

This Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. The final funding available to support the plan outlined here is pending final FY 2017 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



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U.S. PRESIDENT'S MALARIA INITIATIVE



PRESIDENT'S MALARIA INITIATIVE

ZIMBABWE

Malaria Operational Plan FY 2017

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ABBREVIATIONS and ACRONYMS

ACT	Artemisinin-based combination therapy
ANC	Antenatal care
AS/AQ	Artesunate-amodiaquine
ASL	Above sea level
BCC	Behavior change communication
CDC	Centers for Disease Control and Prevention
CHAI	Clinton Health Access Initiative
DHIS2	District Health Information System 2
DHS	Demographic and Health Survey
DPS	Directorate of Pharmacy Services
EHT	Environmental health technician
EPI	Expanded program on immunization
EUV	End-use verification
FETP	Field Epidemiology Training Program
FY	Fiscal year
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GoZ	Government of Zimbabwe
HMIS	Health Management Information System
iCCM	Integrated community case management
IDSR	Integrated Disease Surveillance and Response
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LMIS	Logistics Management Information System
LT	Light trap
M&E	Monitoring and evaluation
MCCM	Malaria community case management
MCH	Maternal child health
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MoHCC	Ministry of Health and Child Care
MOP	Malaria Operational Plan
NatPharm	National Pharmaceutical Company
NIHR	National Institute of Health Research
NMCP	National Malaria Control Program
NMSP	National Malaria Strategic Plan
OP	Organophosphate
OR	Operational research
PMI	President's Malaria Initiative
PR	Principal Recipient

PSM	Pharmaceutical and supply chain management
RA	Resident Advisor
RDNS	Rapid Disease Notification System
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SHC	School health coordinator
SM&E	Surveillance, Monitoring, and Evaluation
SP	Sulfadoxine-pyrimethamine
TA	Technical assistance
TB	Tuberculosis
TraC	Tracking Results Continuously
UNDP	United National Development Program
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
VHW	Village health worker
WHO	World Health Organization
WHT	Ward Health Team
ZIPS	Zimbabwe Integrated Push System
ZAPS	Zimbabwe Assisted Pull System

I. EXECUTIVE SUMMARY

When it was launched in 2005, the goal of the President's Malaria Initiative (PMI) was to reduce malaria-related mortality by 50% across 15 high-burden countries in sub-Saharan Africa through a rapid scale-up of four proven and highly effective malaria prevention and treatment measures: insecticide-treated mosquito nets (ITNs); indoor residual spraying (IRS); accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs); and intermittent preventive treatment of pregnant women (IPTp). With the passage of the Tom Lantos and Henry J. Hyde Global Leadership against HIV/AIDS, Tuberculosis, and Malaria Act in 2008, PMI developed a U.S. Government Malaria Strategy for 2009–2014. This strategy included a long-term vision for malaria control in which sustained high coverage with malaria prevention and treatment interventions would progressively lead to malaria-free zones in Africa, with the ultimate goal of worldwide malaria eradication by 2040-2050. Consistent with this strategy and the increase in annual appropriations supporting PMI, four new sub-Saharan African countries and one regional program in the Greater Mekong Subregion of Southeast Asia were added in 2011. The contributions of PMI, together with those of other partners, have led to dramatic improvements in the coverage of malaria control interventions in PMI-supported countries, and all 15 original countries have documented substantial declines in all-cause mortality rates among children less than five years of age.

In 2015, PMI launched the next six-year strategy, setting forth a bold and ambitious goal and objectives. The PMI Strategy for 2015-2020 takes into account the progress over the past decade and the new challenges that have arisen. Malaria prevention and control remains a major U.S. foreign assistance objective and PMI's Strategy fully aligns with the U.S. Government's vision of ending preventable child and maternal deaths and ending extreme poverty. It is also in line with the goals articulated in the RBM Partnership's second generation global malaria action plan, *Action and Investment to defeat Malaria (AIM) 2016-2030: for a Malaria-Free World* and WHO's updated *Global Technical Strategy: 2016-2030*. Under the PMI Strategy 2015-2020, the U.S. Government's goal is to work with PMI-supported countries and partners to further reduce malaria deaths and substantially decrease malaria morbidity, towards the long-term goal of elimination.

Zimbabwe was selected as a PMI focus country in FY 2011.

This FY 2017 Malaria Operational Plan presents a detailed implementation plan for Zimbabwe based on the strategies of PMI and the National Malaria Control Program (NMCP). It was developed in consultation with the NMCP and with the participation of national and international partners involved in malaria prevention and control in the country. The activities that PMI is proposing to support fit in well with the NMCP strategy and plan and build on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) malaria grants. This document briefly reviews the current status of malaria control policies and interventions in Zimbabwe, describes progress to date, identifies challenges and unmet needs to achieving the targets of the NMCP and PMI, and provides a description of activities that are planned with FY 2017 funding.

The proposed FY 2017 PMI budget for Zimbabwe is \$15 million. PMI will support the following intervention areas with these funds:

Entomologic monitoring and insecticide resistance management: PMI will support NMCP planning for IRS through entomological monitoring in target districts, validating the residual efficacy of

insecticides, and collecting data on insecticide resistance and vector behavior, species composition, and density nationwide. PMI will continue training and post-training follow-up visits to ensure quality improvement. Technical assistance will be continued to the two NIHR laboratories and at Africa University. PMI will support one entomological officer position at the NMCP to consolidate nationwide entomological surveillance.

Insecticide-treated nets (ITNs): PMI will support ITN procurement of 811,675 rectangular ITNs and distribution for the ongoing continuous distribution approach designed to ensure high coverage of new cohorts of pregnant women and children, and to replace worn out ITNs distributed through previous campaigns to all Zimbabweans that need ITN protection. PMI will conduct the third and final year of monitoring of the performance and durability of ITNs, and will support external expertise to advise on ongoing refinement of policies to balance IRS and ITN coverage in Zimbabwe, based upon the epidemiological context.

Indoor residual spraying (IRS): PMI will support a robust, full package of IRS implementation in the highest burden province of Manicaland, spraying 171,736 structures and protecting 375,324 persons in the targeted districts. PMI will support an external evaluation of environmental compliance and environmental management plans associated with the IRS project. PMI's contributions to environmental compliance and other cross-cutting efforts, such as entomological monitoring, including insecticide susceptibility monitoring, surveillance, monitoring, and evaluation, and social and behavior change communication (SBCC), will continue nationwide. PMI will work with the NMCP to identify priority districts based on the most recent entomological and epidemiological data.

Malaria in pregnancy (MIP): PMI will procure 870,000 treatments of sulfadoxine-pyrimethamine (SP) plus 3,300 treatments of clindamycin, and will provide support to the MIP implementing districts for the training and supportive supervision of district, health facility, and community level staff on the revised IPTp and MIP implementation guidelines, including ITN promotion and treatment of malaria for pregnant women as well as data recording and reporting. PMI will promote the use of data from the assessment of barriers and facilitators to IPTp uptake and other evidence to guide the development of SBCC plans for prevention of MIP and knowledge of and adherence to updated treatment guidelines for malaria in pregnant women. PMI will engage with the NMCP regarding opportunities to update facility records, registers, and the health management information system (HMIS) to capture the total number of doses of SP given to women.

Case management: PMI will procure rapid diagnostic tests (RDTs) and medicines for severe malaria, and will train approximately 1,000 facility-based health workers and 1,300 village health workers (VHWs) in 15 districts. PMI will expand direct training support beyond Manicaland to Mashonaland East, Mashonaland Central, and Matabeleland North Provinces, which have moderate to high burden malarious areas. PMI's continued support of workforce development will include mop-up and refresher training of facility-based workers, along with quarterly supportive supervision and the piloting of a mentoring program in a few districts. PMI will support the reinstitution and improvement of death audits and documentation through training and stakeholder consultations. Support will be provided to the NMCP Case Management Advisory Subcommittee to develop a prioritized multiyear training plan.

PMI will support the establishment of university laboratory capacity for both epidemiologic and entomologic surveillance sample analysis. In rural districts and urban referral centers, PMI will prioritize support for health worker training and supportive supervision to develop and maintain proficiency in microscopy, starting out in the 15 districts in Mashonaland East, Mashonaland Central,

and Matabeleland North Provinces with a pilot in 20 health facilities.

PMI will continue to ensure that malaria commodities, such as ACTs, RDTs, severe malaria medicines, and SP, are available in health facilities through the Zimbabwe Assisted Pull System (ZAPS). A focus will be placed on stock management and the ordering system in an attempt to address overstock issues. Support will also be given to strengthen and expand supervision and quality assurance.

Health systems strengthening and capacity building: PMI will support the secondment of an entomological officer to the NMCP who will provide technical assistance on entomological and vector control issues and support entomological surveillance in the remaining sites that PMI is not supporting. PMI will also support the secondment of a Malaria Logistics Focal Person at the Ministry of Health and Child Care (MoHCC) Directorate of Pharmacy Services (DPS) to conduct quarterly support and supervision visits, manage the end-use verification activities, lead the quantification process for malaria products, keep the project informed on changes needed in the procurement plan, and otherwise manage and coordinate malaria commodity logistics issues at the central and lower levels of the system.

Social and behavior change communication (SBCC): PMI will support VHWs and school and community leaders to conduct interpersonal communication on key malaria messages around ITNs, malaria in pregnancy, RDTs, and ACTs in the 47 districts with the highest malaria transmission. The school and community leaders' SBCC activities will be complemented by printed materials that accompany packaged ITNs, RDTs and ACTs, radio spots, and drama skits. The primary focus for all activities will be to support the launch of ITN distribution expansion, improve MIP uptake, and promote IRS and appropriate case management. PMI will continue to support malaria advocacy and commemoration events and the SBCC Working Group quarterly meetings.

Surveillance, monitoring and evaluation (SM&E): PMI will continue work with the NMCP to monitor the quality of malaria data collected through the HMIS and to improve data use to ensure that the programmatic needs of the NMCP are met. PMI will support malaria routine system strengthening with a focus on continued and expanded supportive supervision at the facility level. Support for improving epidemic detection algorithms, health worker capacity to analyze and monitor the malaria trends, and preparedness for epidemic detection and response will also be a focus of PMI activities in “moderate” (annual malaria incidence 6-100 cases/1,000 population) to “high burden” (annual malaria incidence >100 cases/1,000 population) areas such as Manicaland.

PMI will continue support for SM&E trainings at all levels, including VHWs as well as supervisory and district health facility trainings. In addition, PMI support will be used to facilitate quarterly meetings for district, provincial, national level, and cross-border representatives to meet and discuss surveillance and SM&E-related issues. PMI will conduct quarterly surveys to assess the availability of malaria commodities in health facilities and warehouses.

II. STRATEGY

1. Introduction

When it was launched in 2005, the goal of PMI was to reduce malaria-related mortality by 50% across 15 high-burden countries in sub-Saharan Africa through a rapid scale-up of four proven and highly effective malaria prevention and treatment measures: insecticide-treated mosquito nets (ITNs); indoor residual spraying (IRS); accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs); and intermittent preventive treatment of pregnant women (IPTp). With the passage of the Tom Lantos and Henry J. Hyde Global Leadership against HIV/AIDS, Tuberculosis, and Malaria Act in 2008, PMI developed a U.S. Government Malaria Strategy for 2009–2014. This strategy included a long-term vision for malaria control in which sustained high coverage with malaria prevention and treatment interventions would progressively lead to malaria-free zones in Africa, with the ultimate goal of worldwide malaria eradication by 2040-2050. Consistent with this strategy and the increase in annual appropriations supporting PMI, four new sub-Saharan African countries and one regional program in the Greater Mekong Subregion of Southeast Asia were added in 2011. The contributions of PMI, together with those of other partners, have led to dramatic improvements in the coverage of malaria control interventions in PMI-supported countries, and all 15 original countries have documented substantial declines in all-cause mortality rates among children less than five years of age.

In 2015, PMI launched the next six-year strategy, setting forth a bold and ambitious goal and objectives. The PMI Strategy for 2015-2020 takes into account the progress over the past decade and the new challenges that have arisen. Malaria prevention and control remains a major U.S. foreign assistance objective and PMI's Strategy fully aligns with the U.S. Government's vision of ending preventable child and maternal deaths and ending extreme poverty. It is also in line with the goals articulated in the Roll Back Malaria (RBM) Partnership's second generation global malaria action plan, *Action and Investment to defeat Malaria (AIM) 2016-2030: for a Malaria-Free World* and WHO's updated *Global Technical Strategy: 2016-2030*. Under the PMI Strategy 2015-2020, the U.S. Government's goal is to work with PMI-supported countries and partners to further reduce malaria deaths and substantially decrease malaria morbidity, towards the long-term goal of elimination.

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This FY 2017 Malaria Operational Plan (MOP) presents a detailed implementation plan for Zimbabwe, based on the strategies of PMI and the National Malaria Control Program (NMCP). It was developed in consultation with the NMCP and with the participation of national and international partners involved in malaria prevention and control in the country. The activities that PMI is proposing to support fit in well with the National Malaria Control strategy and plan and build on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) malaria grants. This document briefly reviews the current status of malaria control policies and interventions in Zimbabwe, describes progress to date, identifies challenges and unmet needs to achieving the targets of the NMCP and PMI, and provides a description of activities that are planned with FY 2017 funding.

2. Malaria situation in Zimbabwe

Zimbabwe has seasonal and geographic variation in malaria transmission that corresponds closely with the country's rainfall pattern. In general, the major malaria transmission season occurs during the rainy season between November and April, with the average temperature ranging between 18 and 30 degrees Celsius. Peak transmission season is February through April. The annual rainfall varies from less than 700 mm in Matabeleland Province to more than 1,500 mm in Manicaland Province. Malaria transmission is lower in the low rainfall areas and higher in the high rainfall provinces.

Geographically, Zimbabwe is divided by a central watershed lying higher than 1,200 meters above sea level and flanked north and south by low lying areas. In 1986, the country was divided into three malaria epidemiological areas based on altitude above sea level (ASL). The three epidemiological zones in terms of malaria transmission are: areas below 900 meters ASL in the north, and below 600 meters ASL in the southern regions, where malaria was considered to be perennial. Areas between 900-1200 meters ASL north and 600-900 meters ASL south are where malaria is seasonal and they are prone to epidemics. In areas above 1,200 meters ASL in the north and 900 meters ASL in the south, malaria transmission does not normally occur. Traditionally, higher areas have been described as unstable, and lower areas as stable.

Zimbabwe is divided into ten provinces (two of which are urban), 63 rural districts, and 1,200 wards. Forty-seven of the rural districts are considered malarious and of those, 30 are considered high malaria burden districts. Currently, 16 rural districts are considered pre-elimination (Table 1).

Table 1: Morbidity and Mortality Data by District, Zimbabwe, 2015

	District	2015 Health facility confirmed malaria cases	2015 Village health worker confirmed malaria cases	2015 Malaria deaths
	Manicaland Province			
1	Buhera	974	361	18
2	Chimanimani	8370	6440	16
3	Chipingwe	27362	14537	39
4	Makoni	13472	4264	19
5	Mutare	13286	4983	37
6	Mutasa	10400	8659	15
7	Nyanga	17436	11059	22
8	Bindura	14564	9433	21
	Mashonaland Central Province			
9	Centenary	9113	1292	15
10	Guruve	4617	362	12
11	Mazowe	7067	118	23
12	Mbire	20978	336	6
13	Mount Darwin	10384	4704	21
14	Rushinga	2794	1119	6

15	Shamva	11497	238	2
	Mashonaland East Province			
16	Chikomba	212	3	3
17	Goromonzi	8328	779	5
18	Hwedza	392	0	2
19	Marondera	689	2	5
20	Mudzi	17789	5108	19
21	Murewa	4847	115	12
22	Mutoko	33689	6295	25
23	Seke	565	20	1
24	Uzumba Maramba Pfungwe	5793	2010	5
	Midlands Province			
25	Chirumhanzu**	43	9	0
26	Gokwe North	799	91	3
27	Gokwe South**	309	16	1
28	Gweru District**	121	0	1
29	Kwekwe**	146	0	3
30	Mberengwa**	279	0	3
31	Shurugwi**	40	0	1
32	Zvishavane**	95	0	0
	Matebeleland North Province			
33	Binga	1139	957	4
34	Bubi**	17	3	0
35	Hwange	607	34	1
36	Lupane**	74	5	0
37	Nkayi**	47	6	1
38	Tsholotsho**	26	0	0
39	Umguza**	35	0	0
	Matebeleland South Province			
40	Beitbridge**	1192	135	8
41	Bulilima**	4	0	0
42	Gwanda**	91	8	0
43	Insiza**	37	7	1
44	Mangwe**	10	0	0
45	Matobo**	23	0	0
46	Umzingwane**	11	0	0
	Masvingo Province			
47	Bikita	2885	317	2
48	Chiredzi	14499	2837	16
49	Chivi	392	56	0
50	Gutu	390	62	3
51	Masvingo	702	81	2
52	Mwenezi	1770	821	13

53	Zaka	2069	273	6
	Mashonaland West Province			
54	Chegutu	360	5	1
55	Hurungwe	16147	779	29
56	Kariba	1766	1109	1
57	Makonde	3670	814	7
58	Mhondoro**	97	5	3
59	Sanyati	1687	9	11
60	Zvimba	1147	57	9
	Urban Districts			
61	Bulawayo*	187	0	10
62	Chitungwiza*	599	0	18
63	Harare*	2909	0	63
	Total	301039	90733	570

* = Urban districts attend to a number of patients referred from rural district facilities

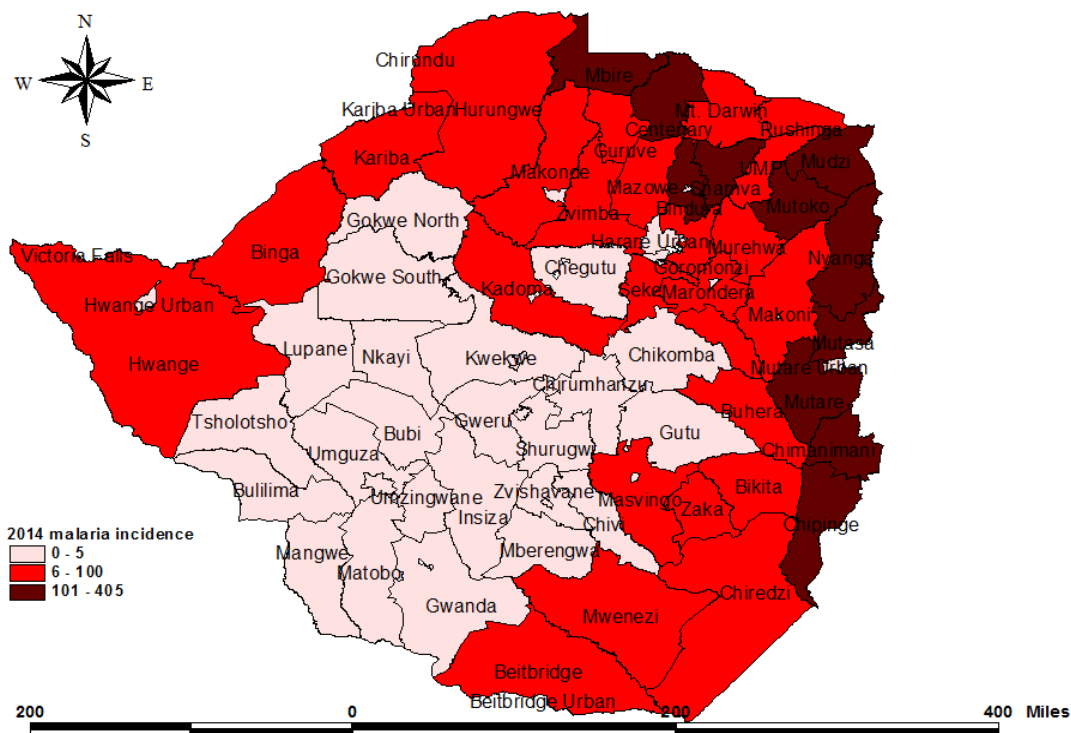
** = Pre-elimination districts

Population estimates for Zimbabwe vary due to recent migration within and outside the country. The 2015 population estimate, as projected from the 2012 census, is 13.4 million and it is estimated that about half of this population lives in malaria risk areas.

Plasmodium (P.) falciparum accounts for more than 98% of all reported malaria cases; *P. ovale* and *P. malariae* account for the remainder. Mosquito collections made using the Centers for Disease Control and Prevention (CDC) light traps and pyrethrum spray catches conducted at PMI-supported sentinel sites during 2013-15 showed that *Anopheles (An.) gambiae* s.l. was the most widely distributed species across seven sites in line with findings from previous vector distribution studies. In contrast, *An. funestus* was the predominant vector in Mutasa and Mutare Districts of Manicaland Province.

There is geographic variation in malaria burden risk across and within provinces. Figure 1 shows a comparison of the burden of malaria by district for 2014.

Figure 1: Annual Malaria Incidence Rates*by District, 2014, Zimbabwe



*Incidence = cases/1000 population

According to Zimbabwe District Health Information System 2 (DHIS2) data, approximately 83% of all malaria cases and 61% of all malaria deaths in 2015 originated from three eastern rural provinces, Manicaland, Mashonaland East and Mashonaland Central, with 42% of all cases and 33% of all deaths coming from Manicaland (Tables 2 and 3). This trend where the three provinces rank highest in reported cases and deaths continues from 2013.

