilities for spray personal do not exist and the runoff from the protective equipment is not being managed adequately. The MOH/NMCC has begun to address this issue, and USAID partners, the IRS IQC and HSSP, are in the process of determining how to expand and refurbish structures so that they meet legal standards and guidelines. It is expected that the majority of the storage of the facilities

will be upgraded in 2007/08 but it is likely that there will still be a need for additional refurbishments in 2008/09.

DDT and insecticide waste is also a problem. In order to appropriately dispose of the sachets and packets, they need to be incinerated at temperatures above 900° C in a specialized incinerator. The DDT manufacturer has agreed to incinerate the waste in its incinerator in South Africa; however, international regulations prohibit the transportation of DDT waste. Even without such prohibition, it will cost more than \$30,000 to transport the DDT waste to South Africa. Given that this is a problem in other countries using DDT, the IRS IQC is conducting a regional meeting to discuss the issue; however, it may be necessary for Zambia to purchase an incinerator so that it can address this problem locally. According to the MOH/NMCC, \$900,000 is needed to address both the storage and waste issue.

Proposed USG Component: (\$4,500,000)

For the 2008/9 campaign, the NMCP would like to expand the IRS program to seven additional urban and per-urban areas. Most of these additional districts would be along the line of rail: Choma, Kalomo, Monze, Chipata, Mansa, Mongu, and Kapiri Mposhi. Funds have not been secured for this scale-up. As of now, the GFATM Round 4 Phase 2 includes only \$480,000 for IRS and no other sources of funding are known. There is a gap of approximately \$4 million in funding in 2008. The PMI will support IRS in the current 15 districts by:

- Procuring sufficient insecticide for the 2008/2009 IRS program in 15 districts (DDT, lambda-cyhalothrin, and alpha-cypermethrin) (\$2,400,000); and
- Contributing to implementation costs of, and technical assistance to, the IRS program, including training of spray operators, support for transportation and logistics during the spray campaign, procurement of personal protective equipment and other IRS-related commodities, support for epidemiological and entomological surveys, insecticide resistance surveys, continued support to ensure environmental safeguards are in place, DDT baseline studies, refurbishment of storage facilities, and waste disposal (\$2,100,000). Resources from the GRZ and other donors are expected to support full implementation costs.

Intermittent preventive treatment in pregnant women (IPTp)

Current Status, Challenges, and Needs

IPTp was introduced as policy in Zambia in 2003 and became practice in 2004. Unlike other countries affected by malaria and HIV, Zambia's MOH recommended three doses of SP from the start. MOH/NMCC guidelines call for the first dose to be delivered at the first visit after the start of the second trimester (18 weeks), the second dose one month later, and the third one month later. Within the MOH Reproductive Health Services (RHS) unit, IPTp has been incorporated into the national strategy of Focused Antenatal Care (FANC), however, roll-out of this strategy has not been well funded. Relatively good coverage of two-dose IPTp (the target for PMI and the Roll Back Malaria Monitoring and Evaluation Reference Group) has

already been achieved. Based on nationally representative figures on IPTp coverage from the 2006 MIS, 77% of mothers reported taking an antimalarial drug for prevention during their last pregnancy, and 75% of mothers received the antimalarial drug during a routine ANC visit; 62% of mothers took the recommended two or more doses of IPTp. These findings indicate relatively high coverage of IPTp, just three years after it was introduced. However, substantial gaps in two- and three-dose IPTp coverage were apparent among poorer women and women in rural areas. To address this, the MOH/NMCC has identified several key steps for improving demand for and delivery of IPTp in its 2007 Action Plan and its Five-year Strategic Plan for 2007-2011.

IPTp is implemented through the MOH RHS Unit. This is effective for delivery of services, and collaboration between MOH/NMCC and the RHS unit of the MOH is relatively good in Zambia. MOH/NMCC technical guidelines have been incorporated adequately into RHS programs, though there is still room for improvement, especially with respect to communication and reporting on the implementation and delivery of IPTp, and management of information that could help improve coverage. IPTp, like all antenatal services, is delivered free-of-charge at all GRZ health facilities as well as at nongovernmental health facilities participating in the CHAZ network, which are generally considered MOH facilities. ANC health workers are trained to dispense the treatment under direct observation. SP for IPTp was available in the routine drug kits supplied to health facilities by the central medical stores and from emergency procurements. It is generally available but the quantities of SP in the kits and emergency procurements are usually based more on its use for malaria treatment than on the needs for IPTp. MOH/NMCC specialists described some stock outs and difficulty getting SP from the pharmacy to the ANC for IPTp, but this has not been well documented. No quantification of SP needs for IPTp alone has been done.

All antenatal care services, including IPTp, subsidized ITN sales, voluntary counseling and testing for HIV, prevention of mother to child transmission of HIV, syphilis testing and treatment, micronutrient supplementation, and pregnancy monitoring and delivery counseling are integrated and implemented under the RHS Unit of the MOH. The FANC approach emphasizes that women should make at least four visits prior to delivery. While MOH/NMCC specialists are confident that IPTp has been incorporated into this approach, their awareness of the day-to-day management of the intervention and its delivery is more limited.

IPTp doses are recorded in designated columns on the ANC register and the patient-held ANC card. Unfortunately, these data are not reported up the system through the routine HMIS, but some routine coverage data are available through the MOH/NMCC's sentinel reporting districts and through occasional Malaria Indicator Surveys.

Despite its national policy status, there has been a substantial lack of government or donor resources to support the roll-out of the FANC strategy nationwide. No systematic qualitative or health facility assessments of IPTp or antenatal care services were available to MOH/NMCC. Most MOH/NMCC and RHS technical experts agree that increasing the demand for ANC services, including prevention and treatment of malaria, will be important for achieving higher IPTp coverage goals. The MOH/NMCC is also focused on improving the proportion of women who receive the recommended three doses of IPTp. It is a common perception that too many women attend only ANC once or present for their first visit too late to accommodate

all the recommended services. Other commonly voiced concerns include reluctance of women to take medicines during pregnancy, specific fears about SP as a strong drug likely to cause extensive side effects, local practices that included using antimalarial medications as abortifacients, and problems with providing clean water or cups for dispensing IPTp at ANC sites.

There are no recent data available on the efficacy of SP as a treatment for malaria infection in pregnant women or on the impact of IPTp on malaria in pregnancy outcomes such as placental parasitemia, birth weight or maternal and newborn anemia. However, as a result of its wider programmatic use, SP is still included in MOH/NMCC's routine *in vivo* efficacy monitoring studies. These are supposed to be conducted at eight sites each transmission season, and efficacy data are available for some of these sites as far back as the late 1990s. There is a global need for evidence to support the value of SP for IPTp in settings where its *in vivo* efficacy has declined and since the MOH/NMCC has continued to collect *in vivo* drug efficacy data for SP from children less than five kg from at least five sites (Chongwe, Mpongwe, Chipata, Isoka, Mansa), Zambia is an ideal site to collect such data on SP use for IPTp.

Proposed USG Component: (\$887,000)

Zambia has relatively high levels of two-dose IPTp; however, the MOH/NMCC would like to increase the number of women who receive the recommended three doses. To increase this proportion, it is recognized that pregnant women must attend ANC earlier in their pregnancy. Interventions to improve the delivery and demand for ANC services in rural areas and among younger first-time mothers and poorer households are expressed goals of the ANC program and support for nationwide roll-out and an assessment of FANC is noted in the MOH/NMCC's Action Plan for 2007. PMI will focus efforts to increase uptake of IPTp in two provinces where the MIS shows relatively lower coverage, in order to contribute to the Year 1 expected 8% increase in national IPTp coverage. Close collaboration with efforts to improve the supply chain management for malaria treatment commodities will be essential to ensure adequate supplies of SP and micronutrients for FANC. There is also a need to monitor SP effectiveness as the drug of choice for IPTp. In the first year, PMI will support these goals by:

- Strengthening FANC in two provinces, Central and Eastern, (total of 14 districts) where uptake of IPTp is relatively lower (based on coverage data from the recent MIS), including training of additional antenatal health service providers and district-level supervisors, the provision of written guidelines, job aids, and tools for district-level supervision of antenatal care service delivery, and quality control (\$500,000);
- Supporting a national IEC/BCC campaign to increase demand for ANC services generally and IPTp in particular through radio and television spots, print media, and community interpersonal approaches such as community drama (this is part of an integrated IEC/BCC campaign covering ITNs, ACTs, and IPTp) (\$125,000);
- Supporting a small grants program to NGOs and FBOs that work at the community-level through interpersonal and community-based approaches to increase demand for IPTp (integrated campaign covering ITNs, ACTs, and IPTp). PMI partners will assist MOH/NMCC to identify and train groups to provide direct interpersonal

communication for malaria control interventions that is consistent with the nationwide media campaign and other efforts of the MOH/NMCC (\$162,000); and

- Carrying out an operations research study on SP effectiveness for IPTp, a priority in the MOH/NMCC Action Plan and a study for which Zambia is particularly well-suited. This will provide a unique opportunity to investigate the relative effectiveness of IPTp in settings with varying and known levels of *in vivo* resistance to SP. The PMI will work with MOH/NMCC's Operations Research Unit to develop and implement a protocol for assessing malaria in pregnancy outcomes (including peripheral, cord blood, and placental malaria at delivery, placental histopathology, maternal and newborn anemia, gestational age, and birth weight) in up to five sites where SP *in vivo* efficacy has been established (\$100,000).

INTERVENTIONS: CASE MANAGEMENT

Malaria diagnosis

Current Status, Challenges, and Needs

NMCC Guidelines for the Diagnosis and Treatment of Malaria in Zambia released in 2003 recommend parasitological diagnosis for all patients with suspected malaria at hospitals and health centers that have laboratory facilities. Clinical diagnosis is recommended where laboratory facilities and staff are not available as an interim measure until malaria diagnostic services are rolled out to all health facilities. Children under five years of age are to be evaluated, classified, and treated according to the algorithm of the Integrated Management of Childhood Illness (IMCI). In spite of these recommendations, clinical diagnosis based on fever or history of fever within the previous 48 hours remains the basis for malaria treatment for patients of all ages at a majority of health facilities in Zambia. The NMCC Action Plan for 2007 indicates that only 38% of patients with malaria have access to laboratory diagnostic services. Since the Guidelines were issued, however, MOH/NMCC and partners have been working to expand the role and availability of malaria diagnostic services through improvements in microscopy and introduction of RDTs where microscopy services are not available. No national level statistics are available on the proportion of malaria cases that are diagnostically confirmed either by RDT or blood slide microscopy.