Table 2: DHIS2 Malaria Morbidity Data, 2015, Zimbabwe

Province	Malaria Cases*	% Contribution
Manicaland	165,600	42.3
Mashonaland Central	74,619	19.0
Mashonaland East	86,636	22.1
Subtotal (3 provinces)	326,855	83.4
Other Provinces	64,917	16.6
National	391,772	100

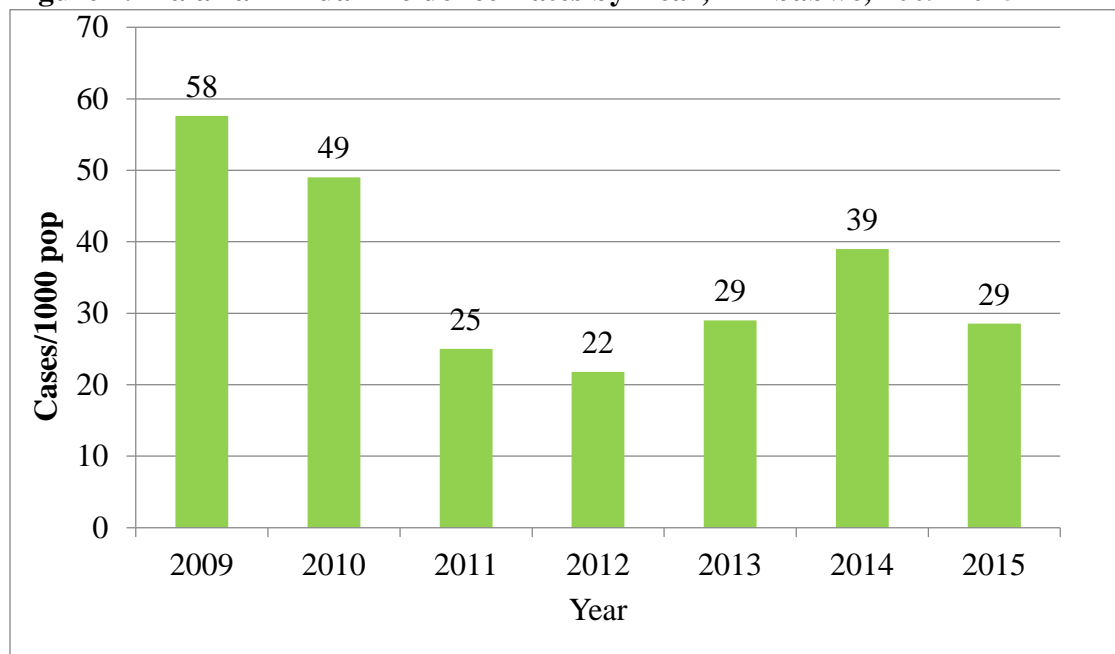
*Parasitologically confirmed

Table 3: DHIS2 Malaria Mortality Data, 2015, Zimbabwe

Province	Malaria Deaths	% Contribution
Manicaland	187	32.8
Mashonaland Central	85	14.9
Mashonaland East	77	13.5
Subtotal (3 provinces)	261	61.2
Other Provinces	221	38.8
National	570	100

Overall, malaria incidence in Zimbabwe has decreased over the past decade. However, it remains a major challenge in certain provinces, districts, and wards. According to the NMCP's latest figures, malaria incidence decreased by 86% from 153 cases/1,000 population in 2004 to 22/1,000 in 2012. The 2012 Malaria Indicator Survey (MIS) showed a national malaria prevalence of 0.4% slide positivity rate and 1.0% RDT positivity rate among children aged 6-59 months. Reported cases decreased from 1.8 million in 2006 to 480,000 in 2014. A continuous decline occurred until 2012, but an upsurge in cases and incidence was recorded in 2013 and 2014 (Figure 2). Incidence declined by 86% from 2004 to 2012; however, from 2012 to 2014 malaria incidence increased by 77 % from 22 cases per 1,000 population in 2012, to 39 in 2014. New malaria cases largely emanated from areas along the Zimbabwe-Mozambique border, mainly in Manicaland Province where the *An. funestus* vector mosquito found to be resistant to pyrethroid class insecticide was identified in 2013. It was difficult to know how much of the increase was due to migration across the border, strengthened surveillance systems, or ineffective malaria control interventions. PMI support helped to institute robust measures to prevent malaria infections mainly by introducing an organophosphate (OP) class insecticide that is highly efficacious against *An. funestus*, and to detect and rapidly respond to malaria upsurges. Hence, the annual malaria incidence decreased by 26% from 39 cases per 1,000 population in 2014 to 29 in 2015. The decrease cannot completely be attributed to the switch to OPs in Manicaland Province only, but also to other factors such as reduced rainfall due to climatic changes in the region and improvements of other malaria prevention and control interventions.

Figure 2. Malaria Annual Incidence Rates by Year, Zimbabwe, 2009-2015



Source: Zimbabwe Health Information System

3. Country health system delivery structure and Ministry of Health and Child Care organization

The Ministry of Health and Child Care (MoHCC) has three main divisions: Policy Planning, Monitoring, and Evaluation; Curative Services; and Preventive Services, plus the Provincial Medical Directorates. The NMCP is under the Preventive Services directorate and is led by a director who is supported by a team of senior officers responsible for case management, monitoring and evaluation (M&E), vector control, social behavioral change communication (SBCC), and finance and administration.

At the provincial level, the Provincial Medical Director is responsible for all health activities, including malaria control, and has a team of managers responsible for epidemiology and disease control, nursing services, environmental health, administration, nutrition, health promotion and pharmacy. The Provincial Epidemiology and Disease Control Officers also serve as the provincial focal persons for malaria. The structure at the district level mirrors the province with a District Health Management Team. The District Health Management Team is led by the District Medical Officer, who is responsible for all health delivery services in the district including malaria. The District Health Management Team works with ward health teams (WHTs) to coordinate and implement health programs. The District Environmental Health Officer manages IRS activities, whereas the District Nursing Officer is responsible for case management-related issues.

The primary health facility level is staffed by two to three nurses, one to two environmental health technicians (EHTs), and nurse aides. There are approximately 1,500 primary health facilities in Zimbabwe and each primary health facility is linked to a WHT comprised of community members such

as village health workers (VHWs), school health coordinators (SHCs), headmen, chiefs, and religious leaders. The health facility staff is responsible for overseeing program implementation at ward level in conjunction with the WHT. The WHT members are volunteers, although trained community-based health volunteers receive an incentive of \$14/month from the Global Fund grant for health system strengthening as well as the Health Development Fund. An additional \$1/month per VHW goes to the Department of Nursing in the MoHCC to support the VHW program.

The NMCP collaborates with diverse partners and has linkages with the following parastatal, governmental, and nongovernmental organizations:

1. National Institute for Health Research (NIHR), a government entity which operates a center for research, training, and service in the fields of disease control, biomedicine, and public health;
2. National Pharmaceutical Company (NatPharm), a parastatal organization which is responsible for the procurement, storage, and distribution of all health and pharmaceutical commodities, including malaria medicines;
3. Medicine Control Authority of Zimbabwe, a statutory government institution which is responsible for registration of all medicines in the country;
4. National Microbiology Reference Laboratory, a government entity which is responsible for internal quality assurance;
5. Zimbabwe National Quality Assurance Program, a nongovernmental organization responsible for external quality assurance for laboratories;
6. University of Zimbabwe (Geographical Information Systems and Earth Observation Department), a government institution which recently has been charged with the responsibility of combining different types of data to create an updated malaria stratification map for Zimbabwe; and
7. University of Zimbabwe (Master of Public Health Program), whose students are attached to MoHCC units at national and subnational levels. The students conduct malaria and non-malaria-related projects such as outbreak investigations and program evaluations. In turn, the NMCP and MoHCC staff mentor the students.

The NMCP has ten national level staff in Harare and eight Provincial Malaria Focal Persons. In addition, there is one national level post, the Chief Field Officer, supporting vector control as well as a Master of Public Health student attached to the NMCP. Due to the government's recruitment freeze the Chief Field Officer's position has been vacant for the past four years. At the national level, the NMCP develops policy, national guidelines, and training materials following advice and recommendations from relevant malaria technical subcommittees. The national level also oversees program implementation, monitoring and evaluation (M&E), resource mobilization, and partnership coordination.

Due to Zimbabwe's economic collapse in 2008-09, all of the NMCP positions in Harare are supported by the Global Fund. The position of the Provincial Malaria Focal Person is also supported by the Global Fund while the other workers receive allowances from the Zimbabwe Health Worker Retention Scheme. A Malaria Logistics Focal Person, who is funded by PMI, sits at the MoHCC under the pharmacy

directorate and spearheads malaria supply chain activities at the MoHCC headquarters and coordinates with the NMCP. The Government of Zimbabwe (GoZ) budget is planned annually, based upon district annual plans which are consolidated at the provincial and later at the national levels.

In addition to the above financial assistance, other local and international non-governmental organizations (NGOs) support malaria control activities.

4. National malaria control strategy

The vision of the NMCP's 2008-2013 (extended to 2015) National Malaria Strategic Plan (NMSP) is a malaria-free Zimbabwe with the goal to "reduce malaria incidence from 95/1,000 persons in 2007 to 10/1,000 persons by 2015, and reduce malaria deaths to near zero by 2015." The NMSP has been extended to 2017 and the stated goal is now: "To reduce malaria incidence from 22/1,000 persons in 2012 to 10/1,000 persons by 2017, and reduce malaria deaths to near zero by 2017."

The key approaches of the NMSP include:

1. Universal access to malaria prevention and personal protection with 90% of the population at risk covered by IRS and ITNs, and 85% coverage of monthly recommended dose of intermittent preventive treatment for pregnant women (IPTp2) attending antenatal care (ANC) in medium-high transmission areas;
2. Improve diagnosis and treatment of both uncomplicated and severe malaria;
3. Improve detection and timely control of malaria epidemics, by detecting 100% of malaria epidemics within two weeks of onset;
4. Expand districts implementing pre-elimination activities;
5. Increase utilization of correct malaria prevention and control measures to at least 80% of the population at risk;
6. Strengthen monitoring and improve evaluation of malaria activities at all levels;
7. Expand and maintain strong multi-sectoral partnerships for effective program management and coordination.

In Zimbabwe, the majority of people seek care for fever and suspected malaria from public sector facilities, including those in the eight rural provinces and the poor and uninsured in urban areas. The 2012 MIS indicated that of mothers surveyed for 285 children under five years of age in the eight rural provinces, 100% indicated they sought care from public sector facilities (government or mission hospitals, rural health or mobile clinics or community health workers) with 76% seeking it at rural health clinics. Eleven percent sought care in the private sector (clinics, physicians, and pharmacies) and 8% went to a shop, traditional healer, or other source. Respondents could indicate multiple responses and sources of care so numbers total more than 100% across the types of sources. The distribution of those seeking care from private sources ranged from approximately 12-20% among those in the third highest wealth quartiles, and their use of public facilities reached 100%, indicating that use of public facilities is common across wealth categories. Similarly, use of public facilities was overwhelmingly greater than the private sector regardless of the mother's highest education.

5. Updates in the strategy section

- IPTp: In 2014, the NMCP changed its policy from IPTp with a recommended three doses of sulfadoxine-pyrimethamine (SP) being given during pregnancy, and adopted the 2013 WHO recommendation for IPTp which does not state a maximum number of doses to be given to all women regardless of the number of ANC visits. The policy is to give a pregnant woman a dose at every antenatal care (ANC) visit, as long as they are at least four weeks apart. The first dose is to be given at the beginning of the second trimester, and dosing continues up to the time of delivery. The WHO recommends that women have at least four ANC visits during pregnancy.
- Global Fund principal recipient: The Global Fund invoked the Additional Safeguards Policy in 2008 following the sequestration of Global Fund funds by the Reserve Bank of Zimbabwe. This meant that the Global Fund reserved the right to select the principal recipient (PR) for Global Fund grants, and it imposed stricter risk mitigation controls. Therefore, since August 2009, the United Nations Development Program (UNDP) had been the PR for Global Fund grants in Zimbabwe.

After the review of the Additional Safeguards Policy in 2014, the Global Fund concluded that a national institution could be selected for programmatic PR-ship for malaria and tuberculosis (TB) and take over from the UNDP. The Global Fund in consultation with the Country Coordinating Mechanism then selected the MoHCC to be the PR for malaria and TB during the implementation of the New Funding Model 2015-2016. A Program Coordinating Unit for Global Fund-supported programs has been established to facilitate the smooth transitioning of the PR-ship from UNDP to MoHCC.

6. Integration, collaboration, and coordination

Both the United States Agency for International Development (USAID) and CDC support programs in three key areas of the U.S. Global Health Initiative (GHI): HIV/AIDS, TB, and malaria. With FY 2017 funding, PMI/Zimbabwe will actively seek opportunities to collaborate with other United States Government (USG) health programs so as to ensure maximum impact for every health dollar the USG invests in the country. Opportunities include the following:

Maternal and child health services and malaria: Since malaria prevention and control activities are implemented as part of integrated maternal and child health services, PMI will make a significant contribution to strengthening capacity to deliver these services. PMI will work with other USG-funded programs and other partners to support the comprehensive primary health care package, including the training and implementation of community-based diagnosis and treatment of fever, IPTp, and early treatment. PMI will continue to support universal coverage of ITNs via campaigns, as well as the integration of ITN distribution within routine ANC and expanded program on immunization (EPI) services.

Integrated Community Case Management (iCCM): With women continuing to deliver at home, falling household compliance with key child health household practices, and added barriers to care for women, newborns, and children (i.e., user fees and fewer rural health centers providing birthing and clinical

care), the need is evident to focus increased attention on the community and households. PMI/Zimbabwe supports malaria prevention and treatment as a part of iCCM.

Beginning in early 2010, the MoHCC and its partners launched a training program to revitalize the VHW cadres. Other partners are also supporting iCCM. The United Nations Children's Fund (UNICEF) is currently supporting VHW training and providing other inputs, such as bicycles. In addition, the MoHCC is using Global Fund resources to expand VHW refresher training to all districts, provide VHW kits, and once again offer a monthly stipend (approximately \$14 per month) to each VHW. The community-based maternal and newborn care manual, developed by WHO and UNICEF, comprises the primary content for the current VHW refresher training.

PMI has complemented other partner resources to integrate malaria community case management (MCCM) within the scope of the VHW program. PMI's partner is training VHWs to provide an integrated package of care using a revised community register as a job aid to record visits on conducting comprehensive care. Village health workers have an important role to play in mobilizing their communities, and identifying those women, infants, and sick children who require care, including those in hard-to-reach areas or groups.

Strengthening of supply chain system: PMI will also support the strengthening of supply chains, including support for the national roll-out of the Zimbabwe Assisted Pull System (ZAPS), which includes management of TB commodities, primary health care packages, and malaria commodities, namely rapid diagnostic tests (RDTs), SP, and ACTs. The ZAPS is replacing the Zimbabwe Informed Push System (ZIPS). PMI had continued to support ZIPS while ZAPS was being piloted and evaluated in Manicaland.

HIV/AIDS and malaria: Based on a 2011 national survey, the seroprevalence of HIV infections is high; an estimated 15.2% among individuals aged 15 to 49 years old are infected. Infection with HIV is higher among women (17.7%) than men (12.3%) and is modestly higher in urban areas (16.7%) than in rural areas (14.6%). Areas where integration will be pursued between the MoHCC's HIV/AIDS Program and NMCP include: promoting adherence to universal precautions when taking blood samples, integrating laboratory quality assurance, providing ITNs to people living with HIV/AIDS, and ensuring appropriate malaria prevention services at Prevention of Mother-to-Child Transmission clinics. At the community level, PMI will support VHWs who provide RDT and ACT services to also communicate important messages regarding HIV prevention and testing.

TB and malaria: The National TB Program supports the activities of village health promoters to inform and support TB diagnosis and follow-up. Where these promoters are the same cadres as the VHWs that provide RDT and ACT services, PMI will work to integrate activities across HIV, TB, and malaria.

Routine partner collaboration and coordination: Commitment to reducing the malaria burden and continuing on the path of malaria elimination is evident at the highest levels of the MoHCC. The NMCP staff meets weekly to review work plans and monitor progress. The NMCP coordinates with partners through five malaria technical subcommittees: vector control, surveillance, monitoring, and evaluation (SM&E), case management, SBCC, and procurement and supply management. These subcommittees are slated to meet quarterly and are chaired by the NMCP, other MoHCC staff, or academicians, and include

the PMI/Zimbabwe in-country team, Global Fund, and PMI implementing partners.

The NMCP participates actively in the multi-sectoral Inter Agency Coordination Committee on Health, formerly “Health Cluster” group meetings, chaired by the MoHCC’s Director of Epidemiology and Disease Control. The NMCP also participates in a number of subregional and cross-border initiatives, a priority for the program. The NMCP is an active partner of the Roll Back Malaria (RBM) Southern Africa Regional Network and with the Southern African Development Community malaria network.

The NMCP is a member of the Malaria Elimination Eight (E8) countries comprised of four front line countries (Botswana, Namibia, South Africa, and Swaziland) and four second line countries (Angola, Mozambique, Zambia, and Zimbabwe). Inaugurated in 2009, the E8 countries have a collective goal to eliminate malaria in their region. There is an E8 strategy which guides the eight front runner districts. The major three pillars for the strategy include 1. strengthening SM&E systems, 2. setting up mobile and static clinics at ports of entry, and 3. strengthening outbreak detection and response. Malaria pre-elimination activities in Zimbabwe have made the targeted districts/provinces shift focus towards parasite clearance and zero malaria deaths. Malaria is now a notifiable disease in these areas within 24 hours to the national level, all RDT positive cases are being confirmed by microscopy, all cases are supposed to be followed up to their homes for active case finding and environmental assessment, all hot spots and breeding sites are supposed to be mapped, and interventions are targeted appropriately for the class/type of transmission foci. PMI currently focuses on the high burdened districts and not pre-elimination areas. However, there are some cross-cutting activities that PMI implements which include both high burdened and pre-elimination areas (e.g., SBCC, SM&E, emergency preparedness and response (EPR), entomological surveillance, etc.). However, as the country progresses more into pre-elimination, PMI will likely transition more into pre-elimination activities.

The program is also a member of the Trans-Zambezi Malaria Initiative with Zimbabwe, Zambia, Namibia, Botswana, and Angola. The initiative is a convergence of five countries on the narrow Caprivi Strip with a total of 16 districts and a combined population of 1.5 million people at risk of malaria. Its vision is to eliminate malaria in the Trans-Zambezi communities with social and economic prosperity by 2020.

The Health Partners Development Group meets on a quarterly basis to discuss issues of mutual interest. Currently, USAID chairs these meetings with WHO being the alternate chair.

PMI, led by the PMI in-country team, will work closely with the NMCP, RBM partners, Global Fund-supported, and other health-related programs in Zimbabwe to provide integrated services at the health facility and community levels. PMI will work with others in USAID/Zimbabwe to ensure coordination of PMI-supported activities within the broader context of the health strategies. These approaches will ensure the most cost-effective implementation of prevention and treatment measures. PMI and NMCP have agreed on quarterly PMI implementing partners meetings, attended by PMI Resident Advisors and Malaria Specialist, partners, and the NMCP.

In addition, PMI staff will provide leadership and technical assistance in other coordinating bodies such as the local RBM (including relevant RBM subcommittees). At the planning and implementation levels, PMI and other partners will work together to effectively fill commodity and human resource gaps.

7. PMI goals, objectives, strategic areas, and key indicators

Under the PMI Strategy for 2015-2020, the USG's goal is to work with PMI-supported countries and partners to further reduce malaria deaths and substantially decrease malaria morbidity, towards the long-term goal of elimination. Building upon the progress to date in PMI-supported countries, PMI will work with NMCPs and partners to accomplish the following objectives by 2020:

1. Reduce malaria mortality by one-third from 2015 levels in PMI-supported countries, achieving a greater than 80% reduction from PMI's original 2000 baseline levels;
2. Reduce malaria morbidity in PMI-supported countries by 40% from 2015 levels;
3. Assist at least five PMI-supported countries to meet the WHO criteria for national or subnational pre-elimination.¹

These objectives will be accomplished by emphasizing five core areas of strategic focus:

1. Achieving and sustaining scale of proven interventions
2. Adapting to changing epidemiology and incorporating new tools
3. Improving countries' capacity to collect and use information
4. Mitigating risk against the current malaria control gains
5. Building capacity and health systems towards full country ownership.

To track progress toward achieving and sustaining scale of proven interventions (area of strategic focus #1), PMI will continue to track the key indicators recommended by the RBM Monitoring and Evaluation Reference Group as listed below:

1. Proportion of households with at least one ITN
2. Proportion of households with at least one ITN for every two people
3. Proportion of children under five years old who slept under an ITN the previous night
4. Proportion of pregnant women who slept under an ITN the previous night
5. Proportion of households in targeted districts protected by IRS
6. Proportion of children under five years old with fever in the last two weeks for whom advice or treatment was sought
7. Proportion of children under five with fever in the last two weeks who had a finger or heel stick
8. Proportion receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs
9. Proportion of women who received two or more doses of IPTp for malaria during ANC visits during their last pregnancy.

¹ http://whqlibdoc.who.int/publications/2007/9789241596084_eng.pdf

8. Progress on coverage/impact indicators to date

Table 4: Evolution of Key Malaria Indicators in Zimbabwe from 2005 to 2015

Indicator	2005 DHS*	2009 MIMS**	2010 DHS	2012 MIS†	2015 DHS
% Households with at least one ITN	9%	27%	29%	46%	48%
% Households with at least one ITN for every two people	-	-	-	-	26.0%
% Children under five years old who slept under an ITN the previous night	3.0%	17.0%	10.0%	57.9%	9.0%
% Pregnant women who slept under an ITN the previous night††	-	-	10.0%	**	6.0%
% Households in targeted districts protected by IRS	15.2%	-	17.0%	48.6%	-
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	-	-	-	100.0%	50.0%
% Children under five years old with fever in the last two weeks who had a finger or heel stick	-	-	7.4%	-	13.0%
% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs	-	-	-	-	0.4%
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	-	-	7.0%	35.0%	-

* Demographic and Health Survey

** Multiple Indicator Monitoring Survey

† MIS was conducted in 51 malaria endemic districts of eight rural provinces

†† Data were collected on net use by women of child-bearing age but not among pregnant women specifically

- Data not available

The difference in the sampling strategy for the Demographic and Health Survey (DHS) and MIS represented in Table 4 was mainly the timing of the two surveys. The MIS is traditionally conducted during the peak malaria season for Zimbabwe (Feb.-May) to capture the malaria problem at its peak, whereas the DHS is conducted during the off rain season (Jun.-Dec.) so that enumerators can access the participants easily when most will not be busy in the fields. The 2012 MIS whose data are presented in Table 4 had major limitations in the way sampling was done. In addition, data collection and denominators that were used to calculate most of the indicators did not take into account whether an area was targeted for the intervention being pursued. Hence, there was a lot of dilution effect when the data analysis was conducted combining intervention and non-intervention areas and contributing to the low coverages reported. However, the design of the 2016 MIS tried to correct such anomalies and analysis is going to take into account whether each area is targeted for a particular intervention.

9. Other relevant evidence on progress

A PMI-funded cross-sectional study was conducted to characterize the cross-border malaria situation between Manicaland Province, Zimbabwe and Manica Province, Mozambique and more specifically to assess malaria caseloads by facility and community, human population movements, client care-seeking behavior, health information systems, and gaps in malaria data along the border. Other goals of the study were: 1) to describe cross-border coordination activities and the extent to which malaria prevention interventions are synchronized between the two provinces, 2) to describe and compare the malaria epidemiological situation between the provinces, and 3) to determine the magnitude of imported malaria and its possible impact on health services and disease burden to inform programming and future studies.

Although this study was designed to collect data from both sides of the border, more data was collected from the Zimbabwean side because permission could not be obtained from the Mozambican side. The greatest limitation was getting information on the objective that focused on assessing the degree of synchronization of malaria prevention and control activities between these areas in Zimbabwe and Mozambique. Such information is crucial because the border is an artificial boundary with communities on both sides sharing common social interactions and practices regarding malaria prevention and control.

Despite the above limitation, the study yielded valuable findings to be considered for implementation on either side of the border. In summary, although the study found the need for establishing cross-border partnerships and funding pools for investment in regional malaria control interventions that target the sources of suspected but unconfirmed imported infections, results indicate that there is much that still needs to be done at country level to ensure adequate intervention coverage and quality performance to achieve greater impact in that geographic area. Typical examples include the needs to ensure adequate coverage of vector control even in hard-to-reach areas and develop a standard outpatient department register that takes into account malaria-specific indicators and includes history of travel as an important variable. The study also recommended increasing information, education and communication interventions, including those targeting migrant and vulnerable populations along the borders, to increase use of personal protection measures.

III. OPERATIONAL PLAN

PMI is one of the major malaria donors in Zimbabwe working under the strong leadership of the NMCP and coordinating closely with the Global Fund in order to ensure complementarity of funds and activities. The goal of the NMCP and both PMI and Global Fund is to support the Zimbabwe malaria program to cover as many financial gaps as possible. PMI and Global Fund support is particularly critical at this time in Zimbabwe in order to protect the tremendous gains made in decreasing the malaria burden over the last decade and expand pre-elimination areas in the country. For this reason, PMI is providing financial and technical support under all the major malaria interventions and prioritizing areas of the country with the highest malaria burden. PMI's focus on high burden areas helps maintain the malaria control piece of the program. The NMCP has primarily used the Global Fund malaria grant and some funds from the Gates Foundation to initiate and further the program's efforts on pre-elimination. As appropriate, PMI provides and will continue to provide some support to the pre-elimination areas, especially as they expand to include more and more districts. PMI provides resources, including financial and technical support, for all the major malaria interventions – vector monitoring and control (ITNs & IRS), malaria in pregnancy (MIP), case management, health system strengthening, SM&E, operational research (OR) and SBCC. Details for each intervention are presented in Operational Plan Sections 1 – 7.

1. Vector monitoring and control

NMCP/PMI objectives

Zimbabwe has a long history of vector monitoring and control through implementing IRS, dating back to 1949. Because of this history and continuous evidence of positive results, IRS in households is a major intervention in the country with supporting systems in place. However, the current NMCP vector control strategy combines IRS with the recent addition of ITNs, circa 2008. Both vector control interventions have become more and more equally deployed every year as the NMCP and Zimbabweans understand the cost-effectiveness and benefits of ITNs.

Because of the geographic and seasonal specificity of malaria transmission in Zimbabwe, the NMCP's ITN and IRS distribution policy has been refined to the ward level, an administrative division below the district level. Malaria transmission can vary significantly within a district due to altitude, temperature, rainfall, humidity, and other geographic characteristics. Therefore, the NMCP has concluded that it is more practical and cost-effective to provide vector control interventions at the ward level. Out of 1,160 wards considered to be malarious in 47 malarious districts, 576 wards are designated for blanket coverage of ITNs and 584 wards for IRS.

The Zimbabwe NMCP's vector control policy is to deploy both ITNs and IRS (Table 5) with a commitment to achieve and maintain complete vector control universal coverage in all of the 1,160 malarious wards within the 47 malarious districts with ITNs **or** IRS – with no overlap of either vector control measure. The policy describes that ITNs complement IRS, and ITN distribution is considered to be an important vector control strategy in both low transmission areas (primarily through routine distribution) and “moderate” (annual malaria incidence 6-100 cases/1,000 population) to “high burden” (annual malaria incidence >100 cases/1,000 population) (through both routine and campaign distribution). The NMCP supports a mixed model of ITN campaign distribution that includes distribution through public health facilities, community-based fixed-point campaigns, and subsequent mop-up campaigns. The NMCP aims to reduce the transmission of malaria by scaling up effective

vector control interventions (IRS and ITNs) to 90% of the population at risk.

Table 5: NMCP/Zimbabwe IRS & ITN Strategic Objective and Strategies

Strategic Objective	Low-to-no transmission (API = 0-5) 16 districts (including urban metropolitan areas), 49% of population	Moderate-to-high transmission (API = 6 and above) 47 districts, 51% of population
To ensure universal access of the population at risk to effective and appropriate malaria prevention interventions by 2017	<p>Routine ITN distribution in ANC, EPI, Elementary Schools, and Community (via VHWs)</p> <p>No mass ITN distribution</p> <p>No IRS</p>	<p>Routine ITN distribution in ANC, EPI, Elementary Schools, and Community (via VHWs)</p> <p>Mass ITN distribution through campaigns</p> <p style="text-align: center;">or</p> <p>IRS in targeted wards of the 47 districts, based on previous transmission patterns and incidence data</p> <hr/> <p>ALL wards are covered by either blanket IRS or campaign ITNs</p>

The MoHCC is responsible for spraying the rural areas outside of municipal boundaries. In urban areas, this responsibility falls under the respective local authority. Historically, the GoZ sprays living and other structures (latrines, fowl runs, etc.) whereas PMI sprays living structures only.

The NMCP defines universal coverage as one net for every two (1.8 specifically) persons or one net per sleeping space. The NMCP intends to: 1) increase the proportion of the general population sleeping under an ITN to 80%, and 2) increase the number of children under five and pregnant women sleeping under an ITN to 85% by 2017.

1. Entomologic monitoring and insecticide resistance management

Progress since PMI was launched

In 2011, a Malaria Program Review was conducted and identified that entomological surveillance was one of the weakest areas of the malaria program for Zimbabwe. That same year, Zimbabwe became a PMI-supported country. In 2013, PMI committed to boost entomological surveillance in Zimbabwe and established three entomological sites in Manicaland Province and at least one site in each of the remaining seven rural provinces. The monitoring work annually begins in October with the objective to capture information on malaria vector populations during the dry season and prior to IRS. In all the sites, the program conducts insecticide susceptibility tests and collects data on vector density and behavior during the dry (pre-spray) and wet (post-spray) seasons. In the PMI-supported districts in Manicaland Province, on a monthly basis PMI conducts cone bioassays for spray quality and insecticide decay rate monitoring as well as vector behavior and density data collections. Although there are 16 entomological sentinel sites established in Zimbabwe, not all sites are performing to the desired level. All sites that are

being supported by PMI are able to conduct bio assays within 48 hours of spraying to assess the quality of spraying and thereafter monitor the insecticide residual efficacy testing on a monthly basis. In addition, all PMI-supported sites are able to conduct vector surveillance on a regular basis which is not the case with the non PMI-supported districts.

Technical support and coordination for entomological monitoring in Zimbabwe is provided by the National Institute of Health Research (NIHR), formerly known as the “Blair Research Institute.” Chemicals or insecticides which are used in Zimbabwe should have undergone successful field trials or evaluation by the NIHR and must be registered with the Ministry of Agriculture. During the early 1990s, vector mapping and vector bionomics were identified as priority activities along with insecticide susceptibility monitoring and bioassay assessments. A total of 16 entomological monitoring sites, two per province, were established with Global Fund support in 2010. While these sites do have some equipment and some trained staff, support is needed to ensure consistent entomological surveillance across all sites. To date, the quality of the spraying operation and resistance of insecticides on sprayed surfaces is verified regularly through a sample bioassay test following the completion of the spraying operation. Mosquito vector surveillance, though currently not at the desired level, provides information on changes of vector density, vector behavior, and vector composition thereby informing vector control programming.

In 2014, PMI continued with the revitalization of the entomology insectaries at NIHR in Harare and its satellite laboratory, De Beers, in Chiredzi. Insectary and laboratory revitalization includes technical assistance, specific guidance on maximizing mosquito colonies, and support for perishable supplies. PMI also funded entomological monitoring that was carried out in ten sentinel sites in eight malaria endemic provinces.

The program used dichlorodiphenyltrichloroethane (DDT) until 1991 when it was replaced with pyrethroids. However, after the switch a marked increase in reported malaria cases was observed, prompting the reintroduction of DDT in 2004. The IRS program continued with a mix of DDT and pyrethroids up to the 2013 spraying season. In 2014, entomological monitoring data showed a marked resistance to pyrethroids, particularly in Manicaland Province.

Due to this resistance, the NMCP included IRS using OPs in Zimbabwe’s concept note for the Global Fund New Funding Model (2015-16). In the 2014 and 2015 spraying seasons (October to December), the country used OPs, DDT, and pyrethroids.

Progress during the last 12-18 months

The PMI conducted monthly routine entomological surveillance at four sites in Manicaland Province, namely, Burma Valley, Chakohwa, Mukamba, and Mutare City, and the same activities in seven sites outside Manicaland (Manjolo, Makakavhule, Kamhororo, Chilonga, Old Mazowe Bridge, Kawere, and Chakari/Sanyati) on a seasonal basis. Additionally, they conducted insecticide resistance monitoring mostly at sites outside Manicaland Province. Table 6 summarizes activities that are conducted at each entomological surveillance site. Table 7 summarizes results of insecticide susceptibility tests conducted in 2015 and part of 2016.

Table 6: Activities Conducted at each Entomological Surveillance Site, Zimbabwe, 2016

Province	Site Name	Supported by	Activities	Comment
Matebeleland North	Manjolo	NMCP&PMI	Monitor vector species, vector densities, vector behavior, and vector susceptibility to insecticides	PMI & NIHR currently implementing
	Jotsholo	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR to implement starting August 2016
Matebeleland South	Tshilanyemba	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR to implement starting August 2016
	Makakavhule	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR currently implementing
Mashonaland East	Kawere	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR currently implementing
	Maramba	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR to implement starting August 2016
	Kotwa	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR to implement starting August 2016
Mashonaland West	Chakari	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR currently implementing
	Kasimure	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR to implement starting August 2016
Mashonaland Central	Muzarabani	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR to implement starting August 2016

	Old Mazowe Bridge	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR currently implementing
Midlands	Kamhororo	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR currently implementing
	Sidhakeni	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR to implement starting August 2016
Manicaland	Chakohwa	NMCP&PMI	Monthly monitoring: vector species, densities, behavior, susceptibility to insecticides and quality of spray and longevity of insecticide	PMI & NIHR currently implementing
	Mukamba (control site without IRS)		Monthly monitoring: vector species, densities, behavior, susceptibility to insecticides	PMI & NIHR currently implementing
Masvingo	Chilonga	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR currently implementing
	Mashoko	NMCP&PMI	Seasonal vector monitoring: species, densities, behavior and IR	PMI & NIHR to implement starting August 216

Table 7: Results of Insecticide Resistance Tests Conducted with *An. gambiae* s.l., Zimbabwe, 2015-16

Province	Lambdacyhalothrin		DDT		Bendiocarb		Pirimiphos-methyl	
	# tested	% mortality	# tested	% mortality	# tested	% mortality	# tested	% mortality
Matebeleland North	100	93PR	-	-	-	-	-	-
Matebeleland South	100	100S	100	85.3	100	100S	100	95.7PR
Mashonaland East	100	100S	100	100S	100	100S	100	100S

Mashonaland West	100	83R	100	99S	100	71.7R	100	100S
Mashonaland Central	100	100S	100	100S	100	100S	100	100S
Midlands	100	92PR	100	87.5R	100	100S	100	100S
Manicaland	50	100S	25	100S	25	100S	50	100S

Note: S=susceptible; PR=potentially resistant; R=resistant;

The WHO criteria for noting susceptibility to insecticide was used:

Susceptibility = Mortality rate of the exposed vector greater than or equal to 98%

Potential Resistance = Mortality rate of the exposed vector equal to or between 90% and 97%

Resistance = Mortality rate of the exposed vector is less than 90%

Through PMI support, a robust entomological monitoring was completed in Manicaland Province, as part of the IRS program. Insecticide resistance to pyrethroid, the insecticide class being used at the time, was identified, so the insecticide of choice was changed to OP in four districts in the province. PMI supported additional entomologic monitoring in other provinces as well, which was used by the NMCP to validate the residual efficacy of insecticides used during the IRS campaigns, gain data on insecticide resistance, vector species and behavior, and provide further entomological data for the NMCP to consider for future IRS campaign planning. *Anopheles gambiae* s.l. was the most widely distributed species across the seven sites outside Manicaland Province. In contrast, *An. funestus* was the predominant vector in sites in Mutasa and Mutare Districts of Manicaland Province.

PMI procured entomological equipment and supplies and delivered the equipment to 17 sentinel sites (Mutare City, Burma Valley, Zindi, Manjolo, Makakavhule, Kamhororo, Chilonga, Old Mazowe Bridge, Kawere, Chakari/Sanyati, Kotwa, Maramba, Sidhakeni, Mashoko, Tshelanyemba, Jotsholo, and Kasimure). The entomological equipment supplied to sentinel sites included items for collecting adult mosquitoes by pyrethrum spray catch, aspirator, and light trap methods, and larval collection, and items for processing and preserving mosquito specimens. Reagents and other equipment procured by PMI through CDC were delivered to NIHR directly or through a PMI partner. Technical support to NIHR laboratories in Harare and Chiredzi continued on a periodic basis.

PMI supported continuous on-the-job training for 101 individuals during routine entomological monitoring at the three sites in Manicaland, including Mutare City, and sites outside Manicaland for officers from NIHR/De Beers' Research Laboratory. A quarter of the trained staff were females.

A PMI partner Technical Manager and the Vector Control Officer from NMCP participated in the PMI Regional Entomological Training held in Ethiopia in July 2015. Three MoHCC officers and three PMI partner staff were trained on the Disease Data Management System in December.

PMI had problems getting colony mosquitoes for cone bioassay tests from NIHR the greater part of 2015 but the situation has since improved. In addition, the NIHR delayed in sharing results from laboratory analysis of mosquito specimens that were submitted in 2014. The laboratory results that were shared were limited by containing incomplete data and errors that had to be rectified. Neither intensity bioassay nor resistance mechanism bioassays was conducted during the period under review. The main reason for this is that intensity bioassays require many mosquitoes to undertake the tests yet Zimbabwe is facing challenges in getting adequate mosquitoes for simple resistance/susceptibility tests. Resistance mechanism bioassays require a good and efficient laboratory. The in-country capacity provided by NIHR has been challenged to meet the demand for molecular analysis dating back to 2014. PMI will

support NMCP's needs by capacitating Africa University as an additional entity to provide needed services and expertise to be able to conduct all the required tests.

Plans and justification

PMI will continue entomological monitoring in its target districts of Manicaland Province unless otherwise instructed by the NMCP to refocus efforts. PMI will also continue supporting the NMCP in validating the residual efficacy of insecticides the national program uses in IRS and in collecting data on insecticide resistance and vector behavior, species composition, and density nationwide. The entomological monitoring results will provide the NMCP with information to use in planning future IRS campaigns.

PMI will continue training and conducting refresher trainings to those already trained to make sure they do not lose knowledge and skills already gained. On-the-job training will be conducted for those who may have missed the opportunity to be trained due to limited resources. Emphasis shall be given to post-training follow-up visits to ensure quality improvement.

Technical assistance will be continued to the two NIHR laboratories. In addition, PMI plans to continue laboratory capacity building at Africa University that is proposed to begin with FY 2016 funding. Both Africa University and NIHR laboratories will be supported with laboratory reagents and consumables through PMI support.

PMI intends to support one entomological officer position at NMCP with FY 2016 funding. The purpose is to expand entomological surveillance to cover sites that are currently not covered due to limited resources. If successful, the same position shall be supported with FY 2017 to consolidate nationwide entomological surveillance.

Proposed activities with FY 2017 funding:(\$549,000)

PMI will continue efforts to consolidate entomological monitoring in its target districts of Manicaland Province and at least one site in the remaining provinces. The vision is to establish nationwide entomological surveillance to guide future IRS decision making.

Specific activities to be supported by PMI with FY 2017 funding include:

- *Entomological surveillance and monitoring:* PMI will continue to support entomological surveillance, including insecticide susceptibility monitoring, in sixteen existing rural sites. Three urban sites, Mutare, Harare and Bulawayo, shall also be supported technically to motivate entomological surveillance in those cities to ascertain whether the cities are still malaria free or not. A point to note is that there are now cases being reported in cities and their peri urban areas with no history of travel. Entomological surveillance activities will include adult and larval mosquito surveillance, assessment of the impact of vector control activities, insecticide resistance monitoring, and bioassay testing to determine IRS longevity on treated surfaces, as well as determination of the resting and feeding preferences of the vector mosquitoes in and around the sentinel sites. (\$300,000)
- *Laboratory capacity building for entomological surveillance:* PMI will expand entomological laboratory capacity to meet national needs for entomological specimen analysis, data dissemination, and use. (\$200,000)

- *Procure entomological supplies:* PMI will provide insecticide resistance monitoring equipment and laboratory reagents for entomological activities to the central NIHR and DeBeers laboratories. (\$20,000)
- *Technical assistance to PMI IRS activities:* PMI will provide two CDC technical assistance visits to support entomology, including enhanced insecticide resistance monitoring. (\$29,000).

2. Insecticide-treated nets

Progress since PMI was launched

The NMCP has worked to increase coverage of ITNs over the past several years with mass campaigns and commencement of routine distribution channels for the first time under the Zimbabwe public health history. The increased coverage of all vector control methods have contributed to the protection of Zimbabweans and the steady decrease in transmission. If sustained as in the past decade, the coverage will support a shift from control to pre-elimination strategies in large parts of the country over the coming years. The shift began in 2014 and has continued with the number of pre-elimination areas increasing from seven districts to 13.

Before 2014, NMCP relied solely on distribution through mass campaigns (fixed point distribution followed by mop-up). However, in late 2014, the NMCP, supported by PMI and partners, began an ITN routine distribution system pilot in four districts in Mashonaland West and Mashonaland Central. The ITN routine distribution pilot has just completed its one year anniversary and is scheduled for an end-line survey in June/July 2016 accompanied by a report describing lessons learned in the pilot districts.

From 2008 to 2010, a total of 1.9 million ITNs were distributed free to targeted communities. Global Fund Round 8 phase 1 procured 1,219,309 ITNs and UNITAID procured 640,557 ITNs in 2009. The ITNs distributed by 2010 are estimated to have covered 83% of the population in 30 targeted districts, assuming that one ITN is shared between two people. These ITNs were distributed through mass campaigns using public health facilities as fixed distribution points. Before each distribution cycle, a registration/census was carried out to determine the number of individuals in the home, sleeping spaces, and estimated nets required.

According to the Zimbabwe 2015 DHS, 48% of households owned at least one ITN, showing an increase from 29% of households owning at least one ITN from the previous 2010-2011 DHS. Children under five years of age who slept under an ITN did not increase in 2015, showing only 9% compared to the previous 2010-2011 which reported 10%. The percent of pregnant women who slept under an ITN the previous night in 2015 was 6% marking quite a decrease from the previous 2010-2011 DHS which reported 10%.

As mentioned above in Section 1. Vector Monitoring and Control, DHS findings related to malaria prevention and control must take into account that DHS data collection takes place during the dry season and covers the entire nation, including malarious and non-malarious areas. Therefore, ITN ownership and use could be underreported. However, these findings may indicate that more work should be done to ensure ITN access within the household, i.e. an adequate number of ITNs covering all sleeping spaces in the household for all household members. NMCP/Zimbabwe is starting to look more closely at

household access to nets in response to PMI advocacy. A total of 3,201,573 ITNs was needed for mass distribution in 2013. Through the support from the Global Fund (1,368,279), PMI (699,500) and other partners, the country mobilized 2,067,779 ITNs which were distributed to 34 priority districts, an increased number of districts from the previous campaign. Districts were prioritized by highest transmission risk. After the distribution, a gap of 1,133,794 ITNs for 2,294,079 people in 13 eligible districts remained; this area was targeted for nets in 2014.

In September-October 2014, PMI distributed 660,688 ITNs via campaign in the “moderate” to “high” malaria transmission districts including: Chiredzi, Chipinge, Gokwe, Makoni, Bulilima, Mangwe, Gwanda, Zvimba, Shamva Urban and Beitbridge Urban. In previous distributions, public institutions such as boarding schools, orphanages, and elder care homes were omitted. On top of the above mentioned districts, these institutions in the following districts were also covered: Mazoe, Centenary, Guruve, Rushinga, Lupane, Binga, Zaka, Masvingo, Kwekwe, Mberengwa, Gokwe North, Chimanimani, Mutare, Nyanga, and Mutasa.

According to the NMCP calculations using the NetCalc quantification tool in 2014, Zimbabwe nearly achieved universal coverage in ITN designated areas, approximately 90%; an achievement which is included as a key component of the NMSP. The 2016 MIS will be an opportunity to survey ITN coverage and use and provide more certainty to the NetCalc estimate.

The 2012 MIS reported that 46.4% of households owned at least one ITN and 58.9% of the population reported sleeping under a net. The 2015 DHS recorded that 48% of households in Zimbabwe own at least one ITN and 26% own at least one ITN for every two persons who stayed in the household the night preceding the survey. Household ownership of at least one ITN has improved since the 2010-2011 DHS which reported that 29% of households had one ITN. The 2015 DHS figures on ITN use were only collected for children under five years of age and pregnant women. Of children and women in households reporting at least one ITN, 18% and 13%, respectively, slept under an ITN the night before the survey. The 2015 DHS also reports vector control coverage for either IRS or ITNs. Thirty percent of children under five years of age and 27% of pregnant women either slept under an ITN the night before the survey or in a dwelling treated by IRS in the past 12 months.