Malaria microscopy: Roll-out of ACTs for first-line treatment was accompanied by a plan for strengthening malaria microscopy at health facilities. This included provision of 120 additional microscopes and a single round of in-service training completed in 2004-2005. The training materials and accompanying Laboratory Manual for Malaria Diagnosis were developed with the Tropical Diseases Research Centre (TDRC), Ndola. These materials are comprehensive and technically appropriate with respect to preparation of stain, care, and maintenance of microscope and related supplies, as well as standard operating procedures for preparing, reviewing and reporting blood slide results. Following this initial round of training, MOH/NMCC records indicate that functional microscopy laboratories were in place at 228 hospitals and health centers; an additional 82 facilities lacked either equipment or critical staffing. Health posts in Zambia do not have laboratories. A total of 279 laboratory

technologists/technicians from GRZ and CHAZ facilities, along with 119 other staff, have been trained.

The NMCC Action Plan for 2007 calls for providing an additional 280 microscopes and training an additional 80 laboratory staff with the goal of ultimately expanding microscopy to 80% of the nation's 1,418 health facilities by 2011, a massive effort that is not currently funded. MOH/NMCC plans for training and supporting blood slide microscopy do not appear to be well coordinated with other programs, such as tuberculosis and sexually transmitted infections, which rely on the same laboratory staff and equipment. Provisions for supervision, refresher training, and quality control of blood slide microscopy are developed or planned but not currently in place.

Licensed laboratory technicians must complete a three-year training program. According to the Draft Human Resource Strategic Plan for the Health Sector, 2006 to 2011, only 100 laboratory technologists and 292 laboratory technicians were reported in-post at GRZ facilities in 2005. Until recently, laboratory technologists and technicians were the only cadres trained and legally authorized to perform malaria blood slide diagnosis. While medical officers and clinical officers receive some training in blood slide microscopy, they are unlikely to perform such testing because of their clinical responsibilities. In 2006, preparations were made to inaugurate and train a new cadre of specialist microscopists in order to address this critical staffing gap. Non-laboratory health workers are recruited from health facilities and attend an eight-week training course in Lusaka before returning to their posts. Up to 400 of these will be trained and the first cohort of 19 graduated in the first year. Plans for certification and deployment of this cadre are not clear. Refresher training and/or supervision of health facility laboratory workers is very uncommon.

MOH/NMCC specialists and partners regard the quality of blood slide microscopy as relatively good. A recent NMCC operations research activity reported that routine microscopy correctly identified about 80% of malaria cases compared with a reference diagnosis. Adequate supplies of materials and reagents for malaria microscopy are usually available but stock outs do occur. An initial assessment of the performance of trained microscopists planned by NMCC for 2007 will represent an opportunity to more accurately assess the equipment, supplies, personnel, training, and supervision requirements for achieving the Program's goal.

Rapid diagnostic tests: The NMCC has conducted a preliminary evaluation of more than ten RDTs for malaria and recommended several for use in Zambia. The NMCC has also developed general requirements for RDT procurements: (1) comprehensive kits based on the identification of Pf HRP2; (2) cassette format; (3) individual packaging, and (4) bulb or loop applicators for sampling the appropriate quantity of whole blood. To date, the NMCC has had most experience with the MAL Pf[®] (ICT Diagnostics, RSA), Visitect Malaria[®] (Omega Diagnostics, UK) and ParaCheck[®] (Orchid Diagnostics, India) products. The NMCC strategic plan recommends two roles for RDT diagnostics: at rural health centers where microscopy is not available or functional and through CHWs where ACTs will be made available.

In 2006, GFATM resources were used to procure 400,000 RDTs for deployment at rural health centers without microscopy. The NMCC staff developed standard operating procedures and training materials, conducted provincial training workshops for staff of GRZ and CHAZ facilities, and provided districts with funding for district level cascade training. At the health facility level, laboratory staff are responsible for ordering malaria diagnostic supplies on a monthly basis. These orders are transmitted and shipments are received from the Medical Stores Limited (MSL) through the same channels that are used for essential medicines. As with drugs, stock outs of RDTs and diagnostic supplies are relatively common.

Although plans are in place and at least partially funded to support the roll-out of microscopic diagnosis and RDTs at all health facilities, progress has been slow. MOH/NMCC estimates that even in health centers where RDTs were available they were utilized in only 11-28% of cases where they might be helpful. As in many other countries, clinicians in Zambia do not always use the results of RDTs or microscopy to guide malaria treatment decisions. Many MOH/NMCC specialists and their partners are concerned that health workers prescribe ACTs or SP in cases where laboratory diagnoses are negative.

In 2007, NMCC plans to procure 2,000,000 RDTs through CHAZ, a GFATM Principal Recipient, which will support the introduction of RDTs for accurate diagnosis at community level, starting with nine districts. USAID will procure additional RDTs worth US \$600,000 with some of its pre-PMI malaria funding for use at health facilities. Legal standards in Zambia require that all diagnostic tests be performed by trained and certified laboratory staff in recognized health facilities. However, RDTs for HIV/AIDS will soon be authorized for use by community-based counselors and this will establish a policy precedent that is expected to facilitate the introduction of malaria RDTs at community level. The strategy for deploying RDTs and ACTs through CHWs is still in development and pending regulatory decisions from the Pharmaceutical Regulatory Authority and Medical Council of Zambia. However, MOH/NMCC specialists have developed a protocol and obtained the necessary research clearances to begin a pilot introduction in up to ten sites in 2007. Beyond this pilot phase, funding for CHW training and roll-out has not been identified.

Proposed USG Component: (\$700,000)

Accurate diagnosis is critical to target antimalarial drugs to infected patients and reduce the unnecessary use of these drugs that occurs when patients are presumptively treated for malaria (especially given the high cost of ACTs when compared with traditional monotherapies). The PMI views malaria laboratory diagnosis as a critical component of good case management and will support strengthening of laboratory diagnosis in MOH facilities with laboratories. The NMCC conducts training and supportive supervision to ensure appropriate use of RDTs, and has identified inconsistent RDT supply as an issue and key factor preventing their appropriate use in the past; therefore, PMI will address this in Year 1 as well. Both microscopy and RDTs have a role to play in a well-functioning diagnostic program but both require considerable attention to supply chain management, initial and refresher training, quality assurance, and supervision. The PMI also recognizes the benefits of combining malaria laboratory training and supervision with partners working on other diseases, such as tuberculosis and HIV/AIDS.

Based on discussions with MOH/NMCC staff and other partners and the 2007 Action Plan, the following activities are proposed for Year One PMI funding:

- Procure approximately 645,000 RDTs for health facility diagnosis (\$400,000); and
- Strengthen malaria diagnostic capabilities at the health center level (\$300,000), including:
 - Work with the MOH/NMCC and other partners to conduct a comprehensive review of written guidance and use of diagnostic procedures for malaria. This should address how scarce personnel and resources for malaria diagnosis are rolled out to health facilities and the community level, as well as rationalizing the policy for confirmed diagnosis to guide ACT use with existing recommendations for treatment based on clinical diagnosis alone, such as IMCI;
 - Support development and implementation of a plan for quality assurance of malaria laboratory diagnosis;
 - Support quantification of laboratory diagnostic supplies and RDTs and improved supply chain management for expansion of laboratory diagnosis to all health centers and RDTs to CHWs;
 - Support initial and refresher training and supportive supervision of laboratory workers in malaria diagnosis;
 - Support training and supportive supervision of health workers to increase their confidence in, and use of, malaria test results to guide treatment; and
 - Evaluate changes in performance of and adherence to lab diagnostic tests to monitor effects of investment.

Pharmaceutical Management and Treatment

Current Status, Challenges, and Needs

Structure of the pharmaceutical management system: The Procurement Unit of the MOH, which reports to the Directorate of Technical Services, has primary responsibility for supplying the national public health system with medicines and medical equipment and supplies. More specifically, this group is responsible for forecasting drug, equipment, and consumable needs, and for supervising the procurement of all health-related commodities as well as overseeing the overall supply chain management system. MSL, a parastatal organization 98% owned by the GRZ, is responsible for customs clearance, central warehouse storage, and delivery of all these commodities to the district level. In 2004, Crown Agents was awarded a contract to manage MSL, but the Procurement Unit remains closely involved in overseeing MSL activities. The Procurement Unit is supposed to coordinate with the MOH/NMCC on issues related to the quantification, purchase, and distribution of antimalarial drugs, RDTs and other laboratory equipment and supplies, ITNs, and other malaria-related commodities.

Medicines and supplies for the public health system are delivered to the MSL warehouse in Lusaka; the warehouse's physical infrastructure is currently being upgraded. Although consideration has been given to establishing provincial or regional warehouses, none exist at

present. The central MSL warehouse delivers medicines and other medical equipment and supplies directly to 140 drop-off points around the country, including MOH and Mission hospitals and each of the 72 district health offices. The DHMTs are then responsible for distributing medicines and supplies to each health center and health post within their district. Where CHWs operate, health facilities supply them with the appropriate medicines, which are contained in an essential medicines kit designed for use at the community level. All drugs are dispensed free-of-charge in MOH facilities. One of the major challenges for the procurement and logistics system in Zambia is the rapid turnover of workers.

Quantification of antimalarials: The Procurement and Supply Unit and the Pharmacy Unit of the Directorate of Clinical Care and Diagnostic Services of the MOH share responsibility with the NMCC for forecasting the quantity of antimalarials (and other malaria-related commodities) that will be needed to evaluate and treat the expected number of cases in the public health system. The Zambian National Formulary Committee decides which drugs should be included in the Essential Drugs List and reviews this list every two years.

According to the Procurement Unit, annual procurements of AL are calculated based on the estimated number of malaria cases in Zambia, derived from health management information system data and projections based on assumptions about population catchment areas and expected health facility utilization. Currently, it is estimated that 4.3 million malaria cases are diagnosed (clinically or laboratory confirmed) at a public health facility each year, including about 500,000 cases in pregnant women and children weighing less than five kg who are not eligible for AL treatment. Thus, the projected 3.8 million treatments (number of cases in pregnant women and children less those who are not eligible for AL) almost certainly underestimate the true annual need for AL in Zambia. The proportion of the four different AL treatment packets (6, 12, 18, and 24 tablets) procured is based on the assumption that 80% of those treated would be under five years of age, weigh less than 15 kg, and receive the 6-tablet treatment, while 4%, 3%, and 13% would receive the 12-, 18-, and 24-packet treatments, respectively. Experience thus far suggests that the number of 6-tablet treatments was greatly overestimated and the number of 12- and 18-tablet treatments even more greatly underestimated. Since January 2007, information is being collected by the Procurement Unit from health facilities on AL consumption to forecast needs more accurately. The MOH recognizes the need for a detailed pharmaceutical management plan and has requested technical assistance to improve forecasting related to antimalarial drugs.

Estimated annual needs for other antimalarial drugs are based on amounts issued by the MSL in previous years include: SP (500mg/25mg), 9 million tablets; quinine sulfate (300mg), 8 million tablets, and quinine hydrochloride (600mg/2ml), 300,000 ampoules.

Drug procurement in Zambia is often limited by available funds. In such situations, the Pharmacy Unit of the Directorate of Clinical Care and Diagnostic Services prioritizes which drugs will be procured based on the total funding available in the Drug Supply Budget Line, the cost of each program's estimated needs, and whether the drug is considered life-saving, essential, or non-essential. In 2006, the MOH/NMCC's needs for antimalarial drugs (other than AL) were estimated at \$529,000; however, only about 30% of this amount was procured due to lack of funding.

Estimated annual antimalarial drug needs and costs

Drug	Tablet size	Cost	Annual estimated need	Annual cost
Artemether-lumefantrine	20mg/120 mg	\$1.00*	3.8 m	\$3.8 m
Quinine (tablets)	300 mg	\$0.032	8.0 m	\$256,000
Quinine (ampoules)	300 mg	\$0.16	0.3 m	\$48,000
SP	500mg/25 mg	\$0.025	9.0 m	\$225,000

*Average costs of the four different pre-packaged dosages for the different age and weight groups.

Most essential medicines are distributed to districts and health centers through an essential drug kit system. Until 2003, when the first-line drug policy was changed nationally, SP was included in the essential drug kits. Currently, because only quinine tablets are included in the health center kits, all SP, injectable quinine, and any other antimalarials drugs are purchased separately.

Procurement: The procedures of the MOH Procurement Unit are in accordance with the Zambia National Tender Board and appear to be compliant with international standards, enforced, and well-established. Using central funds, the Procurement Unit is responsible for procuring the health center essential drug kit, which contains a set quantity of quinine and SP tablets, as well as all other parenteral antimalarial drugs used in the public health system for second-line treatment, severe malaria, malaria in pregnancy, IPTp, and other malaria-related equipment and commodities, including ITNs. The kit for CHWs is prepared at MSL. The Procurement Technical Working Group oversees this process to ensure that it involves free and fair competition and that the medicines and supplies comply with international quality standards.

Since Zambia has no national quality control laboratory, several quality assurance mechanisms are used. First, bid documents must include an origin certificate issued by laboratories that are certified by accredited bodies acceptable to the MOH and included in the WHO certification scheme of pharmaceuticals in international commerce. Second, once received, samples of antimalarial drugs are sent to a private laboratory (Pharco) for testing. Also, goods must have at least 75% of their shelf-life remaining at the time of arrival in the country to be accepted.

The procurement and importation process in Zambia can be long and complicated because of problems with planning, tendering, and monitoring of procurements; however, the situation has improved considerably with the posting of a World Bank-funded procurement specialist to the MOH Procurement Unit. Although the Procurement Unit should order medicines and supplies through one large annual tender, this rarely happens as partial funding becomes available intermittently throughout the year.

For the essential drug kits, suppliers put in a tender bid to supply all of the medicines and commodities included in the two kinds of kits, assemble the kits and deliver them to the MSL. In the past the medical kits were funded primarily by the Dutch Government and JICA, but the most recent procurement was made from Mission Pharma with funds in the Direct Supply

Budget Line, a sort of “common fund” to which partners contribute. The Procurement Unit procures all other antimalarial drugs, including AL, independently. Normally, the NMCC initiates the procurement process for antimalarial drugs with a request for the quantities needed, but the last two procurements of AL have been considered emergencies, and the Procurement Unit has taken the lead to reduce delays. For 2007, 3.8 million AL treatments are being procured with GFATM funding from the WHO Malaria Medicines and Supply Service; 1.9 million treatments have already arrived in county and remainder will be delivered in two shipments, one in April and the second later in the year. The GFATM is currently the only partner supporting AL procurement. Taking into account GFATM funding over the coming years and the estimated needs described above, the Procurement Unit has calculated a gap in AL funding of \$1.4 million in 2008, \$2.8 million in 2009, and \$4.2 million in 2010.

Distribution: Antimalarials, both those in the essential drug kits and those procured separately, are distributed to districts primarily through a “push” system. Distribution to hospitals and health centers is through a combination of “push” and “pull.” Each month, the MSL sends all hospitals and DHMTs a list of the items they have in stock. The kit system distributes two different kits, one for health centers and one for CHWs, each with its own pre-defined set and quantity of essential medicines. Hospitals do not receive essential drug kits, and must request the expected quantities of commodities they receive. Kits and any supplementary drugs are delivered directly to district health offices based on requests that are forwarded monthly from each DHMT.

Although CHAZ-managed mission hospitals and health centers also obtain antimalarial drugs from MSL, CHAZ operates an independent procurement system and maintains a stock of drugs in a central warehouse in Lusaka as a backup to MSL. Since overstocks and stock outs occur with some regularity, health facilities within the CHAZ system will interchange drugs through their central warehouse.

Zambia has no computerized pharmaceutical logistics management information system except for the system devised exclusively for tracking anti-retroviral drugs, which was set up with support from JSI/Deliver through PEPFAR. Other assessments of availability and stock out times of first-line antimalarials as well as anecdotal evidence from informants interviewed suggest that stock-outs of antimalarials in hospitals and health centers are fairly common (also due to problems related to procurement and inaccurate forecasting). In many cases, facility staff wait until they have nearly or completely exhausted their supplies before submitting a new order, and, at any one time, it is reported that about 60% of all items carried by MSL are out of stock. During a five-month period in the latter half of 2006/early 2007 no AL was available in any public health facility. At the time the PMI assessment was being carried out, both SP and quinine tablets were out of stock at MSL. Expired drugs have also been a problem for the MSL. A RBM assessment conducted in September 2005 reported that 80 tons of expired drugs were awaiting destruction. In early 2007, \$190,000 of expired SP had to be written-off for destruction.

Pharmacovigilance: The pharmacovigilance system in Zambia is not well-developed. The NMCC Treatment Guidelines include guidelines and a form for collecting voluntary passive reporting data but only limited numbers of adverse drug reactions are reported through this system. Plans have been advanced to integrate pharmacovigilance for HIV/AIDS,

tuberculosis, the Expanded Program for Immunization, and malaria, but no funding has been identified. The WHO has also conducted at least one training workshop in pharmacovigilance specifically for antimalarial drugs.

Malaria Treatment: At least 4.3 million cases of malaria are reported through the Zambian Health Management and Information System (HMIS) each year. This is almost certainly an underestimate since many patients seek care from community and private sector sources which do not report through the HMIS. Zambia was the first country in tropical Africa to adopt ACT with AL for first-line treatment of malaria (chloroquine was used previously). Since the official change in treatment policy in 2002, difficulties with securing funding and drug supplies have been a substantial and ongoing barrier to implementing this policy shift. As a result of shortages in global supplies of quality-assured ACTs and funding, MOH/NMCC recommended SP as an interim drug and planned for a phased introduction of AL, with deployment in seven districts in 2002, expansion to 28 in 2003, and finally reaching all 72 in 2004.

Because of the lack of safety data and/or appropriate dosing formulations of AL, SP was still recommended as the first-line treatment for uncomplicated malaria in children under ten kg and pregnant women at the time of the policy change. Later MOH Circulars and revised training materials expanded the role for AL to children as small as five kg and for malaria illness among pregnant women in their second and third trimesters. SP is still recommended as an alternative first-line treatment in patients who cannot tolerate AL, those weighing less than 5 kg, when and where AL is unavailable, and for routine use in IPTp.

Although training and initial supplies of ACTs have been rolled out in all 72 districts, availability of first-line treatment has been limited by inadequate forecasting, procurement, and stocks management practices. In the 2006 MIS, of the children with a recent febrile illness that were treated with an antimalarial, 33% were treated with SP and only 13% with AL. In addition to the planned GFATM procurements, GFATM resources will be used to help GRZ procure 3.8 million AL treatments from the WHO Malaria Medicines and Supply Service in 2007. UNITAID has further planned a large donation of AL which is intended for use in the proposed expansion of ACT to community health workers and will not significantly offset this projected shortfall for need in formal health facilities. The broadest coverage of training activities has probably been achieved through MOH/NMCC-supported training workshops at provincial level. Additional trainings also occurred at the district level earlier in the phased introduction of AL. In addition, some training has been provided directly by Novartis, including training materials that were incorporated into provincial training workshops. Resources for refresher training and supportive supervision from district and provincial officials are inadequate.

Treatment of Severe Malaria: MOH/NMCC treatment guidelines and IMCI recommend parenteral quinine as the drug of choice for severe malaria and that children identified at peripheral levels of the health system should be given pre-referral treatment with intramuscular quinine and referred to a hospital or zonal health center equipped to manage severe malaria on an inpatient basis. IMCI guidelines recommend that children with very severe febrile illness or severe pneumonia classifications should also receive parenteral quinine and broad spectrum antibiotics, preferably penicillin and gentamycin, both for pre-

referral and definitive treatment. Although intramuscular artemether and rectal artesunate are registered in Zambia and available at urban pharmacies and some private clinical providers, their role is not specifically addressed in the National Malaria Treatment Guidelines.

The MOH/NMCC 2007/8 Action Plan calls for improving the management of severe malaria at hospitals and referral centers. Activities planned in 2007 include revising treatment guidelines, conducting training, providing laboratory equipment including hand-held hemoglobinometers and glucometers, and enhancing supplies of essential medicines for management of severe malaria. It also includes a comprehensive approach addressing the recognition of potentially severe malaria and general danger signs in the peripheral health facilities and communities. Details of this plan are still being developed. This activity is currently not funded but it is expected that other donors will work to address this issue.

Malaria Treatment in the Community and Private Sector: Use of the formal and informal private sector for malaria treatment in Zambia is common, especially in the larger towns and cities, where private health facilities and pharmacies operate and publicly procured AL has not been made available to them. These providers, including private for-profit health facilities, were informed of the change in first-line treatment, and chloroquine was effectively phased out of wide-scale use. Currently, commercial preparations of AL can retail at up to \$8.00 or more per complete adult dose. A variety of alternative more affordable antimalarial drugs are available in private pharmacies including quinine, SP, and artemisinin monotherapies. The MOH/NMCC and its partners have proposed initiatives to incorporate a subsidized AL product into the private-for profit health sector in urban areas.

A CHW program has been active in Zambia since the 1970s. In addition to providing preventive services and community mobilization, CHWs are supplied with essential medicines kits. SP was supplied in the CHW drug kit immediately after the policy shift from chloroquine but has not been available to CHWs since 2005. Since the last quarter of 2006, no CHW drug kits have been supplied at all. MOH/NMCC and partners are convinced that providing AL in health facilities alone would not achieve high enough coverage of prompt effective first-line treatment, especially in remote communities. The MOH/NMCC plans to introduce AL into CHW kits in a coordinated effort with the expansion of community IMCI. The strategic plan calls for CHWs to provide AL after performing a malaria RDT. These policy initiatives calling for the expansion of ACT and RDT diagnosis by CHWs are under review by the Zambia Medical Council and the Pharmaceutical Regulatory Authority. Support for the phased introduction of the policy change, including procurement of AL and RDTs, became available from the GFATM beginning with a Round 1 award in 2001.