However, it is important to note that DHS data collection takes place in Zimbabwe during the dry season (circa June) and covers the entire nation, including malarious and non-malarious areas. The DHS data collection plan is not optimal for malaria indicator collection and could underreport ITN ownership and use and IRS coverage. This underscores the need for an MIS to obtain more accurate data on ITN ownership in malarious areas and ITN use during the rainy, malaria season and IRS coverage done in preparation for the rainy season as well. The NMCP conducted a MIS in 2016, begun in March during the peak malaria season. The MIS data, when compiled and analyzed, will indicate more accurately whether ITN ownership and use has increased.

The WHO Pesticide Evaluation Scheme recommends that all ITN programs monitor different net products in their local settings. However, following the mass ITN distribution campaign in 2014, prospective ITN durability monitoring was not conducted, as the study could not be initiated within 12 months after the campaign.

PMI continued to support the advent of the routine or continuous distribution pilot in four districts, Mt. Darwin, Mazowe, Hurungwe, and Makonde. The effort began in Mt. Darwin and then moved to Mazoe,

Hurungwe, and Makonde. PMI partners worked with the NMCP to supervise the pilot start-up and complete several rounds of supervisory visits which allowed for refinements in the program. The supervisory team looked at supply logistics, performance of ITN-dispensing staff on the ground, interaction with beneficiaries, and documentation. At least 13 recommendations emerged from the joint supervision of the pilot, which were promptly addressed. Mazowe is the pilot district selected for the baseline survey to determine changes before and after the pilot, including ITN ownership and use. A process evaluation for the pilot in mid-2015 helped identify lessons learned. And, finally a Mazowe end-line survey in June-July 2016 will show if universal coverage was well maintained in Mazowe and determine how ITN use has changed over the past year.

Progress during the last 12-18 months

During the past 12 months, NMCP has focused on maintaining the pilot routine ITN distribution, conducting the 2016 MIS, planning vector control and ITN coverage for the future, and mobilizing for the 2016 ITN campaign.

Plans are underway for the routine distribution end-line survey in Mazowe District including an internal and an external partner with specific ITN expertise. The survey and report writing will occur in June-July 2016.

The MIS questions on ITNs were scrutinized by in-country and outside experts and crafted to gather information as accurately as possible on ITN ownership, ITN quantity of ownership within the household to reveal household access, shape and color experience and preference, ITN use, and any barriers to use, motivation to use, etc. These experts also gave advice on precise wording on some questions from the standard MIS questions and looked at the compatibility of questions from the 2012 MIS. An MIS technical working group weighed the pros and cons on this issue and reached a consensus to add some new questions, and retain some old questions so they are compatible.

NMCP also held several partner discussions over the past 12 months to discuss the future direction of the malaria program now that the NMSP is coming to an end. Specifically, there was a Malaria Program Review in early 2016, led by WHO, to review the program accomplishments and update NMCP program goals, including vector control goals. The Malaria Program Review's overall main finding is that going forward Zimbabwe NMCP must not take a one-size-fits-all approach. Instead, NMCP must tailor interventions based on the specific local context and malaria data therein. Based upon this finding, WHO recommended five program phases, categorizing areas of the country based on annual parasite incidence (API). NMCP is considering adoption of these API phases and will continue to refine their vector control and ITN policy based upon this decision and changes in malaria epidemiology.

As anticipated, the NMCP and partners also began to plan for the upcoming ITN mass campaign in June-July 2016. This planning began with a sensitization meeting with national and provincial level partners, followed by a cascade of planning meetings down to the ward level. Three implementing partners will manage the ITN distribution in 576 wards with more details outlined in Table 8 below. As described in the SBCC section, an accompanying SBCC campaign will also take place to generate information, interest and enthusiasm around the ITN campaign.

Table 8: Zimbabwe NMCP 2016 ITN Campaign Distribution Plan

Province	District	Number of Wards Receiving	Estimated population	Estimated Number ITNs
Mashonaland East	UMP	0	0	0
	Murewa	19	109,025	60,569
	Mudzi	0	0	0
	Mutoko	10	53,257	29,587
	Goromonzi	21	137,068	76,149
Mashonaland Central	Bindura	7	88,802	49,334
	Centenary	6	40379	22433
	Guruve	9	155289	86271
	Rushinga	8	27,219	15,122
	Mbire	0	0	0
	Mt. Darwin	19	134,451	74,695
	Shamva	11	49,762	27,646
	Mazowe	19	136,491	75,828
Matebeleland North	Hwange	0	14,061	7,812
	Binga	0	36,397	20,221
	Nkayi	13	9,164	5,091
	Lupane	0	0	0
	Tsholotsho	9	63,522	35,290
	Bubi	5	16,604	9,224
	Umguzu	9	56,673	31,485
Matebeleland South	Bulilima	18	100,123	55,624
	Mangwe	32	98587	54,771
	Matobo	25	105,858	58,810
	Gwanda	15	81,587	45,326
	Beit Bridge	5	0	0
Midlands	Gokwe North	8	45,509	25,283
	Gokwe South	15	51,947	28,860
	Kwekwe	15	90,281	50,156
	Mberengwa	23	46,328	25,738
Mashonaland West	Chegutu	19	105,437	58,576
	Hurungwe	13	159,191	88,440
	Kariba	0	0	0
	Makonde	6	46,138	25,632
	Mhondoro Ngezi	8	72,477	40,265
	Sanyati	0	0	0
	Zvimba	23	179,747	99,859
Manicaland	Buhera	21	115,036	63,909
	Chimanimani	12	48,410	26894
	Chipinge	24	148,003	82,224

	Makoni	31	184,887	102,715
	Mutare	12	103,024	57,236
	Mutasa	5	50,685	28,158
	Nyanga	9	24841	13,801
Masvingo	Bikita	18	105,498	58,610
	Chiredzi	5	94,728	52,626
	Masvingo	27	183,519	101,955
	Mwenezi	2	14,889	8,272
	Zaka	20	170,296	94,609
Total		576	3,555,190	1,975,105

The campaign will, as usual, be a fixed point distribution method primarily utilizing health facilities as fixed points. All partners will conduct a pre-campaign household survey of distribution areas to determine ITN needs considering number and age of ITN in the households and sleeping spaces indoors and outdoors.

The routine distribution pilot will be wrapped up, and best practices will be scaled up to additional districts in 2017, after the ITN campaign is completed. The expanded continuous distribution will provide an ongoing opportunity for all Zimbabweans in need to have access to new and replacement ITNs routinely – for pregnant women, at ANC clinics, children under five at EPI clinics, and to all community members via the VHW community networks. Distribution in schools to third and sixth graders, as was done in the pilot, may be included, as necessary.

PMI/Zimbabwe will continue to work with the NMCP and partners to further refine and distill a vector control policy with an optimal role for ITNs. These discussions will also include the value of creating a multi-year vector control strategy.

PMI/Zimbabwe will work closely with the PMI Vector Control Working Group and the NMCP/Zimbabwe to transition from conical to rectangular ITNs in 2017. The transition will include close attention to any necessary changes in logistics to support hanging ITNs and ITN demonstrations as well as information, education, and communication and SBCC. Although for the past five years PMI and GF have supported purchasing conical ITNs in Zimbabwe at the request of the NMCP, both donors have informed the NMCP that malaria funds can be stretched further by choosing less expensive rectangular ITNs. The PMI/Zimbabwe team has had ongoing discussions with the NMCP about the lower cost of rectangular ITNs compared to conical ITNs and new, related PMI policies. The Zimbabwe MIS preliminary data is anticipated to be available around September/October 2016. PMI expects data collected on ITN shape and color preference to be useful and interesting, but not to be a single indication on which to base a purchasing decision given the cost implications.

Commodity gap analysis

Table 9: ITN Gap Analysis

Calendar Year	2016	2017	2018
Total Population	13,645,486	13,795,586	13,947,338
Total Targeted Population	3,555,190	3,626,293	3,698,819
Continuous Distribution Needs*			
Channel #1: ANC	0	249,050	251,790
Channel #2: EPI	0	228,296	230,807
Channel #3: 3rd and 6th Graders	0	0	0
Channel #4: Community	0	1,093,151	1,104,083
<i>Estimated Total Need for Continuous</i>	0	1,570,497	1,586,680
Mass Distribution Needs			
2016-2017 mass distribution campaign	1,975,505	0	0
<i>Estimated Total Need for Campaigns</i>	1,975,505	0	0
Total Calculated Need:	1,975,505	1,570,497	1,586,680
Continuous and Campaign			
Partner Contributions			
ITNs carried over from previous year	203,000	0	0
ITNs from Government	0	0	0
ITNs from Global Fund Malaria Grant	847,085	TBD (300,000 requested in costed-grant extension to be submitted 3 rd quarter of 2016)	TBD (New Global Fund grant application expected to be awarded)
ITNs from Other Donors	0	0	0

ITNs planned with PMI funding	735,000	715,043	811,675
Total ITNs Available	1,785,085	715,043	811,675

Plans and justification

Table 9 shows that some additional resources will be needed for 2016 onwards as the country moves forward with a 2016 ITN campaign and 2017-2018 expansion of a continuous distribution pilot to maintain universal coverage. As mentioned above, PMI has procured 735,000 ITNs intended for the campaign in 2016 and has an additional 203,000 in storage left over from the routine distribution pilot which just ended in June 2016. With the Global Fund grant, the NMCP has 847,085 ITNs for the campaign, making a total of 1,785,085 available.

Partners with smaller resources may be able to make up the modest gap of 190,420 ITNs in 2016. The NMCP is discussing implementing a ‘mop-up’ to the 2016 campaign in 2017 so all areas could be fully covered. The NMCP Global Fund grant ends in mid-2017 and staff are now preparing an extension, with costs, to cover the last six month period of 2016. The application includes a budget for ITN procurement. Therefore, additional ITNs should be available for a 2017 mop-up if the Global Fund grant extension proposal is successful. Thereafter, the NMCP/Zimbabwe plans to apply for a new three-year Global Fund grant that will take the program through 2020 and their new Malaria Strategic Plan covering all major technical areas (including ITNs).

PMI will support the NMCP and partners in planning for the routine distribution expansion in 2017. After the NMCP Global Fund grant extension and next grant ITN amounts are determined, PMI/Zimbabwe will reprogram MOP 2017 to add ITNs, as necessary. The PMI/Zimbabwe MOP team has discussed the need to maximize ITNs in Zimbabwe via routine distribution roll-out, especially at ANC and EPI outlets. Community outlets will be included since it was shown to be the most successful outlet within the routine distribution pilot.

PMI will support the prospective durability monitoring of a cohort of ITNs that were distributed through the large-scale school-based distribution in 2015. The school outlet distribution was similar to a mini-campaign and the four pilot areas covered different types of environments in Zimbabwe. Surveys of household respondents and assessment of net integrity and insecticidal activity will be conducted at 6, 12, 24, and 36 months post-distribution to determine the ITN performance under Zimbabwe field conditions. The findings of this will be used to guide the country-specific ITN replacement rate and to refine communications efforts designed to improve net use and care within households.

Major activities related to ITNs in the coming years include:

1. Continue PMI, NMCP, and partner discussions to refine the overall vector control policy for 2017 and 2018.
2. Conduct a mop-up ITN campaign in 2017 to complete any gaps from 2016.
3. Review and discuss the findings of the Mazowe continuous distribution end line survey.
4. Procure 811,675 rectangular ITNs for expansion of routine distribution to all ITN-designated

areas.

5. Review and discuss 2016 MIS findings related to ITNs.

These activities and others over the past five years described above, indicate a turning point for Zimbabwe ITN deployment integrated with IRS. June-July 2016 will mark the second ITN major, nationwide campaign for Zimbabwe. As ITN policies become more entrenched within the program in 2017, the routine distribution system will be there to ensure ongoing coverage in ITN designated areas in-between future campaigns. PMI will continue to engage the NMCP and partners in a dialogue about ITNs and their vital place in protecting Zimbabweans against malaria.

Proposed activities with FY 2017 funding: (\$3,162,623)

PMI will continue to fill strategic gaps in ITN procurement not covered by the Global Fund and the GoZ. Using FY 2017 funding, PMI will support procurement of rectangular ITNs as well as distribution costs for the ongoing continuous distribution approach designed to ensure high coverage of new cohorts of pregnant women and children, and to replace worn out ITNs distributed through previous campaigns to all Zimbabweans that need ITN protection. Specific activities to be supported by PMI with FY 2017 funding include:

- *Procure rectangular ITNs for expansion of routine distribution:* Procure approximately 811,675 ITNs with MOP FY 2017 funds for routine distribution. The routine distribution will include at least three distribution channels – ANC, EPI, and community. (\$2,337,623)
- *Planning, distribution and monitoring of ITNs:* PMI will provide support to the NMCP in logistics and operations to strengthen ITN distribution systems including supply chain management to ensure continuous availability of ITNs and to strengthen the distribution systems capacity for efficient delivery of ITNs to end users. (\$700,000)
- *Conduct ITN durability monitoring:* Continue prospective monitoring of the performance and durability of ITNs distributed during a large-scale school-based distribution in 2015. This will be the 36 month post-distribution assessment. (\$100,000)
- *Technical Assistance Vector Control Strategic Planning:* PMI will seek outside expertise for expansion of the routine distribution to ensure all aspects of support systems are well-implemented and a robust monitoring system in place. In addition, outside expertise will assist the Zimbabwe NMCP and partners with ongoing refinement of IRS and ITN balance policy in Zimbabwe based upon the epidemiological context in-country. (\$25,000)
- *Conduct SBCC activities to promote the use of ITNs:* Using both mass media, interpersonal communication via VHWs, sensitization meetings, informational posters, community road shows (including dramas, singing, and logistical campaign information), community malaria wall signs and *Combi* (mini bus) branding activities will focus on increasing ITN use among those who have access to a net by addressing relevant action elements and by improving understanding of how durable nets are and how to best maintain them to maximize their durability and effectiveness (*budgeted under SBCC section*).

3. Indoor residual spraying

Progress since PMI was launched

Due to the NMCP's experience and capabilities to conduct IRS, from 2012–2013 PMI provided a limited package of IRS support, stressing environmental compliance, and contributing to planning meetings, trainings, monitoring and evaluation, operational logistics, and some procurement of insecticides and equipment in pyrethroid districts. This enabled PMI to fill the operational gaps in the NMCP's IRS program and establish a robust insecticide resistance management system.

PMI began support for IRS activities in Zimbabwe in 2012 by conducting a Supplemental Environmental Assessment to ensure IRS activities would not adversely impact the environment, people, or bio-diversity in the country. The GoZ and the NMCP were not interested in PMI's initial goal of completing a Supplemental Environmental Assessment that would include DDT districts; therefore, PMI support was limited to districts which do not spray DDT.

In the 2014 spraying season, PMI supported the NMCP with a full package to conduct IRS using OPs in four districts of the areas with highest pyrethroid resistance in Manicaland Province. The remaining districts were sprayed by NMCP with either a pyrethroid or DDT. In 2015, the number of districts that were covered with OPs increased to 18 and PMI continued its support to the four high burdened districts in Manicaland. The goal was to create a protected barrier along the lengthy Zimbabwe-Mozambique border. Areas showing little to no pyrethroid resistance continued to be sprayed using a mix of pyrethroids or DDT. In the 2016 spraying season, the choice of insecticides for given locations is going to be the same as for 2015. Table 10 shows the historical and projected IRS plans for Zimbabwe. Indoor residual spraying in Zimbabwe is generally focal/targeted coverage in selected districts yet PMI supports blanket spraying. However, PMI policy and approaches are being embraced and incorporated into district/provincial plans on a yearly basis. As the NMCP starts writing their new strategic plan towards the end of 2016, we fully expect that PMI' approach will be incorporated within.

Table 10: PMI-supported IRS Activities 2012 – 2018

Calendar Year	Number of Districts ¹ Sprayed	Insecticide Used	Number of Structures Sprayed	Coverage Rate	Population Protected
2012	13 (3 provinces)	Pyrethroid	501,613	86%	1,164,586
2013	25 (7 provinces)	Pyrethroid	622,300	91%	1,431,643
2014	4 (1 province)	Organophosphates	147,949	90%	334,746
2015	4 (1 province)	Organophosphates	162,127	94%	365,425
2016 [*]	4 (1 province)	Organophosphates	171,736	-	375,324
2017 [*]	4 (1 province)	Organophosphates	171,736	-	375,324
2018 [*]	4 (1 province)	Organophosphates	171,736	-	375,324

¹Or equivalent geographic divisions.

^{*}Represents targets based on the 2016 IRS work plan and/or projected targets based on national strategic plan and/or discussions with the NMCP.

Progress during the last 12-18 months

In November-December 2014, PMI conducted its first full IRS campaign in four selected high burden malaria districts in Manicaland Province. The key objective was to demonstrate best practices for IRS programming and implementation by covering at least 85% of eligible structures in four districts and increasing capacity in IRS at the district, provincial, and national level.

A total of 147,949 structures were sprayed, achieving 90.3% coverage and protecting 334,746 people. With PMI support, 332 spray operators and support staff were trained in spray operations, 70 persons were trained in IRS data collection and quality assurance, 29 persons were trained in commodity securing including stock management, 29 others were also trained in information, education, and communication training of trainers to equip them with skills to enhance uptake of IRS by communities. An additional 317 persons underwent medical check-ups to assess their fitness to enroll as spray operators. The conclusion of the 2014 IRS season was characterized by a remarkable decline in annual malaria incidence from 39 per 1000 population in 2014 to 29 per 1000 population in 2015. The greatest impact was witnessed in the four PMI-supported districts that had received OPs for the 2015 peak malaria period, on average, the incidence rate of test positive malaria cases was 38 percent of what it was in the same period in 2014 yet in the comparative provinces the 2015 peak malaria season registered about 59 percent of the same period of 2014.

Convinced that OPs were greatly impacting malaria control, the NMCP increased to 18 the number of districts to be covered with OPs in the 2015 spraying campaign. Hence, in October –November 2015, PMI conducted its second full IRS campaign in the same four Manicaland districts that were covered in 2014 and NMCP covered the rest with OPs, DDT, or pyrethroids. A total of 162,127 structures were

sprayed, achieving 94% coverage and 365,425 people were protected. In addition, 332 persons were trained to deliver IRS, 383 underwent medical fitness test for IRS, and 12,639 community people were reached through sensitization meetings for IRS in hard-to-reach areas.

Plans and justification

PMI will continue to concentrate on a robust, full package of IRS implementation in the highest burden province of Manicaland. Unless otherwise requested by the NMCP to refocus PMI support to other districts to achieve greater impact, this will be the fourth year PMI will support a full IRS package in this area. The USG restrictions on directly funding the GoZ, along with an approved Supplemental Environmental Assessment which only covers non-DDT districts, has restricted PMI's ability to respond to most of the critical IRS needs for the entire country. However, a goal of PMI's support in the districts Manicaland is to demonstrate a safe and effective IRS program that other districts in Zimbabwe can learn from. This commitment on the part of PMI is understood to be short-term, to be revisited in the near future. PMI's contributions to environmental compliance and other cross-cutting efforts, such as entomological monitoring, including insecticide susceptibility monitoring, SM&E, and SBCC, will continue nationwide. However, operational support (training, procurement, etc.) will be limited to Manicaland.

Proposed activities with FY 2017 funding: (\$4,563,687)

PMI will continue supporting IRS needs and will work with the NMCP to identify priority districts based on the most recent entomological and epidemiological data. The support will continue to demonstrate good IRS implementation practices that other districts can learn from. The current Global Fund New Funding Model ends in June 2017. It is therefore anticipated that there will be an extension or call for a new grant that the NMCP will secure to cover the rest of the districts that are earmarked for IRS. While the non-Manicaland districts will not receive direct PMI support for operations, they will receive indirect support via inclusion in national level IRS activities, such as, higher-level training, national review and planning meetings, and technical assistance with good environmental compliance practices, SBCC, and SM&E.

Specific activities to be supported by PMI with FY 2017 funding include:

- *Support spray operations:* PMI will support IRS in districts selected based on the most recent entomological and epidemiological data available. The support will include procurement of insecticide and equipment, training, operational logistics, environmental compliance, and overall technical assistance to the NMCP. With FY 2017 funding we anticipate spraying 171,736 structures and protecting 375,324 persons in the targeted districts. (\$4,533,687)
- *Environmental Compliance Inspection:* PMI will provide one technical assistance visit to support USAID Global Environmental Management Support III project to externally evaluate the environmental compliance and environmental management plans associated with the IRS project shall be funded. (\$30,000)

2. Malaria in pregnancy

NMCP/PMI objectives

Control of MIP was adopted as a policy in Zimbabwe in 2004 to be implemented in the "moderate" to "high" burden malaria transmission areas, with 30 districts designated for MIP interventions (Figure 3). Additionally, IPTp may be used in specific, localized areas in the medium to low burden districts adjacent to high burden districts where there is focal transmission of malaria. For example, senior health officials may note increased malaria cases and request IPTp to protect patients. Also, a woman from a high burden district may seek ANC services in a nearby lower burden area. While SP will be delivered to the facility, its consumption at the facility will be monitored by pharmacy staff to note usage and drugs nearing expiry to ideally request additional medicine or redistribution to another facility. If SP is not consumed, it will not be restocked. The MIP policy was a three-pronged approach that recommended IPTp with up to three doses of SP as the drug of choice, usually given at the first and second ANC visits, distribution and promotion of use of ITNs as early as possible during pregnancy, and early and effective diagnosis and treatment of clinical malaria. Based on that policy, the NMSP target for the proportion of pregnant women who will receive at least two doses of IPTp and sleep under an ITN is 85% or greater.

In 2014, the NMCP adopted the latest WHO guidelines for IPTp, which recommend administration of IPTp with SP at every ANC visit starting as early as possible in the second trimester and up until the day of delivery, as long as doses are given at least four weeks apart. Adoption of the WHO guidelines will simplify the implementation of IPTp for health workers and likely increase the uptake of IPTp. Each dose of SP is to be administered under a health worker's observation. The policy states that pregnant women on co-trimoxazole prophylaxis or with an allergy to sulfa medications should not be administered IPTp. Additionally, with the piloting of continuous ITN distribution in four districts in 2014, ANC is an outlet and pregnant women should receive a net at their first booking. The use of ITNs and effective clinical management are unchanged MIP approaches in the updated policy. A new indicator for IPTp use, likely the proportion of pregnant women who will receive at least three doses of SP, will be identified in the upcoming national strategic plan to be drafted starting in late 2016.

According to the national guidelines, iron and folate should be routinely given to all pregnant women at ANC starting with their first visit or 12 weeks gestation, whichever is earlier. The doses are elemental iron 60 mg and folic acid 0.4 mg, prescribed as one co-formulated tablet daily. In the past, there were problems with stockouts, but these drugs are now included in the primary care packages.

ANC attendance in Zimbabwe is very high, with 90% of pregnant women visiting an ANC clinic at least once during pregnancy, 66% visiting an ANC clinic four or more times, and 72% of pregnant women delivering at a health facility (2015 DHS). The 2012 MIS showed that 48% of pregnant women attending an ANC clinic in the 30 target IPTp districts received at least one dose of SP and 35% received two or more doses of the medicine. Data on IPTp coverage from a 2015 NMCP Case Management Audit are estimates based on information from ANC clinic records for 634 pregnant women who had delivered at 26 health institutions in four rural provinces. Out of the 550 (86.8%) women who received SP for IPTp, 74 (11.7%) received only a single dose, 327 (51.6%) received two doses, 138 (21.8%) received three doses and 11 (1.7%) received four doses. Out of the 84 (13.2%) women who did not receive any dose of SP, 48 (57.1%) were on co-trimoxazole prophylaxis, 12 (14.3%) were not booked and 24 (28.6%) did not receive due to unavailability of SP at the health institutions. All women who received IPTp had the correct doses of SP that were directly observed when

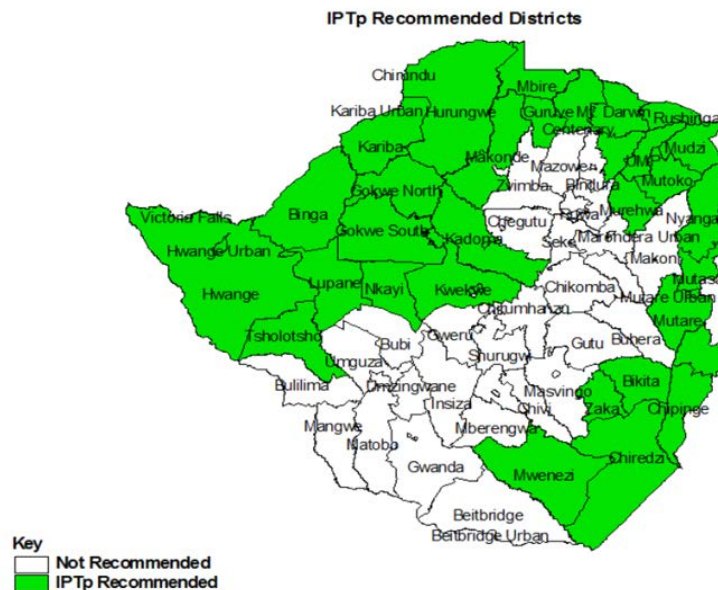
administered. The average gestational age at booking for the women was 20.8 weeks. The NMCP staff have noted that some health workers were not correctly documenting when and which dose of IPTp was given, making it more difficult to monitor IPTp coverage using routine surveillance data as compared to audit data. Consequently, correct documentation of IPTp is being included in health worker training. These data indicate that the target for IPTp uptake is not being met, women do not present early in pregnancy, and SP stockouts are seen in some facilities.

Sleeping under an ITN is part of the MIP strategy, and among women of child-bearing age (15-49 years), 49% slept under an ITN the night preceding the survey according to the 2012 MIS. This proportion is below the national target of 85%. Data from the 2015 DHS and 2016 MIS should provide needed information to monitor progress toward MIP targets and assess MIP prevention and treatment-seeking practices among pregnant women.

To improve the prevention of MIP and the use of ANC and IPTp, NMCP uses VHWs to educate women at the community level. This strategy supplements facility-based patient education and care services and SBCC efforts. Even though VHWs do not give IPTp in the communities, they do advise pregnant women on MIP and encourage early ANC visits, uptake of IPTp, timely presentation at ANC, and consistent use of ITNs. Village health workers also evaluate pregnant women for malaria and test with RDTs and treat those who are positive unless they have signs and symptoms of severe disease or have not felt fetal movement. In these cases, the VHW refers the woman to the nearest health facility.

The recommended treatment of uncomplicated malaria in pregnant women is oral quinine plus oral clindamycin during the first trimester. However, the NMCP has had difficulty finding funding to procure clindamycin, so it is unavailable. If quinine is also unavailable, the recommendation is to use artemether-lumefantrine (AL), which is the first-line ACT for uncomplicated malaria in non-pregnant people. Women in subsequent trimesters are to be treated with AL. With the recent adoption of a second-line ACT, patients in any trimester of pregnancy who do not respond or have side effects to the first-line treatment should be treated with the second-line treatment, which is artesunate-amodiaquine (AS/AQ).

Figure 3: Map of IPTp recommended districts, 2014, Zimbabwe



If a woman develops severe malaria during her first trimester, current policy is to treat her with intravenous quinine until she is able to take oral medicines. At that time, she is to be given oral quinine plus clindamycin to complete a seven day course of treatment for both medicines. If the woman is in her

second or third trimester, she is to be given intravenous artesunate initially. Once improvement is noted and she is able to tolerate oral medications, she should be switched to oral AL, to complete a three-day course with this medicine.

Coordination with maternal/reproductive health programs has been on an *ad hoc* basis since a formal joint meeting was held in 2011. With the change in case management guidelines, efforts are being made to increase this coordination.

Progress since PMI was launched

Annually, PMI has supported the forecasted needs for SP and to date has procured and distributed approximately 2.1 million SP treatments. The SP and primary care packages are delivered through the ZIPS, which has helped improve problems with stockouts. Additionally, PMI has supported both facility-based and VHW training and supportive supervision for malaria case management and MCCM, respectively, including prevention, IPTp, and treatment of MIP. The VHWs first receive training in iCCM and maternal and child health (MCH) that is supported by non-USG partners. They then receive PMI-supported MCCM training which includes assessment and case management of children and adults, testing with RDTs, treatment and referral, MIP prevention and management, and community health information management. During FY 2012-2014, PMI supported the training of 1,683 facility-based health workers in MIP prevention and management. PMI has to date focused its support for VHWs in Manicaland Province and has trained 1,764 of the most current (April 2015) estimate of 2,130 (83%) them. Global Fund has also supported VHW training of all 7,348 nationwide. However, given attrition and recruitment of new VHWs as the VHW program grows, there will be a continuous need for training and there is a known training gap, with not all VHWs having been educated in MCCM and MIP.

Manicaland Province health officials conducted a training gap analysis in 2014 and identified the need for 1,200 of 1,768 VHWs to be trained. In 2014, PMI trained 47 VHW trainers, 1,464 VHWs, 196 nurse aides and 51 SHCs in MCCM, including a module on MIP. While all of the training targets were met or exceeded, based on a 2014 staff gap analysis done for that province, the training done fills only a portion of the gap at 58% (196/337) for the 448 nurse aides and 13% (130/993) for the 993 SHCs, but exceeded the gap for VHWs. There was no pre-identified gap for VHW trainers, which are a new cadre. Consistent with the objective to support supervision, 20 VHWs were oriented to conduct supportive supervision visits to other VHWs.

There has been slight improvement in MIP indicators, with a 2013 case management audit showing 61% and 2014 Health Management Information System (HMIS) data indicating 66% of pregnant women in the IPTp targeted areas took at least two doses of SP. A 2013 PMI-supported Tracking Results Continually (TraC) Survey reported 68% of pregnant women slept under an ITN the night before the survey. The 2015 Case Management Audit showed that approximately 75% of women received at least two doses of IPTp, an encouraging improvement but still below the NMSP target of 85%. Data on IPTp coverage is expected from the 2016 MIS, which used a sampling frame designed to include all malarious districts including all those designated to receive IPTp. These data are expected to be more informative for decision making than the 2015 DHS because the latter includes sampling in non IPTp-designated areas.

Progress during the last 12-18 months

PMI continues to support pharmaceutical and supply chain management (PSM) through ZIPS and

ZAPS. The systems distribute SP, iron, and folate in the primary care packages and other commodities for diagnosis and treatment of malaria. While these distribution systems have helped alleviate shortages, stockouts still remain. One challenge is lack of timely and accurate stock management to allow for redistribution of SP, primarily from facilities that have not used their stock, to a higher burdened location. Additionally, delays in deliveries from manufacturers impacted SP distribution. In 2015, approximately 925,000 treatments were procured and distributed. There has been a decline in cases since 2014 nationwide and in some districts along with the roll out of vector control efforts that are expected to likely decrease the geographic area at risk and the number of women needing IPTp.

PMI has supported facility-based health workers and VHWs training on the revised IPTp and malaria case management guidelines. Facility-based workers began receiving training in prevention and management of MIP as part of their malaria case management training (more information in case management section). PMI trained 191 of 240 targeted workers. These activities supplemented the NMCP's training of 8,862 of 9,870 workers, of which 35% of the activities were supported using Global Fund resources. Those VHWs previously trained were updated on the new policy and others received the information for the first time. In 2015, 1,459 were trained and it is anticipated that by the end of 2016, 1,764 of 2,130 (83%) VHWs in Manicaland will have been trained with the updated MCCM, with some having also received refresher training. VHW peer supervisors have been trained and 40 have had refresher training. An additional 79 SHCs, out of a target of 150, have also been trained. Based on the 2014 analysis, the entire group of 993 needed training, and to date 280 of the now 1,261 (22%) SHCs have been trained in MCCM training. The NMCP is working to have similar job aids disseminated to both general clinics and ANC areas; some deliverables have been finalized and distributed.

While progress is being made with respect to worker training and supervision, further work needs to be done to develop updated data collection tools to capture the doses of IPTp taken by women. Also, job aids, developed with input from reproductive health staff, need to be drafted and distributed by the NMCP and reproductive health leaders in both ANC and primary care clinics.

With \$150,000 of FY 2015 and FY 2016 money, PMI will conduct a rapid assessment to quantify MIP and identify key facilitators and barriers to IPTp uptake and ways to strengthen coordination between the NMCP and Reproductive Health stakeholders. The results of this work will help with the design of future activities such as the development and delivery of SBCC messages to increase demand for and provision of IPTp and other preventive measures.

PMI's activities will also include using \$300,000 allocated for M&E activities that will support, among other things, the revision of data collection tools and reporting on the number of IPTp doses taken by women. The revision of tools will be discussed with stakeholders working in other disease sectors to strive for an integrated, efficient approach and product. Additionally, an updated indicator for IPTp uptake, reflective of the revised policy, will be discussed for adoption with stakeholders, especially as the NMSP and M&E plans are nearing time for revision.

Table 11: Status of IPTp policy in Zimbabwe

WHO policy updated to reflect 2012 guidance	2014
Status of training on updated IPTp policy	In progress
Number of health care workers trained on new policy in the last year	9053
Are the revised guidelines available at the facility level?	In progress
ANC registers updated to capture 3 doses of IPTp-SP?	No
HMIS/DHIS updated to capture 3 doses of IPTp-SP?	No

Commodity gap analysis

Table 12: SP Gap Analysis for Malaria in Pregnancy

Calendar Year	2016	2017	2018
Total Population	13,645,486	13,795,586	13,947,338
Total Population in malaria endemic areas	6,842,796	6,918,067	6,994,165
SP Needs			
Total number of pregnant women	273,712	276,723	279,767
Number of women that receive IPTp 1	246,341	249,050	251,790
Number of women that receive IPTp 2	224,444	226,913	229,409
Number of women that receive IPTp 3	202,547	204,775	207,027
Number of women that receive IPTp 4	177,913	179,870	181,848
Total SP Need (in treatments)	851,244	860,608	870,074
Partner Contributions			
SP carried over from previous year	449,902	0	68,358
SP from Government	0	0	TBD
SP from Global Fund	48,900	128,966	TBD
SP from Other Donors	0	0	0
SP planned with PMI funding	142,850	800,000	870,000
Total SP Available	641,652	928,966	938,358
Total SP Surplus (Gap)	(209,592)	68,358	68,284

Pregnant women are assumed to be approximately 4% total population. For quantification, the assumption is that 50% of pregnancies will occur in malarious areas and consumption data are used.

Plans and justification

With FY 2017 funds, PMI will procure 870,000 treatments of SP. PMI will also procure clindamycin for treatment of uncomplicated malaria in women who are diagnosed during their first trimester. This number is expected to be small, approximately 0.18% of all cases nationwide or approximately 306. A facility-based distribution approach will be used with 100 tablet bottles of 150 mg doses being distributed to clinics and hospitals, with more to those in malaria endemic areas than to those in nonendemic areas. PMI plans to procure 1400 bottles or 3,333 treatments. Usage will be monitored through clinical audits and end-use verification (EUV) surveys to identify dispensing to first trimester pregnant women.

Additionally, PMI will also continue to provide support to the MIP implementing districts for the training and supportive supervision of district, health facility, and community level staff on the revised IPTp and MIP implementation guidelines. This training is part of comprehensive maternal health care delivery training which aims to improve the uptake of IPTp by improving demand for ANC services. Other MIP topics covered by the training will include ITN promotion and treatment of malaria for pregnant women as well as data recording and reporting. This training and supportive supervision support will benefit health center nurses and ANC nurses in the district hospitals and will instruct them that HIV-positive women on regular cotrimoxazole do not need IPTp with SP. As part of the integrated iCCM/MCH/MCCM activities, nurse aides and VHWs will increase their knowledge of new practice guidelines as well including messaging to guide pregnant women to follow the current WHO recommended IPTp with SP dosing schedule, use ITNs during pregnancy, and seek early diagnosis and treatment of suspected malaria or febrile illness. Although a final target has not been set, it is anticipated that approximately 600 VHWs will be targeted to receive initial training and 1,400 VHWs will receive updated training to meet approximately 100% of the expected growth in this cadre in Manicaland Province representing about a third of VHWs nationwide.

The NMCP will also use Global Fund resources to train facility-based workers and possibly VHWs. Case management audits, PSM consumption and health facility utilization data, supervisory visit reports, plus data from the 2016 MIS will be used to monitor success. PMI will also provide technical assistance to the NMCP to improve the forecasting and distribution of SP to the target health facilities to ensure a stable supply anticipated to be procured by the NMCP and other donors.

As part of PMI's support for malaria SBCC activities, PMI will promote the use of data from the assessment of barriers and facilitators to IPTp uptake and other evidence to guide the development of SBCC plans for prevention of MIP and knowledge of and adherence to updated treatment guidelines for cases of malaria in pregnant women.

PMI will engage with the NMCP regarding opportunities to update facility records, registers, and HMIS to capture the total number of doses of SP given to women.

Proposed activities with FY 2017 funding: (\$172,000)

- *Procure SP:* PMI will procure 870,000 SP treatments at \$.18 per treatment. (*\$156,600*)
- *Procure clindamycin:* PMI will procure 3,333 clindamycin treatments at \$4.62 per treatment for treating uncomplicated malaria in first trimester pregnant women. (*\$15,400*)
- *Facilitate facility-based health worker training and supervision in MIP:* PMI will support the training of health workers in the revised IPTp and implementation guidelines. ITN(*Costs included in case management: diagnosis and treatment section.*)
- *Assess, train and supervise VHWs:* PMI will support MCCM including training on MIP. (*Costs included in case management: diagnosis and treatment section.*)
- *Support for MIP SBCC activities:* PMI will support activities focusing on community sensitization, improved IPTp uptake, and other preventive measures such as the use of ITNs during pregnancy. (*Costs included in SBCC section.*)

3. Case management

Diagnosis and treatment

NMCP/PMI objectives

In 2004, Zimbabwe adopted oral AL as its first-line treatment for uncomplicated malaria. In 2014, the country revised its treatment guidelines and adopted oral AS/AQ as its second-line treatment for uncomplicated malaria; oral quinine with a second drug was listed as an alternative second-line treatment, and for pregnant women in the first trimester. Consistent with the most recent WHO treatment guidelines, Zimbabwe adopted intravenous artesunate as the first-line option for severe malaria. Oral and parenteral quinine have been maintained to co-administer with a second drug for first trimester pregnant women, children less than 5 kg, and in the case of stockouts of artesunate. Rectal artesunate suppository (RAS) use for pre-referral treatment of severe malaria at the community level was incorporated in the 2015 Guidelines for Management of Malaria in Zimbabwe. These guidelines recommend pre-referral RAS for all age groups; a difference from the WHO Guidelines for the Treatment of Malaria (2015), which recommends RAS only for those under 6 years old.

The 2015 Guidelines for Management of Malaria in Zimbabwe emphasize the importance of a parasitological diagnosis over a clinical diagnosis of malaria, further supporting the NMCP's 2009 recommendation of administering antimalarial medicines only after a parasitological diagnosis. While microscopy is recognized as the gold standard for confirming a parasitological diagnosis of malaria in the country, RDTs are endorsed for VHWs, rural clinics, district hospitals, provincial hospitals, emergency departments in central hospitals, and private health institutions (including in emergency departments). Monospecies (*P. falciparum*) RDTs have been used in most of the country, with multispecies RDTs used in the pre-elimination areas. Multispecies RDTs will be procured by Global Fund, and possibly GoZ, for use in these areas.

Zimbabwe has 6 central hospitals, 8 provincial hospitals, and 68 district hospitals, 4 of which are situated in urban areas; all of these facilities have laboratories. Zimbabwe has three main cadres of facility-based laboratory staff: clinical scientists with a masters or doctorate-level degree, general laboratory scientists with a bachelor's degree from a university, and state certified laboratory technicians who receive two years of training post-high school at the polytechnic level and hospital training institutions. A professional registry, the Medical Laboratory and Clinical Scientist Council, accredits personnel before they can practice.

There is a quality control and quality assurance system for both laboratory and pharmaceutical supplies. Commodities are procured by the GoZ and donors, which are then pooled and distributed by the National Pharmaceutical Company. Both case and stock management data are reported from the facility to the national level. The RDTs procured by PMI are lot tested before shipment to Zimbabwe. In country, the National Medical Reference Laboratory lot tests all RDTs before they are distributed to public sector facilities.

Progress since PMI was launched

PMI has supported the procurement of malaria commodities, including RDTs and malaria medicines. To date, PMI has procured 8.9 million RDTs, 3.7 million ACTs, 120,000 quinine treatments, 32,400 RAS,

and 349,000 vials of injectable artesunate.

In addition to procurement of commodities, training of VHWs remains a main focus of PMI in Zimbabwe. Strategies include case management courses, supportive supervision (including by peers), and integrating iCCM and MCH care. In most areas, trained VHWs follow an algorithm to test all suspected cases with a malaria RDT and treat those with positive results with an ACT, except those < 5 kg, < six months old, pregnant women who have not felt fetal movement, or those with signs and symptoms of severe disease, whom they refer to a health facility. However, in pre-elimination areas, VHWs test suspected malaria cases (febrile or with recent history of fever) but refer them for evaluation at a health facility. The VHWs, which operate in all districts in Zimbabwe's malarious areas, are selected from their ward by the community and receive training in iCCM, which has a malaria component, as well as focused training in MCCM to deliver care in an integrated manner. Although VHWs are supposed to receive \$14 monthly for their services, this amount is rarely received. The primary health facility staff is responsible for supervising the VHWs and their data collection. PMI's initial strategy has been to focus on training VHWs in Manicaland, the province with the highest burden of malaria in the country. School health coordinators, who help form school health clubs to educate students about malaria prevention and treatment, also receive training in Manicaland as well as nurse aides.

An assessment in 2014 estimated that there were about 1,800 VHWs in Manicaland, each ideally serving one village of approximately 120 households. Based on 2012 census data, 3,417 VHWs are needed in this province to completely reach all villages. To date, PMI's support has been focused in Manicaland but in 2016, PMI plans to expand training to other provinces, such as, Mashonaland East, Mashonaland West, and Matabeleland North with their "moderate" and "high"-burden districts while maintaining proficiency through supportive supervision in areas already trained. It revealed that approximately 25,500 VHWs are needed nationwide in order to attain the coverage goal of one VHW for 120 households.

PMI-supported facility-based training has a broad geographical focus, with training occurring not just in Manicaland but in facilities serving "moderate" and "high"-burden areas throughout many provinces. There are an estimated 18,000 health care workers in the country (including some administrative staff), 12,000 of which are admitting hospital-based workers.

According to the NMCP, parasitological diagnosis of malaria has been fully rolled out to all health facilities. As required by policy, all malaria cases should be parasitologically confirmed. Health centers have mainly RDTs, but a few health centers also possess microscopy capability with trained microscopists who perform both TB and malaria microscopy. In facilities with both RDTs and microscopy, RDTs are mainly used in the outpatient department for testing suspected malaria cases prior to clinical evaluation. External quality assurance for malaria microscopy has been offered since 2011, although the number of participating laboratories has dropped over the last few years.

Training, supervision, and procurement efforts have contributed to increased parasitological confirmation of cases. Since 2005, the number of cases diagnosed clinically is decreasing whereas parasitological diagnosis is increasing. In 2005, only 8.5% of clinical cases seen in public health facilities were tested, while in 2015, the percentage had increased to 99.8%. An evaluation in 2015 showed VHWs in Manicaland tested 99% of suspected malaria cases with an RDT.

Between February and May 2014, a therapeutic efficacy study was conducted in four PMI-supported

sites (Dindi, Hauna, Nyamhunga, and Simatelele) with two additional sites supported by WHO. Preliminary polymerase chain reaction (PCR)-corrected data indicated 97.5% (391 out of 401 persons from six sites) of participants had adequate clinical and parasitological response to treatment using AL. Final PCR-corrected results remain pending.

Progress during the last 12-18 months

In FY 2015, 166,000 vials of artesunate for the treatment of severe malaria and 2.3 million RDTs were procured. No ACTs were procured in FY 2015, a decision supported by end-use verification (EUV) surveys in January 2016 which showed more than half of assessed facilities as being overstocked in all four formulations of the first-line ACT and nearly all other facilities with adequate supplies.

To decrease transmission in low transmission/pre-elimination areas, the country has introduced the use of low-dose primaquine for its gametocytocidal effect in infections, initially with robust pharmacovigilance. It is assumed that 15% of cases will need this medicine. The Global Fund has supported procurement of 53,000 tablets of primaquine, 15mg base, in 2015 and 46,000 tablets in 2016. These new policies have been incorporated into training manuals, training curricula and supervision checklists, and revised treatment guidelines.