Modest plans for exploring how to expand highly subsidized AL through 50 private sector providers and to test a strategy for equipping CHWs with RDT and ACT in five districts are being developed for 2007. If these pilot interventions are successful and the appropriate policy and legal frameworks adopted, projected needs for malaria case management commodities, training, supervision and quality control will have to be greatly expanded in the coming years.

Proposed USG Component: (\$3,388,000)

The MOH/NMCC has specifically prioritized technical support for case management as an area that PMI should address. In the first year of the PMI, the program will focus on increasing prompt and effective treatment for uncomplicated malaria at the health facility level. In later years, PMI will consider supporting efforts to provide malaria treatment at the community-level and in the private sector and improving the treatment of severe malaria. There are projected shortfalls in ACT supply, and the MOH/NMCC has identified support to more accurately quantify the ACT need, and strengthen the supply chain and logistics management systems as priorities. The PMI will respond to these needs by:

- Procuring supplemental supplies of AL to offset projected shortfalls based on planned procurements through GFATM and other sources and ensure that ACTs are available at rural health centers (\$1,000,000);
- Supporting refresher training and supervision at rural health centers, including support to MOH/NMCC to complete an initial assessment of provider training needs, develop and test appropriate training materials and job aids, design and implement a comprehensive training curriculum in support of malaria treatment, and assist MOH/NMCC to evaluate and revise materials for the supportive supervision of health care providers who diagnose and treat malaria (\$600,000);
- Working with other partners to provide assistance to the MOH/NMCC to strengthen the national logistics and pharmaceutical management system for antimalarial drugs and laboratory supplies. This will include assistance and advice related to (\$1,000,000):
 - forecasting of antimalarial drug and RDT needs and gaps;
 - importing, quality control, storage, distribution, and inventory management down to the health facility level;
 - improving feedback and reporting on consumption/stocks from health facility to district and higher levels;
 - improving appropriate use by health workers at all levels of the health system (including instructions on how to deal with children less than 6 months of age);
 - developing, testing, implementing and evaluating IEC for health workers and patients;
 - phasing out the use of SP for treatment of acute malaria in children weighing more than five kilograms and non-pregnant adults in the public and private sectors; and
 - monitoring of implementation/evaluation of coverage.
- Supporting a national IEC/BCC campaign to improve the proportion of children with suspected malaria who seek and receive effective diagnosis and appropriate ACT promptly through radio and TV ads, print media, and community interpersonal approaches such as community drama (integrated campaign covering ITNs, ACTs, and IPTp) (\$125,000);
- Supporting a small grants program to NGOs and FBOs that work at the community-level through interpersonal and community-based approaches to encourage ACT treatment (integrated campaign covering ITNs, ACTs, and IPTp). PMI partners will

assist MOH/NMCC to identify and train groups to provide direct interpersonal communication for malaria control interventions that is consistent with the nationwide media campaign and other efforts of the MOH/ NMCC (\$163,000); and

- Contributing to the district implementation basket to provide monthly grants to fund district health operations, including treatment with ACTs, ITN distribution, IPTp, and IRS support. This support complements project assistance targeted at the general population, children under five, and pregnant women in these areas and contributes to achieving national targets under the current National Malaria Strategic Plan. Annual progress is measured using common sector indicators and a joint review process in which the USG participates (\$500,000);
- Carrying out an operations research study to demonstrate the effectiveness and feasibility of integrated management of fever (malaria and pneumonia) at the community level using CHWs with the aid of RDTs and treatment drugs. This is a unique opportunity to investigate the effectiveness of treating based on clinical signs using IMCI guidelines versus using only RDT result to determine treatment regimens. The PMI will work with the Zambia Integrated Management of Malaria and Pneumonia Study (ZIMMAPS) of Boston University and the MOH/NMCC Operations Research Unit to develop and implement a protocol for assessing the effectiveness of one method versus the other, in selected districts (Core Funds: \$168,000).

HIV/AIDS and MALARIA

Current Status, Challenges, and Needs

An estimated 15.6% of the adult population in Zambia is infected with HIV and about 84% of those diagnosed with HIV are between the ages of 20 and 29. It is estimated that 17.8% of women and 12.9% of men are currently HIV infected. Infection rates are two to four times higher in urban areas than in rural areas with low population density.

The GRZ is implementing a National HIV/AIDS/STI/TB (Sexually Transmitted Infection /Tuberculosis) Strategic Plan for 2006-2010. The Plan is implemented by the National HIV/AIDS/STI/TB Council, which provides national leadership for coordinating and supporting planning, monitoring, and resource mobilization. The National AIDS Council drafted a National AIDS Policy, finalized a national monitoring and evaluation strategy, and has completed its 2006-2010 Plan. Currently, the Council coordinates 14 technical working groups and provides support to nine Provincial AIDS Task Forces and 72 District AIDS Task Forces.

This strategic plan is being supported by both PEPFAR and GFATM in addition to several other donors. PEPFAR is specifically supporting the prevention, care, and treatment of people living with HIV/AIDS through a multi-sectoral approach. In 2006, the PEPFAR program had \$149 million for this effort. As mandated by the U.S. Congress, PEPFAR funding is broken down approximately in the following manner: 55% for treatment, 15% for palliative care, 20% for prevention, and 10% for orphans and vulnerable children. Zambia

also has a Round 1 and Round 4 HIV/AIDS GFATM grants, totaling \$116 million, of which \$81 million has been dispersed.

In light of the potential interaction between HIV/AIDS and malaria and the overlap in target populations, the MOH recognizes the need for the NMCC and National AIDS Council to coordinate. The NMCC Strategic Plan notes that, particularly at the district and community level, existing networks of HIV/AIDS home-based care networks should be utilized. The LLIN distribution program to be launched by the World Vision-led consortium of home-based care NGOs, mentioned in the ITN section, are an example of such coordination.

Linkages and Areas for Collaboration between PMI and PEPFAR:

Both PMI and PEPFAR will provide technical support, training, and supplies to improve the quality of ANC services to increase uptake of both IPTp and PMTCT. Specifically, PMI will support IPTp, distribution of ITNs to pregnant women through the malaria in pregnancy program, and improved detection and case management of malaria in infants and young children, while PEPFAR will improve ANC for PMTCT as well as infant follow-up, early HIV/AIDS diagnosis, and linkages to care and treatment.

PEPFAR will potentially continue to support the PMI's efforts to increase ITN ownership among vulnerable populations through the above-mentioned World Vision-led consortium of home-based care NGOs. This distribution of LLINs benefits not only people living with HIV/AIDS but other households affected by HIV/AIDS that the community deems vulnerable. This program leverages existing structures to effectively distribute LLINs.

The PMI/PEPFAR teams will also work closely together to establish other areas of programmatic overlap. Future areas for collaboration that may be explored include supply chain strengthening, and diagnostics.

CAPACITY BUILDING WITHIN NATIONAL MALARIA CONTROL PROGRAM

The NMCC is a department under the directorate of Public Health and Research of the MOH that provides technical and management oversight of all public health facilities, as well as supporting and coordinating a wide range of partners, including research and training institutions. There are 23 posts within the NMCC, including a Case Management Officer, Chief Entomologist, Chief Parasitologist, Malaria Epidemiologist, IEC, IRS, and ITN officers, a Medical Laboratory Technologist, and an Operational Research Officer. At the provincial and district level, Provincial Health Offices serve as an extension of the MOH, while the DHMTs have the fiscal authority to manage the district health centers and are the main implementers of vertical programs, such as IRS.

The NMCC central staff is committed to scaling-up malaria control and prevention activities; however, they are overstretched and need further support to effectively supervise district-level activities and effectively coordinate the many partners contributing to malaria efforts in

Zambia. In particular, the NMCC and partners recognize its needs for additional staff to support coordination of IRS activities and advocacy and outreach efforts. Both these gaps are being filled in the coming year by MACEPA and USAID, through HSSP. In addition, the NMCC requires support to conduct district-level visits for supervision and program management; this support is currently being provided by the GFATM and MACEPA.

The PMI plans to place two health professionals in Zambia in FY08. It is expected that they will work at or near the NMCC for a majority of their time, ensuring close coordination with the NMCC as well as the chance that these two individuals could help build the technical and managerial capacity of the NMCC.

Proposed USG Component: (no additional cost to PMI)

- Work with other partners to ensure that continued support is provided to the NMCC to increase staff available to support efforts in critical areas as well as conduct supervisory activities at the district level.

COMMUNICATION AND COORDINATION

The MOH/NMCC and its collaborating partners maintain regular communications and coordinate efforts through routine partners' meetings and task groups around support for specific interventions or activities. All partners contributed to the development of the Five-Year Strategic Plan and annual Action Plan. These mechanisms are functioning well in Zambia and provide a good forum for coordinating ongoing and new activities supported by USG funds through PMI with other GRZ activities. In November 2007, MOH/NMCC will convene its partners to review and revise its annual Action Plan in order to prioritize activities and identify gaps in funding.

As previously described, the SWAp in Zambia is the key coordinating mechanism in the health sector. SWAp mechanisms include both written agreements on roles and responsibilities as well as an agreed-upon set of consultative meetings at various levels throughout the calendar year. The MOH signed a Memorandum of Understanding with Cooperating Partners (CPs), including USAID, in June 2006 to maximize opportunities for harmonization and alignment in the sector. This and other documents lay out principles of GRZ-CP partnership, health sector coordination, and regular Cooperating Partners and GRZ-Partners' meetings and consultations. The MOH has appointed a Donor Coordinator within the Directorate of Policy and Planning who acts as the key link between all Cooperating Partners and the MOH. The MOH Donor Coordinator is invited to and attends, where possible, all key Partners' meetings in the sector. Cooperating Partners meet monthly to discuss issues of mutual interest and share information. Since 2004, Health Sector partners have annually selected one Partner to act as a focal point for Partners' coordination in the sector. The coordination has included a three-partner mechanism where the past, present and future Coordinators have regularly communicated, ensuring continuity and spreading the load of coordination.

PRIVATE SECTOR PARTNERSHIPS

In 2007, before the receipt of Year One PMI funds in Zambia, the PMI joined in a \$2.9 million public-private partnership with PEPFAR and the Global Business Council on HIV/AIDS, TB, and Malaria to provide approximately 500,000 LLINs to vulnerable households in Zambia, reaching nearly 10% of the population. PMI is very supportive of these efforts and is interested in continuing collaborations with private sector organizations.