PMI's in-country personnel contributed to the development of the Guidelines for Management of Malaria in Zimbabwe, which were released in June 2015. In addition to basic diagnosis and treatment guidance, the guidelines covered new topics such as: dosing of primaquine in pre-elimination areas, dosing of the second-line antimalarial (AS/AQ), and the pre-referral treatment of severe malaria at the community and primary health center level. PMI funding allowed for the creation of 10,000 copies of the guidelines. PMI distributed 50% of them to health care facilities and personnel throughout the country and provided the rest to the NMCP for future distribution.

The 2015 Guidelines for Management of Malaria in Zimbabwe were used to create an updated curriculum and training materials for VHWs. In Manicaland Province over the last 18 months, PMI and other funders supported the training of 1,931 VHWs in three-day courses on Malaria Case Management in the Community. These clinical case management courses cover taking a history, administering and interpreting an RDT, treatment with an ACT, and reasons to refer to a higher level of care. Included in this training is instruction on the use of pre-referral RAS and prevention of MIP and its messaging to give to the community members. Also in Manicaland over the same time period, approximately 60 SHCs and 60 nurse aides received initial malaria case management training. In 2015, over 7,200 health care workers, representing over 50% of those working in admitting hospitals throughout the country, received one-day training in the new case management guidelines, utilizing facilitator and trainee manuals printed and distributed by PMI. In 2015, 191 trainers (nearly 80% of the total goal) received case management instruction, with the expectation that they will provide cascade training to lower levels. The ultimate goal is to have at least three sets of trainers per province or 240 total to train other facility-based staff. The trainers may also be used to train VHWs.

Global Fund and PMI initiated post-training follow-up funding in 2015, with PMI focusing on districts in Manicaland. These supportive supervision visits occur quarterly and are conducted by health facility staff from the national, provincial, district and facility levels using a standard supervision tool. Deficiencies identified during visits prompt the drafting of a corrective action plan for the worker. The VHW program in Manicaland has started a peer-to-peer supervision program where high-achieving VHWs are identified and trained to be peer supervisors.

Availability of microscopy reagents and consumables has been a challenge, as there is no pooled procurement for such items under the NMCP budget. Recently, the number of facilities performing malaria microscopy was limited, reportedly due to stockouts of reagents.

Commodity gap analysis

Table 13: RDT Gap Analysis

Calendar Year	2016	2017	2018
RDT Needs			
Total country population	13,645,486	13,795,586	13,947,338
Population at risk for malaria	6,842,796	6,918,067	6,994,165
PMI-targeted at-risk population	6,842,796	6,918,067	6,994,165
Total number of projected fever cases	962,904	808,840	679,428
Percent of fever cases tested with an RDT	100%	100%	100%
Total RDT Needs	962,904	808,840	679,428
Partner Contributions			
RDTs carried over from previous year	2,402,551	3,665,547	4,792,407
RDTs from Government	0	0	0
RDTs from Global Fund	256,600	256,600	TBD
RDTs from Other Donors	0	0	0
RDTs planned with PMI funding	1,969,300	1,679,100	500,000
Total RDTs Available	4,628,451	5,601,247	5,292,407
Total RDT Surplus (Gap)	3,665,547	4,792,407	4,612,979

The population at risk is counted as those in malaria endemic areas. The number of fever cases is not measured by NMCP, so a baseline number was chosen based on a combination of prior consumption and estimated fever data. It is assumed that there will be a 20% reduction in fever cases in 2016 and 16% reduction in 2017 and 2018.

Table 14: ACT Gap Analysis

Calendar Year	2016	2017	2018
ACT Needs			
Total country population	13,645,486	13,795,586	13,947,338
Population at risk for malaria	6,842,796	6,918,067	6,994,165
PMI-targeted at-risk population	6,842,796	6,918,067	6,994,165
Total projected number of malaria cases	240,726	202,210	169,856
Total ACT Needs	240,726	202,210	169,856
Partner Contributions			
ACTs carried over from previous year	782,617	1,671,106	2,348,085
ACTs from Government	0	0	0
ACTs from Global Fund	612,000	361,305	TBD
ACTs from Other Donors	0	0	0
ACTs planned with PMI funding	517,215	517,883	0
Total ACTs Available	1,911,832	2,550,294	2,348,085

Total ACT Surplus (Gap)	1,671,106	2,348,085	2,178,229
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Projected malaria cases taken from the national quantification exercise (February 2016). It is assumed that there will be a 20% reduction from reported cases in 2016 and 16% reduction in 2017 and 2018.

Plans and justification

In FY 2017, PMI will procure RDTs and medicines for severe malaria. Because large discrepancies for both RDTs and ACTs exist between needs (based on a national quantification exercise using case data) and consumption, an assessment will take place in 2016-2017 to investigate this disparity. Since the current gap analysis forecasts a surplus of ACTs (and recent EUV surveys have revealed overstocked ACTs in most facilities), there will be no additional ACT purchases in FY 2017. Likewise, PMI will reduce procurement of RDTs to 500,000 in FY 2017, with the plan to modify case management commodity procurement figures through reprogramming based on findings from the aforementioned assessment. PMI will procure and advocate for the use of pre-referral rectal artesunate in those with severe malaria under six years of age, as specified in the 2015 WHO Guidelines for the Treatment of Malaria. Given current stock on hand no injectable artesunate will be purchased but increasingly available consumption and morbidity data, expiry dates, and procurement plans from other donors will be monitored to indicate whether a change in PMI procurement planning will be needed.

PMI plans to support case management activities through the training of approximately 1,000 of estimated 2,900 facility-based health workers and 1,300 of an estimated 3,800 VHWs in 15 districts. These activities will build upon the 2016-2017 training of 2,300 facility-based health worker, 2,500 VHWs, and 40 trainers, standardization of supportive supervision tools, production of 800 malaria treatment charts and improved documentation of trained workers by developing data collection tools and training staff to use TrainSMART software.

PMI will also support two malaria death documentation and audit meetings to prepare for the training of 96 people to improve malaria death audits. PMI will support the reinstatement of malaria death audits by holding meetings with stakeholders regarding malaria death documentation and audits to prepare trainings for staff. The ultimate goal of death audits is to be able to find gaps and avoidable issues and develop strategies to correct them and improve the management of severe malaria cases to prevent malaria deaths. PMI will work with the NMCP to prepare mentor guidance materials in order to support less experienced clinicians’ case management practices.

Lastly, the plans include supporting two NMCP Case Management Advisory Subcommittee meetings, with one goal being to develop a prioritized multiyear training plan. During FY 2017, PMI’s continued support of workforce development will include mop-up and refresher training of facility-based workers, along with quarterly supportive supervision and the piloting of a mentoring program in a few districts. It is anticipated that with the development of the training database, training plans can be based on more accurate numbers and needs compared to the past approaches. PMI will expand direct training support beyond Manicaland to Mashonaland East, Mashonaland Central, and Matabeleland North Provinces, which have “moderate” to “high” burden malarious areas. Training and supportive supervision of VHWs will be included in this expansion and serve to enhance the national VHW network in addition to PMI’s continued training and post-training follow-up support of VHWs, SHCs, and nurse aides and peer supervisors in Manicaland Province reaching 1,400 VHWs in addition to new recruits. It is likely that the number of VHWs will have increased and there will be attrition as well. PMI will review the pace of

recruitment and baseline training of VHWs and consider whether it can support iCCM training as well to grow the cadre in the communities where they are needed. PMI will also support the production of standardized supervision tools to optimize supervision and assessment of village health as well as facility-based workers.

In order to increase malaria laboratory capability, PMI will continue to work with national partners and support the establishment of university laboratory capacity for both epidemiologic and entomologic surveillance sample analysis. Another focus will be in rural districts and urban referral centers, where PMI will prioritize support for health worker training and supportive supervision to develop and maintain proficiency in microscopy, starting out in the 15 districts in Mashonaland East, Mashonaland Central, and Matebeleland North Provinces with a pilot in 20 health facilities. A technical assistance visit is planned in order to facilitate scale-up of these activities. In addition, supplies and equipment will be procured for microscopes already existing in the country .

PMI will continue to focus its support on reducing malaria in the highest burdened areas while other partners support efforts to decrease transmission and eliminate the disease in lower transmission and pre-elimination areas. However, PMI participates in discussions and provides technical input into pre-elimination efforts in Zimbabwe and the region (e.g., through the E8 Initiative) and stays abreast of topics, needs, and plans. For example, PMI participated in crafting pre-elimination sections in guidelines and health care worker training materials which will be promulgated in areas that use these pre-elimination-specific commodities (e.g., multi-species RDTs and primaquine). PMI will be in the position to annually evaluate its role in providing technical and other support toward the pre-elimination strategy in Zimbabwe.

Proposed activities with FY 2017 funding: (\$2,542,690)

- *Procure RDTs for malaria diagnosis:* Procure approximately 500,000 RDTs for use at health facilities and by VHWs. (\$265,000)
- *Procure ACTs for treatment of uncomplicated malaria:* Since the gap analysis indicates no need for additional stock, PMI will not procure. However, final quantifications will be based upon findings of the 2017 assessment of case and consumption data. (\$0)
- *Procure artesunate suppositories:* Procure approximately 38,880 artesunate suppositories (half 50mg and half 200mg). (\$17,690)
- *Procure malaria diagnostic supplies:* Purchase laboratory supplies and reagents to support microscopy diagnosis of malaria. (\$50,000)
- *Support case management technical assistance visit:* Provide a technical assistance visit by a CDC laboratory expert to provide technical support to the NMCP on ongoing diagnostic activities for quality assurance in case management in country. (\$10,000)
- *Facilitate supportive supervision for health facility workers:* Complete any final initial trainings and transition to refresher case management training including MIP; provide supportive supervision and mentoring in selected districts. (\$750,000)

- *Assess, train, and supervise VHWs in iCCM (Manicaland):* Reinforce initial case management training offered in 2015-2016 with supportive training and supervision on malaria case management for VHWs at the community level on ACTs, RDTs, and MIP prevention. (\$300,000)
- *Assess, train, and supervise VHWs in iCCM (three non-Manicaland districts):* Offer initial case management training for VHWs at the community level on ACTs, RDTs, and MIP prevention. PMI will eventually reinforce with supportive training and supervision. (\$750,000)
- *Strengthen malaria laboratory capacity:* Expand laboratory capacity to increase access to quality analysis for malaria surveillance activities in Zimbabwe, while also building human capacity through training and supportive supervision and improving local platforms for teaching critical laboratory skills. (\$400,000)

Pharmaceutical management

NMCP/PMI objectives

Over the past ten years, MoHCC has developed and implemented a number of supply chains in order to ensure the availability of health commodities at the facility level; the availability of medicines is one of the key performance indicators for the MoHCC. An annual quantification process, including an update semi-annually, is led by the DPS in consultation with the NMCP.

These multiple supply chain systems have traditionally been separated out by health commodity type and consisted of mainly four different systems as of 2012. Each varied in structure, cost and level of performance. In an effort to prepare the MoHCC to provide a larger role in supporting public health supply chain management systems, stakeholders with DPS created a vision to bring the management of all health commodities under a single unified commodities system for all primary care facilities and to have TB, malaria, and preventive commodities distributed via one system to all levels. The MoHCC's goal, first envisioned in 2012, is to reduce the number of systems to one or two, and to implement more effective and efficient supply chain operations that are sustainable in the medium to long term. The main requirements in consolidating the systems includes ensuring that the needed data is collected, that re-supply takes place according to a defined schedule, and that coverage/order rates and stockout rates remain at or are better than those achieved under the current multiple systems.

The ZIPS, a rolling warehouse concept that uses an informed push mechanism, distributes malaria commodities (ACTs, SP, and severe malaria pharmaceuticals), TB, and 26 selected essential medicines and medical supplies (including RDTs) to approximately 1,600 service delivery points quarterly. The ZIPS was piloted in 2009 and quickly rolled out. It allowed for the first time collection of data on consumption, stock on hand, losses and adjustments for malaria commodities. The MoHCC DPS in conjunction with NatPharm provides leadership to the ZIPS, including leading the annual national quantification process and mid-year updates. The quantification of malaria commodities is integrated with that for other program commodities such as TB, HIV/AIDS, drugs for opportunistic infections, and other essential medicines and medical supplies. The MoHCC programs (AIDS, TB, malaria) and partners (Clinton Health Access Initiative [CHAI], UNDP, UNICEF, Elizabeth Glazer Pediatric AIDS Foundation, Supply Chain Management System, and PMI) participate and provide input to the quantification. However, the goal is to transition from the ZIPS to the ZAPS, which includes the

management of all health commodities under a harmonized system of assisted ordering to create cost-efficiency without losing any of the availability of data and lower stockout rates.

Progress since PMI was launched

PMI has supported procurement and distribution of commodities as well as operational and logistical support for procurement and supply management. Activities covered under the ZIPS operations budget line include fuel, maintenance and repairs for delivery trucks and monitoring vehicles, ZIPS forms printing, internet technology hardware and software maintenance, ZIPS mop-up training, support and supervision of the distribution system, and direct and indirect costs of technical assistance (including, but not limited to, maintaining critical positions and field office operations). The availability of vehicles and fuel under the informed push system has facilitated needed deliveries of malaria commodities and decreased stockout rates.

Two critical positions include a PSM specialist and the secondment of a pharmacist to DPS. Their technical expertise has helped with coordination of malaria supply chain activities, annual quantification and updates leading to any needed revision in procurements, and support for quarterly end-use verification (EUV) surveys, for which a pharmacist is the lead data analyst and reporter. Prior to the initiation of the EUV surveys, PMI supported a stakeholders meeting to explain the process and anticipated outcomes, which enhanced stakeholder buy in and adherence to the quarterly survey schedule. Additionally, PMI supports the Logistics Management Information System (LMIS) and has supported the printing of forms.

To achieve the goal of moving to a unified system, in late 2013, the MoHCC with support from PMI designed an integrated single “assisted ordering pull” system, called ZAPS. ZIPS distributed commodities related to malaria, TB, nutrition products and selected set of essential medicines and medical supplies only for the primary care level. ZAPS includes all of these as well as condoms, contraceptives, HIV and syphilis rapid test kits, prevention of mother to child transmission and antiretroviral therapies (ART) with antiretroviral drugs (ARVs), fluconazole, Early Infant Diagnosis, and point of care consumables. Previously these additional commodities were distributed through the Delivery Team Topping Up (DTTU) and the Zimbabwe ART Distribution System (ZADS). Therefore, ZAPS combines four distribution systems, ZIPS and DTTU, which are push systems, the Essential Medicines Pull System, and ZADS, a full pull system, into one system for the primary health care level. The ZADS will continue to distribute ARVs for ART to hospitals as a separate system while MoHCC explores opportunities for further integration/consolidation of systems. The ZAPS will move towards an assisted pull model. The ZAPS also places the responsibility of picking, packing and delivery of commodities to the NatPharm team (as under the ZADS) while the picking and delivery was done by MOHCC- and Zimbabwe National Family Planning Council-led teams under ZIPS and DTTU. The system builds on the technology and lessons learned from the ZIPS and other systems while removing the limitations on the number of products that the system can manage by integrating the transport, warehousing, and management information systems.

An evaluation of existing distribution systems was conducted with PMI support as part of a baseline measurement for the evaluation of the ZAPS system. The evaluation collected data for 2013 and the first quarter of 2014 and looked at indicators for performance and costs. With respect to information availability and quality, almost 100% of ZIPS facilities received a quarterly visit; however, cash flow challenges at NatPharm present obstacles to obtaining essential medicines kits. In an effort to find a more cost-effective program, ZAPS was piloted in Manicaland Province for one year spanning 2014-

2015. The pilot was deemed successful as it demonstrated a higher level of cost-effectiveness than previous systems without sacrificing the level of visibility and high levels of performance of ZIPS.

Progress during the last 12-18 months

PMI supported the pilot of the ZAPS in Manicaland while also maintaining the functions of the ZIPS in the other provinces. This involved providing support for the delivery trucks, monitoring vehicles, LMIS maintenance in coordination with other donors, and ongoing monitoring of both the ZIPS and ZAPS.

At the end of the ZAPS pilot, preliminary results were shared at a workshop in Harare on June 25, 2015 and PMI supported an end-line report that was shared with stakeholders. The report found that ZAPS performed well overall compared to the baseline by maintaining supply chain performance at a lower overall cost and with greater efficiency compared to the current four supply chain systems. ZAPS lowered the burden of stock management on the health facility workers while handling a higher volume of commodities at a similar cost to the baseline assessment. The existing systems used similar resources that were organized and managed separately, using separate transport, warehousing, and management information systems, and drawing on different funding streams. Combining these systems under one management showed multiple indicators of increased efficiency. The cost-effectiveness analysis performed after the pilot of ZAPS in Manicaland Province factored in supply chain cost, throughput measures (volume and value of commodities in the system), supply chain performance measures, and cost-effectiveness measures compared to a baseline. The supply chain cost as a percentage of commodity value was found to be 12% under ZAPS compared to 17% under the baseline. ZAPS also showed a lower supply chain cost per cubic meter (m³) at \$770 versus \$960. Additionally, the total annual cost to operate the ZAPS (in Manicaland Province only) was about \$220,000 less than what it cost to operate the previous systems.

Most of the ZAPS savings were realized at the health facility level. Health workers spent less time managing products under the ZAPS compared to the time they spent managing products under the four separate systems at baseline. Furthermore, under the ZAPS, health facility workers almost completely eliminated the time and out-of-pocket transport expense associated with picking up commodities at baseline. Meanwhile, central, provincial, and district costs, remained roughly the same under ZAPS compared to the baseline. These are the costs that are largely supported by funding partners. Although operating at a lower total cost, in Manicaland Province, ZAPS handled a higher volume of commodities compared to the baseline systems, 1,955 m³ versus 1,803 m³. Similarly, the value of commodities that the ZAPS handled in Manicaland Province was higher compared to the baseline, \$12.3 million compared to \$10.4 million. These performance measures demonstrated ZAPS to be cheaper and more effective than the baseline system (or the four separate systems), and is a driving force in the enthusiasm to roll out the system nationally.

As a result of these findings, ZAPS is in the process of being expanded first to Masvingo Province with Bulawayo Metropolitan, Matebeleland North, Matebeleland South and Midlands Provinces followed next with the intent for rollout to all 10 provinces to be complete by the end of calendar year 2016. This is seen as an ambitious target. The initial rollout of the first couple of provinces after Manicaland has not progressed as quickly as anticipated so this might push back the implementation timeline a few months into calendar year 2017. However the expectation is still by the time of this MOP's implementation, ZAPS will be fully rolled out nationally. Most of the trainings are funded by Global Fund and any delays in the release of those funds would push the full rollout of the system into 2017 as well.

Under both systems, discordance between malaria cases reported in the HMIS and LMIS data presents challenges for the quantification process and the commodity management system. Past studies have found that the splitting and combining of ACT by service delivery points, challenges with record keeping including use of different source records and inconsistent record keeping especially during malaria outbreaks, lack of standardized RDT registers, late submission of VHW reports, and poor understanding of malaria case definitions among health workers are all contributing factors to the discrepancy in data. However, it is unlikely that even all of these factors are leading to the consistently found difference of greater than 300% between the consumption data in comparison to malaria cases. The annual quantification exercises are calculated based on both consumption and morbidity data, with consumption data historically being relied upon more than case data. Another concern has arisen around the recording and ordering units of commodities. It is unclear if the commodity quantities entered into the ordering system are consistently recorded as the number of treatments, number of pills, or number of boxes. If for one quarter the number of pills is recorded, then for the next quarter the number of treatments is recorded, this might show a greater consumption than what actually occurred. Irregularities such as these may be contributing to the discrepancies between consumption and case data.

Connected to this concern over possible “over-ordering” is the high level of overstock being seen at the facility level. According to the EUV surveys from July 2015, October 2015, and January 2016, more products were reported to be overstocked compared to understocked. The percentage of commodities that were appropriately stocked was low. Overall, malaria products appeared to consistently be overstocked while essential medicines showed higher risk of being understocked. Particularly of concern are the consistent high levels of overstock for AL and injectables. In the January 2016 EUV survey, 80% or more of facilities showed an overstock of all four AL presentations, injectable quinine, and injectable artesunate. This indicates a need to relook at the current stock management practices and ordering systems as this overstock was not seen at the central level in the Procurement Planning and Monitoring Reports from March 2015 to March 2016, indicating an issue further down the system.

PMI will continue to support activities to improve LMIS data quality and commodity management through workshops for district pharmacy managers to improve stock management and record keeping at the facility level. For example, stock counts may be incorrect when the unit reported differs between facilities and reporting quarter, expired stock is not separated from usable stock, or stockout days are not recorded correctly, affecting average monthly consumption calculations. There are concerns that overstock and expiries are not seen as a problem at the facility level due to the priority placed on preventing stockouts, and therefore the overstocks are less likely to result in follow-up. However, due to concerns around cost-effectiveness of programs and appropriate use of resources, PMI plans to investigate this issue further with FY2016 funding.

Balancing stock availability is also complicated by the occurrence of unstable epidemic patterns influenced by climate and weather patterns. NMCP’s adoption of WHO treatment recommendations, particularly in the treatment of severe malaria, also causes some changes in the supply chain as providers adjust to switching from quinine injectable to artesunate injectable and the use of RAS for pre-referral treatment. PMI will continue to support this transition.

Plans and justification

PMI will continue to ensure that malaria commodities, such as ACTs, RDTs, severe malaria medicines, and SP, are available in health facilities through ZAPS, as ZIPS will be replaced completely at the end of 2016. If the nationwide implementation of ZAPS is delayed, PMI will continue to support ZIPS in

parts of the country that have not yet expanded to ZAPS. A focus will be placed on stock management and the ordering system in an attempt to address overstock issues. Support will also be given to strengthen and expand supervision and quality assurance. PMI support will complement that of other donors including pharmaceutical supply chain management training and procurement of SP, ACTs, primaquine, quinine, injectable artesunate, RAS, and RDTs by the Global Fund.

Proposed activities with FY 2017 funding: (\$1,100,000)

- *Supply Chain Strengthening*: Support ZAPS operations to distribute ACTs, RDTs, severe malaria medicines, and SP to approximately 1,600 health facilities nationwide. Funds will complement other pharmaceutical and commodities management funding from other partners. PMI support will include operational costs, technical assistance, trainings, quantification support and logistics. Improve LMIS reporting and ordering as well as stock management, based on results of an LMIS and HMIS assessment. (\$1,100,000)

4. Health system strengthening and capacity building

PMI supports a broad array of health system strengthening activities which cut across intervention areas, such as training of health workers, supply chain management and health information systems strengthening, drug quality monitoring, Africa University, and NMCP capacity building.

NMCP/PMI objectives

The NMCP leads Zimbabwe's malaria control efforts through the formulation of policy strategies and the coordination of all partners involved in malaria control in Zimbabwe. The NMCP coordinates malaria activities at all levels and implements directly at the national and provincial levels. In 2015, the MoHCC became the PR for malaria and tuberculosis-related activities funded by the Global Fund in Zimbabwe. The NMCP will direct all activities under the malaria grant, reporting to and advising the program coordination unit within the MoHCC. The NMCP, which was elevated to directorate within the MoHCC in 2015, collaborates with several partners including USAID, UNICEF, UNDP, WHO, CDC, Bill and Melinda Gates Foundation through CHAI, and other international and local institutions.

The NMCP has demonstrated strong management and planning. Technical areas that NMCP leadership would like to see strengthened within the institution include entomology, vector control, epidemic detection and response, and prevalence estimate mapping or stratification.

Through the Field Epidemiology Training Program (FETP), the University of Zimbabwe has trained public health personnel in field epidemiology, data analysis, epidemiologic methods, and use of strategic information to make appropriate health decisions. This is a two-year course, which typically benefits central and provincial level MoHCC personnel. At the end of the program, graduates earn a Master of Public Health degree. The University also organizes a short course on leadership and health management for middle-level MoHCC personnel who work at the district level.

Progress since PMI was launched

PMI supported a cohort of FETP students that began coursework and training in January 2013 and partnered with the University of Zimbabwe to strengthen the malaria curriculum within the existing FETP. The goal was to support students in receiving a malaria-focused education and enhance the

malaria competency of the entire class. Two students from each cohort were selected annually. One FETP candidate was assigned to the NMCP under the supervision of the NMCP Director to support their programmatic and monitoring work and another candidate was assigned to a province under the supervision of the Medical Director to support malaria work at the provincial level. In 2014 and 2015 the PMI-supported fellows conducted 13 malaria-related projects and their classmates conducted eight. Six of the projects were malaria outbreak investigations in Zimbabwe. These projects were presented to the NMCP, and MoHCC staff, academicians, partners, FETP alumni, and PMI staff during monthly seminars.

In the past five years, PMI has worked with the NIHR, which is a national center for research, training and service in the fields of disease control, biomedicine, and public health. It comprises The Blair Research Laboratory (established in 1939), Health Systems Research Unit (established in 1981) in Harare, and the De Beers Research Laboratory (established in 1965) in Chiredzi. PMI supported entomological activities by providing training and updated staff at NIHR-Harare and De Beers Laboratory on insectary management and mosquito rearing to improve the insectaries and establish two colonies of susceptible mosquitoes for insecticide resistance monitoring. This included the refurbishment the Harare NIHR and Chiredzi insectaries, and improving the capacity of the entomology laboratories to carry out entomologic monitoring activities. PMI has also provided reagents and supplies to NIHR-Harare to perform molecular and immunodiagnostic assays for the entomological monitoring activities.

Progress during the last 12-18 months

The two students in the first FETP cohorts to receive PMI support both graduated the program in 2015 with merit and are currently employed by the MoHCC. The second cohort has also gone on to continue working in public health. PMI staff worked directly with the University of Zimbabwe FETP to enhance the malaria-focused education of supported fellows and others in the class, and provided guidance on modifying existing program documents to capture the malaria- and HIV/AIDS-focused projects and contributions. A PMI Resident Advisor participated in FETP conferences and acted as an attending or faculty member critiquing students' oral presentations. The FETP staff created a tool to capture the malaria-focused activities and contributions of PMI-supported residents. PMI-supported residents conducted at least three of six required projects on malaria topics. Due to the USG regulatory constraints, PMI support as of January 2016 has been limited to in-kind mentoring.

During the past year, PMI has established collaboration and support to the Faculty of Health Sciences of the Africa University in Manicaland. The faculty building complex was constructed with funding from the American Schools and Hospitals Abroad in 2004. Africa University is currently recruiting laboratory personnel to support molecular surveillance activities and will process mosquito specimens from the NMCP. PMI is providing laboratory equipment and training for malaria vector sibling species differentiation PCR and circumsporozoite enzyme-linked immunosorbent assay.

Plans and justification

Many PMI activities result in strengthened health systems, even those that fall under other technical areas. Table 15 describes activities budgeted under all program areas that contribute to strengthening health systems in Zimbabwe, listed by health system building block.

Proposed activities with FY 2017 funding: (\$0)

See activities for strengthening health systems which are covered under each of the PMI-supported interventions.

Table 15: Health Systems Strengthening Activities

Building Block	Technical Area	Description of Activity
Health Services	Case Management	Expand laboratory capacity to increase access to quality analysis for malaria surveillance activities in Zimbabwe, while also building human capacity and improving local platforms for teaching critical laboratory skills.
Health Workforce	Case Management & MIP	PMI will support the NMCP to conduct training and supportive supervision on malaria management for primary health facility staff and VHWs on ACTs, RDTs, and MIP.
	Entomology and Vector Control	PMI will support the secondment of an entomological officer to the NMCP who will provide technical assistance on entomological and vector control issues and support entomological surveillance in the remaining sites that PMI/Zimbabwe is not supporting.
	Pharmaceutical and Supply Chain Management	PMI will support the secondment of a Malaria Logistics Focal Person at MoHCC DPS to conduct quarterly support and supervision visits, manage the end-use verification activities, lead the quantification process for malaria products, keep the project informed on changes needed in the procurement plan, and otherwise manage and coordinate with the NMCP, as needed, malaria commodity logistics issues at the central and lower levels of the system.
Health Information	Vector Monitoring and Control	PMI will expand entomological laboratory capacity to meet national needs for entomological specimen analysis, data dissemination, and use.
	M&E	PMI will provide technical and logistic support to the NMCP for malaria outbreak detection and response in outbreak-prone areas and/or pre-elimination settings. PMI will support training to improve capacity to analyze and monitor the malaria trends, and improve preparedness for epidemic detection and response.
	M&E	PMI will support quarterly district health team meetings, provincial M&E review meetings, and training support and supervision across all levels. Recommendations from the assessment conducted with FY14 funds will be implemented.
	M&E	PMI and the NMCP will utilize existing epidemiologic, entomologic, and environmental data to produce a map of malaria burden and risk.
	M&E	PMI will support on-the-spot training/ supervision at the facility level to improve data collection; technical assistance at the district level to conduct supervision and use data for decision making.
Essential Medical Products, Vaccines, and Technologies	Insecticide-treated Nets	PMI will expand and strengthen routine ITN distribution systems in ANC and EPI clinics, the community, and possibly schools.
	Pharmaceutical Management	PMI will support ZAPS operations to distribute ACTs, RDTs, severe malaria medicines, and SP. Improve LMIS reporting and ordering as well as stock management, based on results of an LMIS and HMIS assessment.

Health Finance	NA	NA
Leadership and Governance	NA	NA

5. Social and behavior change communication

NMCP/PMI objectives

The NMSP objectives form the basis for the implementation of the SBCC activities for the malaria control program in Zimbabwe. To achieve NMSP's desired outcome, PMI supports SBCC activities that aim to promote correct and consistent use of ITNs, acceptance of IRS, and adherence to diagnosis and treatment. PMI also supports SBCC to improve uptake of IPTp in the areas where IPTp is used.

SBCC activities are implemented at the national, provincial, district, and community levels. PMI support is approximately allocated 15% to the national level and 85% at the community/interpersonal level. Mobilizing traditional and religious community leaders and civic organizations to support and promote malaria prevention and control is critical for achievement of the NMCP's NMSP and PMI's objectives.

At each primary health facility, there are one or more WHTs, which are composed of community health workers, school administrators, and community leaders who assist with malaria communication for IRS and ITN distribution campaigns. Community malaria committees are made up of volunteers selected by their communities and trained by the primary health facility staff on key malaria messaging at an interpersonal communication level. With the implementation of MCCM using VHWs, the NMCP emphasizes VHW interactions with individuals, households, and small groups. The VHWs test, treat, and refer for malaria treatment as warranted and can serve as important conveyors of appropriate health messages and information.

In Zimbabwe a big part of cultural life is centered on the church. This is often the only way to interface with hard-to-reach or closed religious communities, some that reject medical intervention. Also, we have seen a growing increase of church conferences and longer term meetings in centralized locations that would be a good venue to include malaria messages, discussions, and even ITNs.

Progress since PMI was launched

PMI has been supporting malaria SBCC in Zimbabwe since the first MOP in 2011. This support included a revision of SBCC materials and development and dissemination of new materials in the key malaria intervention areas (ITNs, IRS, MIP/IPTp, and case management). In 2012, PMI supported a small survey to gather data to better understand SBCC needs in the malarious districts – both facilitators and barriers in different areas of the country. The MIS, conducted in March-April 2012, provided useful information that has helped malaria partners better tailor SBCC supporting messages to address critical gaps in knowledge, attitudes, and practices.

In 2013, PMI supported the revision of the Zimbabwe Malaria Communication Strategy (2008-2013) and which was extended to 2017 in line with the NMSP. The strategy sets forth seven key interventions to be achieved: Vector Control (IRS, larviciding and ITNs), case management, EPR, IPTp, SBCC, OR,

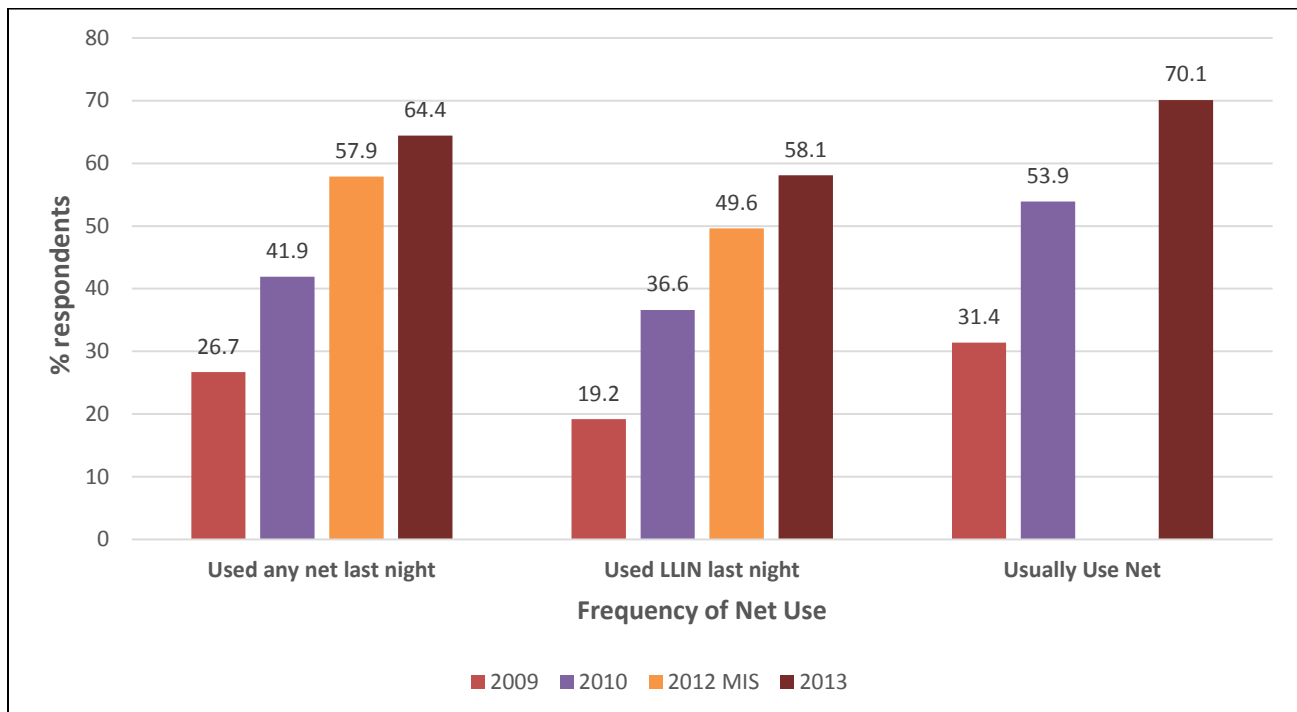
and SM&E.

PMI also supported the development of an SBCC Implementation Guide for 2014-15 which provided principles for malaria SBCC including communication theories, situational analysis, strategic design (approach, messages, channels), development and testing of materials, implementation, and monitoring and evaluation. Malaria partners now use this reference guide to help with better planning and management of SBCC activities to assist communities in malaria control. The first of its kind in Zimbabwe, it has been heralded as a model for other departments of the MoHCC.

Results from the 2013 PMI-supported TraC Survey shows that ITN use increased from 37% in 2010 to 58% in 2013 (Figure 4). PMI partners followed up on the TRaC results with SBCC outreach to communities designed to increase ITN use. SBCC outreach also corresponded with additional ITN campaigns in 2014 which NMCP estimates has pushed ITN coverage levels to reach approximately 90% in malarious areas, achieving universal coverage. Data regarding progress on ITN use and other malaria indicators are expected from the 2016 MIS results.

Further analyses of the same data using propensity score matching comparing between people who have been exposed to SBCC activities with people who were not exposed show higher proportion of respondents who slept under an ITN the night before in the exposed group 71.7% (exposed, N=256, $p < 0.001$) compared to 55% in the groups that were not exposed to the same SBCC campaign (N=439, $L1=0.112$). The print media (leaflets, flyers, posters, and newspapers) and interpersonal communication (road shows and drama groups) had the greatest impact on influencing net utilization and compared to mass media.

Figure 4: TRaC Survey Monitoring Individual Net Utilization, by Percent Surveyed, Zimbabwe, 2009-2013



In 2015, PMI continued to work through VHWs to promote ITN use and IPTp as well as early treatment-seeking behavior. These outreach activities included routine and specific SBCC activities in

areas where outbreaks of malaria were reported. PMI also supported increased and broader dissemination of IRS messaging to assist with information and acceptance on a new IRS chemical, OPs, deployed in PMI-supported spraying areas. Indoor residual spraying messages prepare families for arrival of the sprayers and provide safety messages.

For ITN activities in 2014-2015, PMI partners used a combination of outreach methods including radio, promotional materials, drama events (also known as road shows) and also added the branding of mini buses (known as *combis* in Zimbabwe) and prominently located wall space at schools, clinics, and market places.

Key ITN Messages:

1. Insecticide-treated mosquito nets are available for free in all malaria endemic areas.
2. Support and encouragement from family, friends, peers, and partner to use ITNs is valued.
3. Insecticide-treated mosquito nets are safe to use in malaria prevention.
4. Pregnant women and children under five years are more susceptible to malaria. Pregnant women have a compromised immunity due to pregnancy and children under five years do not have fully developed immune systems.
5. It is important to register and receive mosquito nets during the mass distribution exercise being carried out by the MoHCC.
6. People are urged to encourage each other to go and register for, as well as collect, their ITNs.
7. Mosquito nets should be properly hung, tucked in, and maintained.
8. Husbands and heads of households should assist and ensure that nets are hung properly. Mothers and other women in the home should ensure that children are properly tucked in before going to bed.
9. Sleeping under a treated mosquito net should be done consistently (every day) to prevent malaria.
10. Everyone in the family should sleep under a treated mosquito net every day to prevent malaria.

PMI supported radio messages on three radio stations nationwide, as well as the production of promotional materials in two languages. Over 100 road shows were performed annually in advance of ITN and IRS activities in target areas.

PMI engaged schools to be malaria prevention and treatment advocates by supporting school health clubs and training teachers as SHCs. Increasing malaria awareness among school cohorts tie into one of the routine distribution outlets that may soon be active in all elementary schools in malarious areas.

Progress during the last 12-18 months

Over the last year, the PMI partner managing the majority of SBCC communications experienced a smooth transition to another partner. This year, the NMCP SBCC Subcommittee remained active and committed to providing countrywide leadership.

PMI anticipates findings from the 2016 MIS during the second half of this year. Special care was taken in developing the MIS questionnaires to gather as much evidence as possible on malaria knowledge, preferences, and practices. The NMCP and partners eagerly anticipate the 2016 MIS results to help better direct SBCC materials and events. PMI is supporting a special workshop for the SBCC subcommittee to look at SBCC-related data from the MIS and determine what the data means for the

next NMSP and the affiliated SBCC Strategic Plan. An outside expert in SBCC data analysis will assist the SBCC subcommittee at the workshop, supported by PMI. Also in the latter half of 2016, PMI will provide resources for the development and dissemination of the SBCC strategic plan.

Highlights of key SBCC activities in the past year include:

- School activities, i.e., school health clubs and larger inter school events
- VHWs and SHC SBCC outreach
- Social and behavior change communication support ITN continuous distribution pilot
- Social and behavior change communication to support for IRS
- Inclusion of specific SBCC indicators in the malaria indicator survey
- Social and behavior change communication support for areas with increases seasonal malaria cases
- Malaria Program Review results related to SBCC
- SBCC support for Southern African Development Conference events and World Malaria Day.

Plans and justification

PMI support will complement Global Fund malaria grant activities and, under the NMCP's guidance, focus on inter-personal communication, print materials development, pre-transmission season malaria prevention activities (ITNs, IRS), early care-seeking behavior, and IPTp uptake early in pregnancy. In line with the new NMCP Implementation Guidelines, PMI will use evidence-based messages, focusing on a target audience and delivery methods such as mass media, interpersonal communication, and print media.

The expected major SBCC event of 2017 is the launch of the ITN routine distribution campaign nationwide. This will be the first time in Zimbabwe vector control history that a routine distribution program will be widespread. The expansion of routine distribution will need to be widely advertised and touted as a reliable resource for Zimbabweans to help protect themselves against malaria. Over the years, Zimbabweans have become more accustomed to ITNs. In 2017, the routine distribution system expansion should help normalize the availability of ITNs and further establish the ITN culture in the country.

SBCC efforts will address critical gaps in MIP including timely booking during the first trimester and returning to ANC for each scheduled visit, based on group discussions at the ANC with mothers presenting to ANC late. PMI is attempting to address maternal knowledge gaps and improve attendance through SBCC campaigns promoting early and frequent visits and community outreach through VHWs. In addition, involvement of husbands is being stressed. Other barriers include providers who may have incorrect practices and perceptions, including confusion over the number and timing of SP doses, and concerns that SP should not be given due to drug resistance. PMI is working to gather more data about the barriers and facilitators for IPTp. The 2016 MIS results will help in getting a better picture as well as the upcoming assessment. Currently, NMCP/Zimbabwe and partners feel that barriers to IPTp uptake are on the patient behavior side. But, the assessment may bring out issues on the provider side. In Zimbabwe, we have not had an intervention or messages targeted at the provider side. Should the data provide compelling evidence; the country team will reorganize the implementing partner's activities to address the need. In 2015, one of our partners and the SBCC subcommittee developed a mother profile called *Mai Tendai* (*Mai* means mother in Shona and *Tendai* is a very common Zimbabwean name). Here are the three insights for *Mai Tendai* related to Malaria in Pregnancy including IPTp. For *Mai Tendai*, sleeping under a mosquito net every night provides a comfortable and protected space so she and her

family get a good night's sleep. Booking early (for ANC) ensures the wellbeing of *Mai Tendai*'s future baby, giving her a sense of fulfillment which is better than maintaining discreetness about her pregnancy. *Mai Tendai* seeks early treatment which makes her feel relieved and successful as a mother because she's doing the right thing to protect herself and her baby.

In pre-elimination areas for 2017, PMI support for SBCC will include active surveillance and case detection activities. Creating awareness and an understanding of pre-elimination is important, as is generating collective support for the ultimate goal of elimination. For example, SBCC messages in pre-elimination districts will include information about reporting suspected malaria cases rapidly and following through with diagnosis, case confirmation, and treatment with primaquine quickly in order to limit further transmission. These messages will be targeted to health workers in facilities and VHWs in communities. Similar but differently tailored messages would be targeted to community members (with a less clinical focus). Social and behavior change communication messages can also help manage community expectations and encourage their participation in the urgent need to do malaria (and parasite) case follow-up testing within the radius of a discovered case. Taking a standardized travel history is also an important part of case investigation in pre-elimination areas. SBCC can help encourage communities to share this information and understand why it is important in understanding transmission.

SBCC efforts use the following communication channels:

- For One-on-one Communication: PMI supports health workers, VHWs, partner staff, and peer to peer channels.
- Group Communication: Schools, religious meetings, group discussions, and campaign channels
- Infotainment: Songs, community road shows (including dramas, singing, and logistical campaign information).
- Information Broadcasting: Radio
- Print Media: School branding, community malaria wall signs and *Combi* branding and posters.

The messages include: sleep under ITN every night, attend ANC within the first four months of pregnancy and attend ANC as scheduled, adhere to national guidelines for provision of IPTp (e.g., appropriate frequency of dosing and directly observed therapy), and respect national guidelines for malaria case management (e.g., only those testing positive by RDT/microscopy receive an ACT).

Target audiences are: families, VHWs, leaders at religious conferences, leaders in hard-to-reach religious communities, mothers, and mother-in-laws.

Proposed activities with FY 2017 funding: (\$600,000)

Support malaria SBCC: With FY 2017 funds, PMI will support VHWs, school, and community leaders to conduct interpersonal communication on key malaria messages around ITNs, malaria in pregnancy, RDTs, and ACTs in the 47 districts with the highest malaria transmission. The school and community leaders' SBCC activities will be complemented by printed materials that accompany packaged ITNs, RDTs and ACTs, radio spots, and drama skits at various locations including religious institutions, schools, and community events. The primary focus for all activities will be to: support the launch of ITN distribution (routine) expansion; improve MIP uptake (SP at each ANC at least four weeks apart, starting early in the second trimester, increase early and consistent use of ITNs during pregnancy, and early and effective diagnosis and treatment of malaria); and promote IRS and appropriate case management. PMI will provide technical support for implementing the NMCP Communications

Strategy Extension to 2017 in line with the NMSP. PMI will continue to support malaria advocacy and commemoration events and the SBCC Working Group quarterly meetings. (\$600,000)

Specifically, the \$600,000 budget for FY 2017 can be disaggregated as follows:

- Support ITN routine distribution countrywide launch and any mop-up distribution from the 2017 ITN campaign (\$175,000)
- Improve MIP uptake (SP at each ANC at least four weeks apart, starting early in the second trimester, early and consistent use of ITNs during pregnancy, and early and effective diagnosis and treatment of malaria) (\$150,000)
- Support SBCC on IRS (\$100,000)
- Appropriate case management (\$150,000)
- Support for malaria advocacy and commemoration events and the SBCC Working Group quarterly meetings (\$25,000)

The proposed activities for FY 2017 may be considered for slight revision based upon results from the 2016 MIS in case there is an immediate need to re-prioritize PMI-supported SBCC activities.