MONITORING AND EVALUATION PLAN

Current Status, Challenges, and Needs

Zambia is fortunate to have a wealth of generally good quality and up-to-date information on malaria prevention and treatment interventions. The MOH/NMCC and partners have developed a National Malaria Prevention and Control Monitoring and Evaluation Plan for 2006-2011, which establishes clear goals, objectives, and indicators for program monitoring and evaluation. Other partners already cover most of the costs of monitoring and evaluation. PMI's key evaluation indicators for coverage of malaria control interventions and all cause child mortality can be tracked through existing plans of MOH/NMCC and partners which include Malaria Indicators Surveys conducted in 2006, 2008, and 2010, and Demographic and Health Surveys completed in 2007 and in the coming four-five years. Because these surveys are already planned and supported, MOH/NMCC has requested PMI support in developing, implementing, and maintaining more routine systems for effective monitoring of malaria control activities.

Monitoring: Information for routine monitoring of malaria efforts comes from three major sources:

1. The National HMIS is a comprehensive MOH system that collects information on a quarterly basis from all public and mission health facilities and some private facilities. Information is collected on reported cases of malaria, malaria case fatality rate, and stocks of medicines and supplies. Information flows from the health facility to the district and provincial level before being transmitted to the HMIS group within the MOH. In 2006, a major assessment of the HMIS funded by the European Union found that while it was functional at all levels of the health system and that data collection and reporting tools are in place in all health facilities and district offices, the quality of data is not checked, reporting tends to be irregular, and most staff are not adequately trained in HMIS procedures. This has resulted in a lack of confidence in the data reported by the HMIS and the development of parallel systems for diseases, such as malaria and HIV/AIDS. Following this assessment, the European Union committed considerable financial and technical support to strengthening the HMIS under a three-year plan of action, but the revised HMIS will not be fully operational until sometime in late 2009;

2. Because of weaknesses in the HMIS reporting at the district level, the Integrated Disease Surveillance and Response system was instituted in 2006 in all 72 districts to provide monthly information on notifiable diseases. This data collection system has also been modified to report on additional malaria indicators, including antimalarial drug and ITN stocks, the percentage of pregnant women and children under five who slept under a bed net the previous night, and the percentage of children under five with fever who received appropriate antimalarial treatment within the last 24 hours. This interim measure will come to an end when the revised HMIS is fully operational; and
3. The Malaria Information System was established by the MOH/NMCC in 2000 because of the weaknesses and lack of some malaria-specific information from the HMIS. This sentinel malaria surveillance system operates in all health facilities in ten largely rural districts (with one in each of the nine provinces) and reports on a monthly basis on malaria cases confirmed by laboratory test, cases of anemia in children under five, on malaria in pregnancy, on children and pregnant women sleeping under an ITN, and stock outs of antimalarial drugs. The MOH/NMCC acknowledges that the quality and regularity of reporting under this system is quite variable from site to site. Since 2005, the GFATM has provided some of the funding for this system.

With World Bank Malaria Booster Program funding, a plan of action has now been developed for harmonizing and strengthening existing malaria data collection and reporting systems, together with those systems that have the potential to report on malaria-specific indicators within the revised Zambian HMIS. For the malaria component of the HMIS, the aim is for a system that will allow reporting to multiple donors and funding sources under a single national monitoring and reporting system. Standard malaria indicators have been identified through several consensus processes, including the development of the Millennium Development Goals indicators, the National Malaria Strategic and Monitoring and Evaluation Plans for 2006-2011, and the National Health Strategic Plan and the Fifth National Development Plan Monitoring and Evaluation Frameworks. The key indicators chosen are also in line with recommendations of the Monitoring and Evaluation Reference Group of the RBM Partnership. Information collected will include malaria incidence rate (clinical diagnosis and laboratory-confirmed cases), malaria case fatality rate, numbers of women receiving one, two, and three doses of IPTp, as well as information on ITNs distributed, bed nets retreated, and IEC materials disseminated. Monitoring of IRS will be conducted by the MOH/NMCC.

This upgraded reporting system will take advantage of existing data flow for facility-based reporting through DHMTs. Between 2007 and 2009, while the National HMIS is being revised and upgraded, the existing Malaria Information System will continue to provide monthly information. Data will be collated, analyzed, and reported by district. In addition, the NMCC will produce an annual report on the progress of malaria prevention and control operations beginning in 2006.

Information is also collected on a regular basis on the therapeutic efficacy of antimalarial drugs. Ideally, this and routine monitoring of insecticide resistance would be part of routine monitoring activities that NMCC needs to conduct, but they are both considered operational research issues by the NMCC.

Evaluation: The major sources of information for evaluation of malaria prevention and control activities in Zambia are nationally-representative surveys, such as the DHS and the MIS, which are performed every two to five years. The last DHS was conducted in 2001-02 and will be repeated in 2007. A nationwide MIS carried out in May-June 2006 provides the most up-to-date information on the coverage of the four major malaria interventions, malaria parasite prevalence, and the prevalence of anemia. The current DHS survey has a malaria module and got underway in March 2007, covering the last month or two of the malaria transmission season and the initial months of the post-transmission period; this 2007 DHS will provide baseline estimates of all-cause under-five mortality. Both the 2006 MIS and the 2007 DHS will provide coverage estimates to be used for PMI evaluation in Zambia.

In addition to these standardized nationwide surveys, a variety of other, usually smaller, surveys and evaluations have been carried out over the past five years that provide useful information for the NMCC. These include health facility surveys to assess health worker performance and the quality of health care, availability of health guidelines, personnel, and equipment, and household surveys to assess knowledge, attitudes, and practices related to malaria, malaria parasite prevalence, and the prevalence of anemia. As part of routine supervisory visits to MOH facilities, checklists are also completed on health worker performance and other technical aspects of health care. These forms are forwarded to higher levels of the MOH, but the information they provide is not systematically tabulated or disseminated.

Although there are no Demographic Surveillance System sites currently operating in Zambia, it may be possible to collect information on malaria-specific mortality through several other approaches. These could include building on the Sample Vital Registration using Verbal Autopsy (SAVVY) reporting system which is planned to investigate adult cause of death in at least two urban and low malaria risk districts, and which has received technical and financial support from CDC.

Proposed USG Component: (\$350,000)

Reliable and well-functioning malaria surveillance and health information systems are crucial for monitoring trends in malaria morbidity and mortality and guiding the MOH/NMCC's implementation of control measures. Monitoring and evaluation to measure progress against project goals and targets, to identify problems in program implementation and allow modifications to be made, and to confirm that those modifications are having their desired effect will be a critical component of PMI support to the MOH/NMCC in Zambia.

The PMI has adopted a general monitoring and evaluating framework that has been adapted to the context of each country. According to this framework, specific activities are monitored on a regular basis to allow in-country program managers to assess progress and redirect resources as needed. Activities within four main intervention areas, ITNs, IRS, IPTp, and case management with ACTs, will be tracked through periodic reports from groups providing commodities, health facilities, and international and local partners. Types of activities that will be monitored will include procurement and distribution of commodities, availability of commodities for prevention, diagnosis and treatment of malaria, health worker performance,

IEC efforts, supervision and training for health care workers, and monitoring drug and insecticide efficacy and effectiveness.

The evaluation framework is based on the PMI goal to reduce malaria deaths by 50% and to achieve coverage targets with specific interventions over the course of the program. The framework is aligned with the standard methodology for malaria program evaluation that is being adopted and promoted by WHO RBM. Program evaluation will be based on coverage outcomes that will be measured at the baseline, midpoint, and end of the Initiative, and impact on malaria mortality, which will be measured at the baseline and the end of the initiative. Information used to evaluate program outcomes and impact in PMI will be collected primarily through household surveys of a representative sample of the national population. All-cause mortality and malaria-specific mortality in children under five will be interpreted together with data on anemia, parasitemia, available information on malaria cases and deaths reported from health facilities, rainfall and PMI coverage indicators to consider changes in mortality at the population level that can be attributed to reductions in malaria over the course of PMI.

In the case of Zambia, other partners, such as MACEPA and the World Bank, already provide most of the necessary funding for malaria monitoring and evaluation. Nationwide information on coverage with ITN, IPTp, and ACTs will be obtained from periodic, large-scale surveys, such as the DHS and MIS. To complement these data, hemoglobin levels in pregnant women and children under five and malaria parasitemia in a sample of children under five will also be measured during the survey. The number of houses in areas targeted by the MOH/NMCC for IRS in Zambia during Year One will depend on the detailed mapping of provinces and districts where spraying will be conducted in 2008. Once that information is available, the proportion of targeted houses that were sprayed can be calculated from IRS weekly and monthly field records.

The MOH/NMCC and its partners have made excellent progress during the past two to three years in developing a unified plan for malaria program monitoring at the community, health facility, and district levels, and in preparing a National Malaria Monitoring and Evaluation Plan for the period 2006-2011, which is already well funded. Zambia is also fortunate in having good quality, up-to-date information related to coverage of all major malaria prevention and treatment measures through the 2006 MIS. A DHS survey with a malaria module began in March 2007.

PMI support will build upon and complement what has already been developed and accomplished by the NMCC and its partners, and will fill identified gaps in the MOH/NMCC Plan. Although PMI and NMCC coverage targets differ slightly (85% vs. 80%), this is not a major issue. After consultation with the MOH/ NMCC staff and other partners, the PMI proposes to support the MOH/NMCC's monitoring and evaluation efforts by:

- Strengthening the performance and quality of data collection, reporting, analysis, and dissemination from the existing ten sentinel districts that make up the Malaria Information System. This support will also potentially include expansion of the number of sentinel sites nationwide (\$300,000);

- Provide support for the collection and synthesis of data from PMI partners and the NMCC. This effort will help both program monitoring as well as aid in the fulfillment of PMI reporting requirements. (\$50,000); and
- Support for operations research activities already identified by NMCC in its 2007 Action Plan is covered in another section (see page 27).

STAFFING AND ADMINISTRATION

Two new health professionals will oversee the PMI in Zambia, one representing CDC and one representing USAID. In addition, one or more FSNs will support the PMI team. All PMI staff members will be part of a single inter-agency team led by the USAID Mission Director or his/her designee in country. The PMI team will share responsibility for development and implementation of PMI strategies and work plans, coordination with national authorities, managing collaborating agencies and supervising day-to-day 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 the individual agency.

It is envisioned that these two PMI professional staff will work together to oversee all technical and administrative aspects of the PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, and reporting of results. Both staff members will report to the USAID Mission Director or his/her designee. The CDC staff person will be supervised by CDC both technically and administratively. All technical activities will be undertaken in close coordination with the MOH/NMCP and other national and international partners, including the WHO, UNICEF, the GFATM, World Bank, and the private sector.

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

Table 2

**President's Malaria Initiative - Zambia
Planned Obligations for FY08 (\$000)**

Proposed Activity	Mechanism	Budget (commodities)	Geographic Area	Description of Activity	Page Number Reference
PREVENTIVE ACTIVITIES					
ITNs					
Procurement of LLINs	DELIVER Task Order #3	2,450 (2,450)	National	Procure 400,000 LLINs for distribution through the ANC/EPI Program	
Social marketing and distribution	Society for Family Health (SFH)	786	National	Distribution and promotion of LLINs, including transportation, marketing, advertisements, etc.	
National IEC//BCC for net usage ¹	Health Communication Partnership (HCP)	250	National	National IEC/ BCC campaign to increase net usage	
Community IEC/BCC for net usage	HCP/Zambia Malaria Foundation (ZMF) ²	325	National	Community-based IEC/BCC campaign through NGOs/FBOs (small grants program)	

¹ National IEC/BCC and community IEC/BCC activities are integrated across prevention, treatment, and malaria in pregnancy activities. These activities will include comprehensive national media as well as household-level efforts to promote demand for, and correct use of, ITNs, ACTs, and IPTp. The activities are broken down in this table and throughout this document for the purposes of presenting financial investments by intervention area. The total investment in NGOs/FBOs for this activity is shown below under Capacity Building.

² The ZMF is an umbrella organization which facilitates coordination and communication between the NMCC and NGOs, FBOs, volunteer groups, and community health and development organizations in Zambia. The "host" NGO is World Vision. ZMF is in the process of mapping their partners throughout the country. In already mapped areas, affiliated NGOs include: Zambia Red Cross Society, Christian Children's Fund, Zambia Scouts Association, Mandevu Women for Change, Adventist Relief Agency, Tukuke Rural Community Development, Family Health Trust, and Catholic Diocese of Mongu.

IRS					
Procurement of IRS-related commodities	IRS IQC	2,400 (2,400)	15 districts	Procure insecticides (Icon, Fendona, and DDT) and other IRS supplies/equipment	
Contribute to implementation of IRS program, monitoring and evaluation, environmental assessment, storage/incinerator ³	HSSP	2,100	15 districts	Training, monitoring and evaluation, and IEC for IRS; environmental assessment, entomological monitoring, pesticide (DDT) storage, waste disposal	
IPTp					
Strengthening of FANC for IPTp	HSSP (through sub JHPIEGO)	500	Central and Eastern Provinces (total of 14 districts)	Strengthen FANC in two provinces where IPTp uptake is low (training, coordination with PEPFAR where appropriate)	
National IEC/BCC to increase demand for IPTp	HCP	125	National	National IEC/BCC campaign to increase ANC attendance and demand for IPTp	
Community IEC/BCC to increase IPTp demand	HCP/ZMF	162	National	Community-based IEC/BCC campaign through NGOs/FBOs (small grants program)	
OR: SP efficacy in pregnant women	TDRC	100	Selected district with drug efficacy data	SP efficacy study	
SUBTOTAL: Preventive		9,198 (4,850)			
CASE MANAGEMENT ACTIVITIES					
Diagnosis					
Procure rapid diagnostic tests	DELIVER Task Order #3	400 (400)	National	Procurement of approximately 645,000 RDTs for use in health facilities	
Strengthen malaria diagnostic capabilities at the health center level	New Diagnostics RFA	300	National	Review of guidance and use of diagnostic procedures, development and implementation of plan for quality assurance of lab diagnosis, quantification,	

³ PMI will contribute \$2,100,000 to implementation costs of the IRS program. Other donors, such as the World Bank and GFATM, as well as the Zambian Government, are expected to contribute to these non-commodity costs as well in order to fully support Zambia's 15-district IRS program.

				training	
Pharmaceutical Management and Treatment					
ACT procurement	DELIVER Task Order #3	1,000 <i>(1,000)</i>	National	Procurement of AL	
Strengthen facility-based treatment with ACTs	HSSP/TBD	600	National	Training, supervision support, to improve service delivery in health facilities	
Strengthen the national logistics and pharmaceutical management system for malaria commodities	DELIVER Task Order #3	1,000	National	Strengthen supply chain and logistics for all malaria commodities and essential drugs, including Pharmaceutical Regulatory Authority	
National IEC/BCC for ACT usage	HCP	125	National	National IEC/ BCC campaign to increase ACT usage	
Community IEC/BCC for ACT usage	HCP/ZMF	163	National	Community-based IEC/BCC campaign through NGOs/FBOs <i>(small grants program)</i>	
Support to District Basket	Sector Program Assistance	500	National	Support for districts malaria programs	
OR: Effectiveness of integrated management of fever	ZIMMAPS	Core Funded	Selected districts	Efficacy of integrated management of fever study	
SUBTOTAL: Case Management		4,088 <i>(1,400)</i>			
MONITORING AND EVALUATION					
Strengthen Malaria Information System sentinel sites	TDRC	300	10 sites	Strengthen performance and quality of data collection, reporting, analysis, and dissemination (hospital and outpatient data on malaria-related cases and fatalities); potential expansion of sites.	
M & E Support	GH-Tech	50	National	M & E support contract to assist with data collection, analysis, and reporting for PMI	
SUBTOTAL: M&E		350			

CAPACITY BUILDING					
Small grants program for integrated community-based IEC/BCC activities focused on prevention, treatment, and MIP	HCP/Zambia Malaria Foundation (ZMF)	Budgeted under prevention, case managt., and MIP	National	Community-based IEC/BCC campaign through NGOs/FBOs (small grants program)	
SUBTOTAL: Capacity Building		650			
IN-COUNTRY MANAGEMENT AND ADMINISTRATION					
USAID and CDC staff and associated administrative expenses	USAID/CDC	980	N/A	Support for USAID & CDC resident PMI advisors, includes all logistical expenses, salaries, and benefits for both positions.	
FSN staff and other in-country administrative expenses	USAID	331	N/A	Support for USAID FSNs to work full time with PMI and to cover other administrative expenses related to PMI.	
Technical assistance visits	CDC	53	N/A	3 for entomology (regional visits), 2 for SP efficacy study, 1 for sentinel site support	
SUBTOTAL: Management. and Administration		1,364			
GRAND TOTAL		15,000 (6,250)	<i>Commodities represent 42% of total budget</i>		

Table 3

**Zambia – Year 1 Targets
Assumptions and Estimated Year 1 Coverage Levels**

Year 1 PMI Expected Results:

Prevention:

- Approximately 700,000 LLINs will have been distributed by partners (of which PMI will contribute 400,000) to pregnant women and children under five. This is expected to bring nationwide household ownership of one or more ITNs to 65%.
- At least 85% of houses in geographic areas targeted for IRS during Year One will have been sprayed (urban and peri-urban areas in 15 districts, covering approximately 700,000 households).

Case Management:

- Approximately 1,000,000 treatments of ACT will have been purchased and used to maintain supply of ACTs to health facilities nationwide. Combined with investments from the Global Fund to Fight AIDS, TB, and Malaria, these efforts are expected to result in over 30% of children under five with suspected malaria receiving ACTs.
- To help fill the gap in diagnostic supplies and support the NMCC's recommendation of parasitological diagnosis for all patients with suspected malaria, close to 700,000 rapid diagnostic tests (RDTs) will have been purchased to ensure steady supply to health facilities.
- Focused antenatal care (FANC) will have been strengthened in selected districts where current uptake of IPTp is low, increasing the proportion of women receiving two or more doses of IPTp.

Assumptions:

Population of country: 11,477,477

Pregnant women: 4% of total population = 459,099 pregnant women

Infants (children <1): 3% of population = 344,324 infants.

Children <5: 20% of population = 2,295,495 children under five

Average number of malaria-like illnesses per year and cost per treatment (costs given are for AL):

Children <5: 3 illnesses/year at \$0.45 each
Older Children/adults: 1.25 illnesses/year at \$1.50 each

Cost of a LLIN = \$7.00; average of 3 nets/household needed to cover all pregnant women and children under five in family

Cost of spraying a house with an average of 5-6 inhabitants = \$10.00

Inter- vention	Needs for 100% Nationwide Coverage over 3 Years*	Needs for 85% Nationwide Coverage over 3 Years*	Annual Needs to Achieve 100% Coverage	Needs to Achieve Year 1 PMI Targets	Year 1 Contributions
IPTp	459,099 pregnant women x 2 treatments/woman = 918,198 treatments/year x 3 years = 2,754,594 treatments	2,341,405 SP treatments	918,198 SP treatments	Target: 70% of pregnant women receive 2 doses of IPT = 642,739	No SP needed; provide support for FANC
LLINs	Annual needs for 100% coverage x 3 = 3,529,412 nets	3,000,000 LLINs	1,176,471 LLINs	Target: 65% of households own at least 1 net = 764,706 nets	PMI is contributing 400,000 LLINs, other partners are contributing approximately 300,000
ACTs – children < 5	2,295,495 children under 5 x 3 episodes/year = 6,886,468 treatments/year x 3 years = 20,659,459	20,659,459 treatments/year for 3 years x 85% = 17,560,540	6,886,486 treatments	Target: 30% of children under 5 receive ACTs = 2,065,946 treatments	GFATM is procuring 3 million treatments of AL-LUM for children u5, PMI is procuring 1 million doses of which part them will be for this age group
ACTs – older children and adults	9,181,982 older children and adults x 1.25 episodes/year = 11,477,477 treatments/year x 3 years = 34,432,431	34,432,431 treatments/year for 3 years x 85% = 29,267,566	9,755,855 treatments		GFATM is procuring 152,000 treatments of AL-LUM for this age group. PMI is procuring 1 million doses of which part them will be for this age group
TOTAL	55,091,890 treatments	46,828,106	16,642,341		
IRS	700,000 households x \$10 per hh x 3 years = 21,000,000	700,000 households x \$10 per hh x 3 years x 85% = 17,850,000	700,000 households	Target: 80% of targeted houses to be sprayed 560,000 households to be sprayed = \$5,600,000	PMI is contributing \$4.5 million for the procurement of insecticides and operational costs. NMCC will receive additional resources from the MOH and GFATM.

Table 4

**President's Malaria Initiative – Zambia
Year 1 (FY08) Budget Breakdown by Intervention (\$000)**

Area	Commodities \$ (%)	Other \$ (%)	Total \$
Insecticide-treated Nets	\$2,450 (64%)	\$1,361 (36%)	\$3,811
Indoor Residual Spraying	\$2,400 (53%)	\$2,100 (47%)	\$4,500
Case Management	\$1,400 (34%)	\$2,688 (66%)	\$4,088
Intermittent Preventive Treatment	\$0 (0%)	\$887 (100%)	\$887
Epidemic Preparedness & Response	\$0 (0%)	\$0 (0%)	\$0
Monitoring and Evaluation	\$0 (0%)	\$350 (100%)	\$350
Administration	\$0 (0%)	\$1,364 (100%)	\$1,330
Total	\$6,250 (42%)	\$8,750 (58%)	\$15,000

Table 5**Year 1 (FY08) Budget Breakdown by Partner (\$000)**

(Once the FY08 Implementation Plan is approved and contracts/grants cooperative agreements awarded, all other partners will be listed here)

Partner Organization	Geographic Area	Activity	Budget
DELIVER Task Order #3	National	Procurement of LLINs	2,450
		Procurement of RDTs	400
		Procurement of AL	1,000
		Strengthening supply chain management	1,000
IRS IQC (RTI)	15 districts	Procurement of IRS-related commodities	2,400
HCP (JHU/CCP)	National	National IEC/BCC Campaigns: ITNs, ACTs, IPTp	500
		Umbrella to NGOs/FBOs through Zambia Malaria Foundation for community-based IEC/BCC	650
TDRC	Selected districts	Operations research: SP efficacy in pregnant women	100
	Ten sites	Strengthen/expand sentinel sites	300
SFH (PSI)	National	Routine distribution of LLINs through ANC	786
HSSP (Abt Associates)	National	Facility-based health worker training, supervision	600
	Central and Eastern Provinces (total of 14 districts)	Strengthening of FANC in two provinces where IPTp uptake is low	500
	15 districts	Support for IRS implementation	2,100
Diagnostics RFA (TBD)	National	Diagnostics quantification, laboratory workers' training	300
GH Tech (QED)	National	Support contract for M&E	50
SPA	National	Support to District Basket	500
Staffing & Admin	National	Staffing + CDC TDYs	1,364

ANNEX 2

Multi-Year Strategy and Plan: Zambia

GOAL AND TARGETS OF THE PRESIDENT'S MALARIA INITIATIVE

By the end of the Initiative, reduce malaria-related mortality in Zambia by 50% when compared with pre-Initiative levels.

After three years of full implementation, the PMI will have provided resources to assist each country to attain the following targets in populations at risk for malaria:

- >90% of households with a pregnant woman and/or children under five will own at least one ITN;
- 85% of children under five 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 under five will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the last 6 months;
- 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and
- 85% of children under five with suspected malaria will have received treatment with an ACT within 24 hours of onset of their symptoms.

PREVENTION ACTIVITIES

Insecticide-treated nets (ITNs)

Zambia has recognized that ITNs are a key part of its malaria control strategy and is working to rapidly scale-up coverage. The MOH/NMCC's five-year strategic objective is to have 75% of all persons sleeping under an ITN in areas not covered by the IRS campaign by 2008 and for 80% of households to have a minimum of three LLINs.

According to the 2006 MIS, 44% of households own one ITN and 19% of households have more than one ITN. Ownership varies greatly by geographic region. In Western Province, where a major net distribution campaign recently took place, ITN ownership was found to be 73%, while Lusaka, Northern, and Copperbelt Provinces reported the lowest household ownership of at least one ITN (35%, 33%, and 40%, respectively). Lower ownership in these areas can be partially explained by the lack of any mass distribution campaigns in these regions and the presence of IRS in peri-urban and urban areas of Lusaka and Copperbelt Provinces.

While net ownership is increasing rapidly, utilization of nets remains low. The MIS found that only 23% of children under five and 24% of pregnant women had slept under an ITN the previous night. There are slight geographical and urban-rural differences in utilization, with

usage among children under five in urban areas slightly higher than that in rural areas (26% compared to 21%) while among pregnant women, rural women were more likely than their urban women counterparts to sleep under ITNs, (27% vs.18%). Regional usage in children varied from 11% in the Central province to 33% in the Southern province. Among children under five, those from wealthier quintiles were more likely to have utilized an ITN. There was no difference in utilization by wealth quintile among pregnant women.

To increase coverage and utilization of LLINs in Zambia, the MOH/NMCC has adopted a four-pronged net distribution strategy:

- Regional mass campaigns to distribute free LLIN to all households;
- Highly-subsidized nets to pregnant women and children under five through ANCs;
- An equity program to provide free LLINs to vulnerable populations such as households with orphans and vulnerable children, people living with HIV/AIDS, and the poorest of the poor; and
- Sales of LLINs through the commercial sector.

Some 3.1 million LLINs are planned for distribution in 2007; if these are distributed as planned, there will be over five million LLINs in the country and it is likely that the MOH/NMCC will achieve its coverage targets. The focus will then be turned to maintaining this high coverage and replacing the nets that wear out over the next three years.

Over the next three years, PMI will work with the MOH/NMCC to maintain high coverage. In year one, the PMI will focus on distributing highly subsidized LLINs through the MIP program in ANC and EPI clinics. The NMCC is currently exploring making LLINs through the ANC and EPI clinics free. If this is the case, in years two and three PMI will have to adjust its support to offset the loss of the subsidy. Also, the NMCC may continue to support mass campaigns in areas where LLIN coverage is not as high and the PMI will consider supporting these mass campaigns in year two and three. In addition, in years two and three, PMI may begin to engage in collaborations with the private sector net market to help expand its reach and ensure its sustainability. This could include building local net distributor capacity, expanding the number of distribution outlets, and improving marketing capabilities.

To continue to promote increased demand for, and correct usage of, LLINs, and provide further education on the correct and consistent use of ITNs among targeted populations, PMI will support an ongoing national campaign promoting ITN use. This will include radio and TV ads, print media, and community interpersonal approaches such as community drama through a small NGO/FBO grants program. This will be a particular focus in year one to help increase the consistent use of LLINs. In later years, this messaging may become more targeted to particular populations or districts where LLIN usage remains low.

Indoor residual spraying (IRS)

Indoor residual spraying (IRS) in the main urban and peri-urban areas of Zambia was re-established in 2003 after a hiatus of thirty years. The first spraying campaign was conducted in the 2003/4 malaria season in five districts. This was scaled-up to eight districts in the

2004/5 season and 15 districts in the 2005/6 season. In the 2005-2006 campaign, 236,759 out of the 281,489 houses targeted were sprayed, constituting 11% of households in the country.

In the 2006/7 campaign, the MOH/NMCC expanded the scope of this program within the 15 districts, and targeted 700,000 households and aimed for 70% coverage. In 2007, the campaign had sprayed over 592,346 households. This represents coverage of 85%. The denominator used for IRS coverage is the number of eligible households in a selected area, although these areas are yet to be fully mapped.

In the 2007/2008 campaign, the MOH/NMCC will focus on improving their operations in the 15 districts. USAID has committed to procuring the insecticide (both DDT and pyrethroids) through RTI for the campaign and to providing continued implementation and technical support through both RTI and HSSP. There continues to be a need to fund additional environmental assessment and put in place environmental safeguards. Prior to the reintroduction of DDT, no baseline studies on either vector resistance or susceptibility to DDT, or the existence of DDT in the environment were conducted. Without such data, it will be difficult to determine if DDT resistance is rising as a result of IRS. Also, the lack of baseline data on the existence of DDT in the environment prior to its reintroduction will make leakage monitoring difficult. The 2007 Action Plan includes such studies but they are currently unfunded.

Over the next three years, PMI will continue to procure sufficient amounts of DDT, Fendona, and Icon-wp to spray targeted households in 15 districts. The NMCP would like to expand this IRS program to seven additional urban and per-urban areas in 2008/2009, however, while PMI is willing to support IRS in 15 districts, it is expected that other donors would support the expansion. While continuing to support spraying, PMI will work with the NMCC and other partners to ensure support for the most effective combined ITN-IRS strategy in the future.

CASE MANAGEMENT

Malaria diagnosis: Currently, fewer than 40% of patients with suspected malaria have access to laboratory diagnostic services in Zambia. The NMCP is committed to expanding and strengthening microscopic diagnosis of malaria and introducing the use of RDTs in health facilities (and in the future at the community level) where microscopy is not feasible. Children less than five years of age with symptoms suggestive of malaria are to be treated presumptively for malaria according to the IMCI algorithm; older children and adults undergo a diagnostic test before treatment.

With the increased cost of ACTs, accurate diagnosis will be critical to target treatment to infected patients and reduce the overuse of antimalarial drugs. In addition, accurate information on the geographic and seasonal distribution of malaria will be important for the cost-effective use and evaluation of malaria control activities. The PMI views malaria laboratory diagnosis as a key component of good case management and will support strengthening of malaria laboratory diagnosis throughout Zambia. The PMI will work with the MOH/NMCC and other partners to review written guidance and use of diagnostic

procedures for malaria to ensure a rational and cost-effective plan for the use of microscopy and RDTs at different levels of the health system and in different clinical and epidemiological settings. The PMI will also support pre-service and in-service training for MOH laboratory technicians in malaria diagnosis and will work with the MOH to strengthen the supply chain management system for laboratory supplies. The PMI recognizes the benefits of combining malaria laboratory training with training for other diseases, such as tuberculosis and HIV/AIDS, and will work with PEPFAR and other groups to strengthen laboratory facilities. It will be particularly important to ensure that health workers responsible for patient care are trained in the proper interpretation and use of laboratory tests for malaria, as some clinical officers and physicians ignore the results of laboratory tests when they do not agree with their clinical diagnoses.

Decisions on PMI procurement of microscopes, microscopy supplies, and RDTs in FY09 and beyond will be based on the planned review of the existing malaria diagnostic network, ongoing monitoring of this network, and projected funding from the GFATM, other partners, and the MOH.

Pharmaceutical Management and Treatment: The effective implementation of Zambia's national policies for case management of acute malaria illness have been confounded by poor forecasting, procurement, and distribution and management of essential commodities including ACTs, second-line drugs, medicines and related supplies for the management of severe malaria, diagnostic test kits, and reagents. The PMI has invested heavily in year one to improve the systems for supplying and managing malaria treatment drugs and related commodities. After establishing the improved supplies management system, this first year investment is likely to be sufficient to cover only about half of the nation's 1,400 health facility delivery points. Additional support will be necessary to expand the improvements to all health facilities in subsequent years and to continue support the health facilities strengthened in year one. The MOH/NMCC also has plans to expand ACTs to private providers and the community level. This will require equipping CHWs with RDTs and ACTs and may be beyond the scope of PMI resources alone. However, PMI in years two and three may contribute to these efforts once the necessary regulatory approvals are passed if there is a broader commitment among GRZ and collaborating partners to these activities.

Because malaria treatment and diagnostic supplies represent a substantial portion of the entire essential drugs system, PMI will carefully manage its efforts for improving their supply and management in such a way that other essential drugs are not overlooked. For this reason, PMI will seek to enhance, rather than duplicate, the essential drugs program. Over the life of the initiative, PMI may explore the development of a stand-alone information system for malaria drugs; as the program evolves, PMI may support efforts to incorporate the rest of the essential drugs into the enhanced information system.

Although Zambia was the first country to recommend AL for first-line treatment of uncomplicated malaria, coverage is still very low, even at health facilities where it is available. Enhancing the systems for drugs stocks management may contribute to overcoming this problem. However, even with these improvements, it is very likely that the resources available to procure ACTs will not meet the needs of the health system. The PMI is

unlikely to be in a position to meet the country's ACT requirements alone. However, supplemental stocks, such as those programmed in year one could be procured in future years. The PMI will work with MOH/NMCC and other donors including GFATM and World Bank to revise ACT quantification on an annual basis and to advocate effectively with GRZ and other collaborating partners to meet those needs.

PMI acknowledges that provision of adequate quantities of first-line treatment and diagnostic tests will not be sufficient alone to ensure the high coverage goals outlined in the MOH/NMCC strategic plan. For this reason, the USG partners anticipate multi-year funding for the integrated behavior change communication activities initiated in the first year. Additional resources for health worker training, both in-service and pre-service, and supportive supervision may be allocated in the years two and three.

As MOH/NMCC and its partners resolve the regulatory issues around expanding ACTs to private sector providers and community health workers, PMI may be in a position to allocate additional resources to these priority interventions in 2009 or 2010. Support for training and management of one or both of these interventions will likely be a priority for MOH/NMCC and all of its partners during the next PMI planning cycle.

The first year PMI Malaria Operations Plan does not include resources for support of IPTi or improved management of severe malaria (aside from the substantial support allocated for improving drug supply chain management). USG in-country staff will continue to engage in MOH/NMCC policy discussions on these issues. If sufficient funding is available in future PMI planning cycles, it is possible that these potential intervention areas could be addressed through pilot implementation or operations research projects.

MALARIA IN PREGNANCY

Zambia's policy for IPTp recommends that every woman receive three or more doses of SP during the second and third trimesters of pregnancy. Currently, 62% of pregnant women receive at least two doses. Although the PMI target of 85% coverage with two doses may be reasonably achievable in the coming years, additional effort will be required to reach MOH/NMCC coverage targets, which are based on three doses. The PMI will continue to support the roll out of FANC as the primary means for enhancing coverage of IPTp as one component of comprehensive services for maternal and newborn health. Resources in the first year of the PMI anticipate that other donor and GRZ funding will be available to expand these services nationwide. The PMI will advocate with the MOH/NMCC to secure additional support from other collaborative partners to ensure that the FANC strategy reaches the entire country. FANC efforts will also be coordinated carefully with the routine provision of ITNs through the MIP program.

First year support for a comprehensive integrated behavior change communication strategy in support of IPTp, ITNs, and effective case management will be continued and intensified in year two. The PMI is committed to balancing behavior change efforts among mass media and interpersonal communication strategies. In subsequent years of the PMI, it is likely that IEC messages in support of IPTp will evolve and that the balance between mass media and

community-based IEC will shift. This approach will likely be regionally targeted to areas of low IPTp uptake to increase coverage with two-dose IPTp from the current level of 62% to 85%.

Although no PMI resources are programmed for procurement of SP supplies, PMI support for pharmaceutical supplies management will ensure that SP is available along with the drugs necessary for managing acute malaria illness. As the role of SP as a first line treatment of malaria during ACT stock outs diminishes, PMI will support MOH/NMCC to ensure it remains available for IPTp. This will include forecasting the need for SP supplies to support IPTp and potentially assisting with procurement as necessary. Operations research on the effectiveness of SP for IPTp will be supported only once during the three-year project, unless the outcomes of the initial study suggest that more data would be useful for the malaria control program.

MONITORING AND EVALUATION PLAN

The PMI's monitoring and evaluation plan will be closely coordinated with efforts of the MOH/NMCC, the GFATM, MACEPA, and other partners so as to contribute to the National Malaria Prevention and Control Monitoring and Evaluation Plan for 2006-2011. As MACEPA has committed to biennial MIS surveys, the PMI will not need to support either a baseline or a final survey in Zambia. A nationwide DHS will be carried out in 2007. Both the 2006 MIS and the 2007 DHS, together with field records of IRS activities, will provide baseline information for the PMI on coverage of the four major interventions. A final MACEPA-supported MIS survey in 2011 will measure progress related to the coverage and mortality targets over the three-year course of the PMI in Zambia. The PMI will also support strengthening of the ten existing malaria sentinel site information system to provide regular and reliable data on malaria morbidity and mortality beginning in year one and such support will likely continue in subsequent years. Information on other indicators of interest, including the number of children and pregnant women attending child health and ANC clinics, the number of health facilities delivering IPTp and ACTs, the number of ITNs distributed, stock outs of drugs, the quality of health services, and antimalarial and insecticide resistance will be collected through routine monitoring by the MOH and other partners and/or smaller, targeted surveys or studies. Funding of specific monitoring and evaluation activities will depend on discussions with the MOH/NMCC and other partners to identify gaps and unmet needs.

SUSTAINABILITY PLAN

The three-year strategic plan for Zambia is designed to begin addressing the complex issues of longer-term sustainability and building national capacity for effective malaria prevention and control in Zambia over time. The PMI's framework for sustainability addresses three major components: management capacity; technical knowledge and skills; and financial strengthening.

Strengthening management capacity: The PMI plans to place two full-time malaria advisors in country to work with the MOH/NMCC in program implementation. It is hoped that these two workers will have offices in or near the MOH/NMCC and that they

will work closely with MOH/NMCC counterparts on day-to-day management of PMI-supported and other malaria control activities. Special attention will be given to helping build capacity in areas such as planning, budgeting, human resources management, and financial management systems and working in collaboration with other MOH departments and sections as well as with cooperating partners. Strengthening these systems will be integral to the MOH/NMCC's effective use of resources and its ability to attract further resources through the national budget and other donors, such as the GFATM.

Technical knowledge and skills: Although the MOH/NMCC in Zambia provides strong and effective leadership of malaria control efforts in Zambia, they have indicated a need to build capabilities related to epidemiology, monitoring and evaluation, and entomology. The PMI will keep these needs in mind as they interview staff to occupy the two in-country malaria advisor positions. The implementation of the PMI will result in the transfer of technical knowledge and skills to the MOH/NMCC and other MOH departments, NGOs, community- and faith-based organizations, health workers, and private sector partners. The PMI will also focus on IEC/BCC activities directed at increasing Zambians' understanding of the risks of malaria, and promoting the adoption of appropriate prevention measures and correct treatment-seeking behavior.

Financial sustainability: Financial sustainability will be one of the most challenging areas to address within the PMI. There are legitimate concerns that 85% coverage levels for key interventions such as ITN and IRS coverage and access to ACTs are unlikely to be sustained over time without adequate future financing. However, improved local managerial and technical capacity, more cost-effective use of interventions, expected reductions in the cost of key malaria commodities, and reduced malaria transmission within the country should make it easier for the MOH/NMCC to take on increased responsibility to fund key interventions. Other financing sources available to the MOH/NMCC will include an increased portion of the national budget, resources from other donor including the GFATM, and a greater private sector market share for malaria commodities, such as ITNs. Over time, shifting those beneficiaries who can afford to pay to the private sector will enhance sustainability and enable the government to more effectively target their resources. Strategies to prime the local market will include working with private sector pharmacies, shops, and social marketing networks on training, IEC, and distribution.

Table 1**Timeline of Expected Coverage of Interventions – Zambia**

Indicator	2006 Zambia MIS	Year 1	Year 2	Year 3
Proportion of children under five years old with fever in the last two weeks who received treatment with an ACT within 24 hours of onset of fever	13%	30%	60%	85%
Proportion of women who received two or more doses of IPTp during their last pregnancy in the last two years	62%	70%	80%	85%
Proportion of households with at least one ITN.	44%	65%	75%	>90%
Proportion of pregnant women who slept under an ITN the previous night	24%	40%	65%	85%
Proportion of children under five years old who slept under an ITN the previous night	23%	40%	65%	85%
Proportion of targeted houses adequately sprayed with a residual insecticide in the last 12 months.	N/A	80%	85%	85%

Table 2**Illustrative 3-Year Budget and Expected Coverage Levels**

PMI Targets: After three years of full implementation, the PMI will achieve the following targets in populations at risk of malaria in Zambia:

- i. 85% of children under five will have slept under an ITN the previous night;
- ii. 85% of pregnant women will have slept under an ITN the previous night;
- iii. 85% of pregnant women will have received two or more doses of SP for IPTp during their pregnancy;
- iv. 85% of houses targeted for indoor residual spraying will have been sprayed;
- v. 85% of children under five with suspected malaria will have received treatment with an ACT within 24 hours of the onset of their symptoms.

Assumptions:

Population of Zambia: 11,477,477 persons

Pregnant women:	4% of total population = 459,099 pregnant women
Children <5:	20% of population = 2,295,495 children under five
Infants (children <1):	3% of population = 344,324 infants

Average number of malaria-like illnesses per year and cost per treatment with AM-LUM:

Children <5:	3.0 febrile episodes/year (\$0.45 per treatment) = \$1.35 per year
Older Children/ adults:	1.25 malaria illnesses/year (\$1.50 per treatment) = \$1.50 per year

Cost of IPTp with SP: \$0.20 (\$0.10 for each of the two treatments a woman will receive during her pregnancy)

Average household will require 3 ITNs to cover all children under five and pregnant women in the family

Cost of a long-lasting ITN = \$7.00

Cost of spraying a household with an average of 5 – 6 inhabitants = \$10.00

Costs per person for epidemic preparedness, implementation support and USG implementation costs were taken from a detailed cost analysis prepared for Uganda.

Item/Activity	Annual Cost per Person	Annual Cost	3-year total	Assumptions/Comments
Prevention- ITNS		\$7,000,000	\$21,000,000	Based on projected ITN replacement need
Prevention- IRS		\$7,000,000	\$21,000,000	Based a projected cost of \$10 per HH with a target of 700,000 HHS
Treatment- malaria		\$20,315,133	\$60,945,399	
Treatment- IPTp		\$91,819	\$275,459	459,099 pregnant women a year x \$.20
Implementation Support	\$0.92	\$10,559,279	\$31,677,837	Commodities management, human resources, supervision and training, etc
Monitoring and Evaluation		\$928,000	\$2,784,000	Based on 2007 NMCC action plan cost estimates
Cost of Program		\$45,894,231	\$137,682,693	
USG Implementation Support Costs		\$1,367,000	\$4,101,000	
Total funding needed (including USG support costs)			\$141,783,693	
GRZ Malaria Budget			\$5,100,000	Based on GFATM Rd 4 application information
GFATM Rd 1 Phase 2			\$17,047,031	
GFATM Rd 4 Phase 2			\$28,882,544	assumes that phase 2 is approved
World Bank.			\$4,450,000	
WHO/UNICEF			\$610,000	
MACEPA			\$10,500,000	
Available from Other Sources			\$66,589,575	
PMI funds available (estimated)				
Year 1		\$15,000,000		
Year 2		\$15,000,000		
Year 3		\$20,000,000		
Total PMI funding			\$50,000,000	
Total available funding			\$116,589,575	
Remaining Gap			\$25,194,118	Amount still needed to achieve targets