6. Surveillance, monitoring, and evaluation

NMCP/PMI objectives

The NMCP's SM&E Plan was released in 2009, and the indicator table was updated in 2014 and recently extended through 2017 to reflect the changing malaria landscape in Zimbabwe and to align with the NMSP and the WHO pre-elimination strategy. The SM&E plan is based on the Global Fund SM&E Toolkit, WHO recommended indicators, and internationally accepted tools and practices related to SM&E. The plan defines national malaria indicators, sources and frequency of data collection, measurement procedures, and mechanisms to track progress towards targets. The main objective of the SM&E plan is to provide a comprehensive tracking system that enables transparent and objective management of information on malaria control program activities to use to decide on effective implementation of malaria interventions in Zimbabwe.

The SM&E objectives are to:

- Ensure collection, collation, processing, analysis and use of malaria data at all levels of malaria control programming
- Enable regular monitoring and documentation of program performance based on implementation plans and targets
- Harmonize data collection based on standardized tools and indicators
- Establish and operationalize a comprehensive malaria database for warehousing, retrieving, and using malaria control information
- Facilitate and coordinate linkages of malaria control activities with other programs and partners in order to eliminate duplications
- Provide information for evidence-based decision making at all levels

Malaria SM&E procedures and activities have evolved over time and have helped improve the quality of the malaria morbidity and mortality data in the HMIS. Major SM&E activities include nationwide surveys (2015 DHS; 2016 MIS), program reviews, planning and data review meetings, supervisory visits to provincial and district health offices, collaboration with global and national institutions, strengthening routine data collection management and use, and improving the NMCP's capacity to measure and define seasonal variation. Information obtained is used for evidence-based decision making, program management, and accountability.

Progress since PMI was launched

Prior to PMI malaria control support in Zimbabwe, SM&E and OR data have been collected, reported, and recorded from many channels including routine data systems, programmatic monitoring, and national surveys. Since 2011, PMI has supported these and other SM&E efforts include insecticide resistance monitoring, vector mapping, and therapeutic efficacy studies. These data continue to be important in furthering malaria control efforts through a better understanding of disease trends and resistance patterns. In early 2017, the University of Zimbabwe Geographical Information Systems and Earth Observation Department will compile data from these various sources (routine health information data, programmatic insecticide resistance and therapeutic efficacy monitoring data, and household survey data) to develop an in-depth and up to date map of malaria burden and risk to inform future programmatic decisions with resources from other partners. PMI will support any supplemental activities to enhance stratification mapping, if indicated, once this map is produced. Table 16 summarizes some of the key SM&E data for malaria in Zimbabwe, including national level surveys, routine and specialized surveillance systems, and other data sources.

Table 16: Key Monitoring & Evaluation Data Sources, 2009-2018, Zimbabwe

Data Source	Survey Activities	Calendar Year									
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Household surveys	Demographic Health Survey*		X					X			
	AIDS Indicator Survey*							X			
	Malaria Indicator Survey^				X				X		
	Multiple Indicator Monitoring Survey*	X					X				
Health facility and other surveys	EPI survey*					X					
	Rapid Impact Assessment*					X					
	Tracking Results Continuously*	X		X		X^					
	EUV survey				X	X	X	X	X	X	X
	ITN durability monitoring (see Vector Control section)							X	X	X	
Malaria surveillance and routine system support	Support to malaria surveillance system			X	X	X	X	X*	X*	X*	X*
	Support to HMIS/Integrated Disease Surveillance and Response (IDSR)			X	X	X	X	X	X	X	X
Therapeutic	In vivo drug efficacy testing					X**	X**				
Entomology	Entomological surveillance and resistance monitoring				X	X	X	X	X	X	X

*Not PMI funded ^Partially PMI-supported **WHO supported two additional sites

There are two sources of routine malaria data reported and followed in Zimbabwe. One is the monthly HMIS collects aggregated malaria cases and deaths from all public health facilities and most mission clinics. These data are reported through the District Health information System 2 (DHIS2) platform, a web-based HMIS reporting system. The other is the weekly malaria data on case information is collected and submitted by cell phone short message service (SMS or text message) by approximately 95% of the nearly 1,600 public health facilities. These data are part of the national Rapid Disease Notification System (RDNS), an electronic system where SMS text data is received and reviewed at district levels and entered into the same DHIS2 platform used for HMIS data but accessed separately. PMI supported activities for malaria surveillance have focused on HMIS as monthly aggregate high quality data are most appropriate in “moderate” to “high” burden areas for programmatic decision making.

Zimbabwe transitioned their routine HMIS nationally to the electronic DHIS2 platform in January 2014. PMI supported this transition as the main source of routine malaria data, HMIS includes the number of suspected cases, proportion of suspected malaria cases that received parasitological testing (microscopy/RDT), number of parasitologically-confirmed cases, ACT consumption, and IPTp uptake. Ongoing SM&E and data quality assurance to maintain the system as a reliable source of health facility data includes on-site validation checks, supervision and supervisory visits, training new staff to fill vacancies, frequent re-trainings at the district and provincial levels, and ensuring internet connectivity. At each data source point (clinic, rural health center, hospital), there is a person responsible for reviewing all data generated to ensure good data quality before sending to the next level, which, in most cases, is the district level. Data validation is also conducted at district level and entered into the electronic system where it becomes available at the provincial level where the data is also validated before they are sent to the national level. Further data review occurs at the national level before the data is widely shared outside MoHCC structures. Special site visits are conducted by SM&E specialists from MoHCC and partners (such as USAID, Global Fund, and implementing partners) to assess data quality, collection and management procedures. A checklist is used that focuses on reliability, validity, timeliness, integrity, and precision. As data are being reviewed, feedback and mentoring is provided to help all those involved at various levels.

The RDNS provides weekly data on 12 epidemic-prone diseases, including laboratory-confirmed malaria cases and deaths, from approximately 1,600 health facilities nationwide. Health facilities reporting to RDNS submit data to the districts via SMS text that are then housed in the DHIS2 platform and available to provincial and central levels. A weekly report is produced and distributed to the national program areas. As part of this report, malaria case data from the same week from the previous 4 to 5 years are used to determine an epidemic “alert” threshold (cases exceed the average of the previous 4-5 years from the same week) or an epidemic “action” threshold (cases exceeding 1.5 standard deviations above the mean number of cases from the same week from the previous 4-5 years). This is in keeping with RDNS training, however goes against WHO malaria epidemic detections which triggers an epidemic “alert” threshold if monthly cases exceed the 75th percentile of reported monthly malaria cases over the previous 36 months and an epidemic “action” threshold if monthly case totals are above 1.5 standard deviations over the previous 36 months. If an “action” threshold is reached in any given week it is referred to as an “outbreak” by the NMCP.

In 2014, 34% of cases were associated with 130 outbreaks, mainly occurring in two of the border provinces, Manicaland and Mashonaland East. Although the NMCP has not reported 2015 numbers yet, it is expected they will report similar findings. A priority of the NMCP is to continue improving “outbreak” detection and response. To this end, the NMCP has continued to train VHWs to perform iCCM and passive case finding in their respective villages. This reporting system is exacerbated by a

method that is unable to account for seasonality variation by restricting comparison data to the exact same week from previous years. The NMCP, with support from PMI, will further engage M&E officers to ensure threshold values are being calculated correctly for malaria epidemic detection and evaluate how the threshold values are identifying “outbreaks” compared with moderate seasonal malaria increases. Barriers for rapid detection and response include facilities not having any or current thresholds calculated, limited evidence of data use where health facility staff are not trained on utilizing the thresholds in order to recognize and report an increase in cases in a timely manner, and the lack of district, provincial, or national staff to have the flexibility to provide commodities or control measures quickly to respond to identified “outbreaks.”

Programmatic data on IRS, ITN distribution, and entomologic monitoring are managed by the NMCP and are used to monitor and report on the implementation of all malaria control activities. Data are collected from the subdistrict level and passed through district and provincial levels to the national level on a weekly, monthly, or quarterly basis, depending on the data being reported.

In April 2009, UNICEF supported a Multiple Indicator Monitoring Survey (MIMS), which is similar to the Multiple Indicator Cluster Survey and included a malaria module. A 2010-11 DHS included a standardized malaria module. Data from the DHS and MIMS provided pre-PMI baseline estimates for most of the coverage indicators used by PMI. In 2012, PMI supported an MIS, which also included anemia and parasitemia biomarkers collected from children aged 6-59 months in households from 51 malaria endemic districts in eight rural provinces. Key results from the 2012 MIS include the finding of low national parasitemia in children less than five years of age: 1% by RDT and 0.4% by microscopy, yet there was high anemia prevalence. Additional findings from the survey include: moderate ITN utilization, low IPTp uptake, and that radio or TV were not common sources of malaria information. Zimbabwe recently completed a DHS in 2015, but did not measure parasitemia.

Ten EUV surveys (a quarterly survey to verify availability of malaria commodities in a sample of health facilities and warehouses), were conducted in 2012 through 2015. Quarterly reports are provided summarizing the EUV activities and findings. These reports provide key observations, recommendations, and next steps for commodity distribution and are distributed widely to MoHCC personnel and in-country partners in Zimbabwe. To improve the utility of the EUV surveys in Zimbabwe for 2016 and onward, the survey tool, as well as the timing and facilities visited during the survey, will be adjusted to better accommodate the seasonality and epidemiology of malaria in the country.

Progress during the last 12-18 months

PMI supported multiple NMCP SM&E activities including routine HMIS, household surveys, and EUV surveys.

The national routine malaria reporting system is considered to be high quality, timely, and complete; during the most recent reporting in 2015, reporting completeness was similar to 2014 at approximately 98% of 1,600 facilities reporting, but timeliness was 80.3% up from 67.5% the previous year. SM&E indicators from 2015 can be found in Table 17.

Table 17: SM&E Indicators, Zimbabwe, 2015

Indicators	Value	Comments
1. Total number of reported malaria cases Data source: DHIS2	391,326	Decline in malaria cases compared to previous year
Total diagnostically confirmed cases	391,326	
Total clinical/presumed/unconfirmed cases	0	All suspected cases are parasitological tested
<i>If available, report separately for outpatients and inpatients</i>		
Outpatient number of reported malaria cases	Not available	
Diagnostically confirmed		
Clinical/presumed/unconfirmed		Not recorded
Inpatient number of reported malaria cases	Not available	
Diagnostically confirmed		
Clinical/presumed/unconfirmed		Not recorded
2. Total number of reported malaria deaths Data source: DHIS2	570	Deaths increased by 20.1% as compared to the previous year.
 Diagnostically confirmed	570	
 Clinical/presumed/unconfirmed		
3. Malaria test positivity rate (outpatients) Data source: DHIS2	28.3%	Notable decline in the positivity rate as compared to the previous year; this relates to the reduction in incidence for the same period
Numerator: Number of outpatient confirmed malaria cases	391,326	
Denominator: Number of outpatients receiving a diagnostic test for malaria (RDT or microscopy)	1,383,171	
4. Completeness of monthly health facility reporting Data source: DHIS2	97.8	
Numerator: Number of monthly reports received from health facilities	19,771	
Denominator: Number of health facility reports expected (i.e., number of facilities expected to report multiplied by the number of months considered)	20,208	

The NMCP has been trying to focus attention on improving quality and “outbreak” or epidemic detection through various quality assurance and supportive supervision visits from District M&E officers to the health facilities. PMI supported these efforts and provided technical assistance, raising concerns with the current method used for epidemic detection, especially in Manicaland. Quality of data,

however, continues to improve.

Recent household surveys, supported in part by PMI, included the Zimbabwe 2015 DHS and the 2016 MIS. PMI is the primary supporter of the 2016 MIS and in 2015 supported the initial planning and tool development of the 2016 MIS, which began data collection in April 2016. To estimate national malaria prevalence parasitemia biomarkers using RDTs and blood smears will be collected from all participants in the sample which includes those six months and older. Additionally, household malaria survey data will be collected from knowledgeable household members and women aged 15-49 years to determine gains in malaria control activities in Zimbabwe since the last MIS in 2010.

PMI supported two district health team meetings in Chipinge and Mutare with a total of 169 participants, five SM&E trainings of 196 participants, and one IDSR training, which included 40 participants. Zimbabwe and Mozambique cross-border activities to evaluate drivers of malaria and health care-seeking behaviors along the border were initiated in 2014 and completed in 2015. This emphasized several expected risk factors related to a porous border adjacent to a higher prevalence country. However, the cross-border activity also identified previously unknown gaps in IRS and ITN coverage for some border wards thought to have been completely covered.

PMI supported Zimbabwe MoHCC to conduct quarterly EUV exercises for malaria commodities (medications and RDTs). The EUV surveys assess the availability of malaria commodities at facility level, identify areas of strength and weakness in the supply chain and malaria case management, and provide data and insight for analysis, advocacy, and decision-making on a quarterly basis.

Plans and justification

PMI will continue work with the NMCP to support monitoring the quality of malaria data collected through the HMIS and to improve use to ensure that the programmatic needs of the NMCP are met. The need to use real-time data to identify temporal and geographic variations in morbidity or mortality in pre-elimination and epidemic-prone settings existing in Zimbabwe is a high priority to ensure the success of the program. With FY 2017 funding, PMI will continue to support malaria routine system strengthening with a focus on continued and expanded supportive supervision at facility level. PMI will also support surveillance, monitoring and evaluation activities through encouraging data use by taking advantage of the analysis tools in the DHIS2 system. Support for improving epidemic detection algorithms to differentiate epidemics from seasonal variations and health worker capacity to analyze and monitor the malaria trends, as well as enhancing preparedness for epidemic detection and response will also be a focus of PMI activities in “moderate” to “high” burden areas such as Manicaland.

PMI will continue support for SM&E trainings at all levels including VHWs as well as supervisory and district health facility trainings. In addition, PMI support will be used to facilitate quarterly meetings for district, provincial, national level, and cross-border representatives to meet and discuss surveillance and SM&E-related issues. PMI will also work with the NMCP to support epidemic detection and response efforts in pre-elimination settings by participating in meetings and providing in kind technical assistance while still focusing on prevention and control activities in “moderate” (annual malaria incidence 6-100 cases/1,000 population) to “high burden” (annual malaria incidence >100 cases/1,000 population) areas.

Proposed activities with FY 2017 funding: (\$710,000)

- *End-use verification survey:* Conduct quarterly surveys to assess availability of malaria

commodities in health facilities and warehouses. (\$100,000)

- *Epidemic detection, investigation and response:* PMI will support improving detection algorithms and training to improve capacity to analyze and monitor the malaria trends, and improve preparedness for epidemic detection and response in “moderate” (annual malaria incidence 6-100 cases/1,000 population) to “high burden” (annual malaria incidence >100 cases/1,000 population) areas. On-the-job supervision/coaching post-training will be included. (\$100,000)
- *National SM&E support:* Support quarterly district health team meetings. Further focus on data use and interpretation for trend analysis and programmatic decision making. Implement recommendations from the training needs assessment conducted with FY 2014 funds. (\$300,000)
- *Quarterly supervision/quality assessment for SM&E:* Support on the spot training/supervision at the facility level to improve data collection; technical assistance at the district level to conduct supervision and use data for decision making. (\$200,000)
- *Technical assistance:* Provide one CDC TDY to support PMI/Zimbabwe SM&E activities. (\$10,000)

7. Operational research

NMCP/PMI objectives

The current NMSP reiterates the importance of conducting OR as an essential strategy to measure impact of control and prevention activities and to identify gaps and weaknesses to improve program implementation.

Under Strategy 5, *Strengthen Evidence Based Programming* under Objective 7, *To Expand and Maintain Strong Multi Sectoral Partnerships for Effective Program Management and Coordination by 2017*, the NMSP states, "A malaria research agenda of national priorities will be developed to guide malaria research and implementation including reviews such as the Malaria Program Review." It goes on to say that an OR agenda will be established and there is a corresponding indicator which is: # of *operational research activities conducted*.

In the previous version of the Zimbabwe Malaria Strategic Plan 2008-2013, one of the indicated challenges mentioned OR specifically. It stated that there was poor coordination and monitoring of all research in malaria and no research priority list. Most OR has been external, originating from partners.

Regional and international collaborators that have provided key contributions to malaria research include PMI, Johns Hopkins Bloomberg School of Public Health (USA), Witwatersrand University (South Africa), International Centers for Excellence in Malaria Research (ICEMR), CHAI, and the Bill and Melinda Gates Foundation. Most malaria partner-initiated OR in Zimbabwe is aimed at optimizing the coverage of interventions. Their impact was conducted and best practices documented to improve specific program quality, efficiency and effectiveness. Some of the OR studies conducted include:

- Monitoring and assessment of drug efficacy in uncomplicated cases of *P. falciparum* at sentinel

sites

- Monitoring of insecticide resistance
- Laboratory and field evaluations of insecticides for registration
- Molecular markers for resistance to chloroquine and pyrimethamine in *P. falciparum* from Zimbabwe
- Association of house spraying with suppressed levels of drug resistance in Zimbabwe
- Validation of malaria drug sensitivity studies and case management in sentinel sites in Zimbabwe.

A research study funded by the NIH-ICEMR grant that began in 2012 to assess malaria burden in the region collected mosquito samples during the wet seasons of 2012-2014 using CDC light traps and pyrethroid spray catches. Morphological identification indicated that the predominant malaria vector is *An. funestus* s.l. Molecular identification of samples from the 2012-2013 collections also confirmed these results, with samples being *An. funestus* s.s. or *An. leesoni*, both members of the *An. funestus* species complex. Blood meal analysis indicated that these mosquitoes feed predominantly on human populations. These findings prompted NMCP to commission its own study to confirm and validate the findings. These results are in part informing NMCP's strategy for IRS and ITNs.

Progress during the past 12-18 months

The NMCP and WHO initiated discussions on the need for developing a national malaria OR agenda. However, a research agenda has not been formally developed and produced yet. The new bilateral mechanism for PMI/Zimbabwe was tasked to convene a meeting for malaria stakeholders that would provide a platform for discussing and coming up with the malaria research agenda. Some of the topics envisioned include, but are not limited to: 1) malaria in mobile and remote populations, 2) role of VHWs in malaria pre-elimination, and 3) documenting progress towards pre-elimination. Development of the new NMSP 2016-2020 will provide an opportunity for NMCP and partners to reflect on OR needs. Now that the Global Fund has produced a report identifying the need to encourage country-led OR as part of future grants, there is potential for additional funds to leverage.

With FY 2016 funding the following three studies were proposed:

- Assessing the effectiveness of VHWs in decreasing the malaria morbidity and mortality burden through active or reactive case detection in hotspot and/or pre-elimination areas in Zimbabwe;
- Assessing the potential for and human risk factors associated with outdoor feeding by malaria vectors in Manicaland Province; and
- An evaluation of microscopy, rapid diagnostic tests, and serologic and polymerase chain reaction analysis of dried blood spots from the 2016 Zimbabwe MIS;

Based on the information gathered in 2015, PMI noted significant VHW roll-out challenges and that greater needs are in the areas of recruitment, retention and training. Funds for this study were reprogrammed to these immediate needs. The PMI team also determined that while the problem of outdoor mosquito biting may be an area for operations research in the near future, appropriate coverage for malaria control interventions needs to be prioritized given the data from the NIH funded ICEMR study showing that the main malaria mosquito vectors in Zimbabwe feed predominantly on human

population. Funds for this study were reprogrammed to other immediate malaria commodity needs. Finally, on the third study on evaluation of microscopy, rapid diagnostic tests, and serologic and polymerase chain reaction analysis of dried blood spots from the 2016 Zimbabwe MIS was withdrawn by primary investigators due to methodological challenges on answering the study question. The funds for this study were also reprogrammed.

Plans and justification

The lack of research agenda to guide PMI has made it difficult for PMI to assist with OR in Zimbabwe. PMI will take time to work with NMCP and partners on the development of a research agenda during the discussions around development of the new NMSP for 2016-2020.

Proposed activities with FY 2017 funding: (\$0)

No OR activities are proposed with FY 2017 funds.

8. Staffing and administration

Two health professionals serve as Resident Advisors (RAs) to oversee PMI in Zimbabwe, one representing CDC and one representing USAID. In addition, one Foreign Service National works as part of the PMI team. All PMI staff members are part of a single interagency team led by the USAID Mission Director or his/her designee in country. The PMI team shares 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 RA positions (whether initial hires or replacements) 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.

The PMI interagency professional staff work together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance and direction to PMI implementing partners.

The PMI lead in country is the USAID Mission Director. The day-to-day lead for PMI is delegated to the USAID Health Office Director and thus the two PMI RAs, one from USAID and one from CDC, report to the USAID Health Office Director for day-to-day leadership, and work together as a part of a single interagency team. Technical expertise housed in Atlanta and Washington complements PMI programmatic efforts.

The two PMI RAs are physically based within the USAID health office but are expected to spend approximately half of their time with and providing technical assistance to the NMCPs and implementing partners, including time in the field monitoring program implementation and impact.

The number of locally-hired staff and necessary qualifications to successfully 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, in addition to the U.S. Global Malaria Coordinator.

Funds allocated for USAID will be used to support in-country PMI staff and in-country mission program development and learning costs. The latter will be to a maximum of 2% of the total PMI/Zimbabwe budget.

Proposed activities with FY 2017 funding: (\$1,600,000)

- *USAID in-country staffing and administration:* Support management and administration costs, USAID RA and one Foreign Service National PMI-supported salaries, CDC and USAID RAs' International Cooperative Administrative Support Services costs, and program development and learning costs (\$1,000,000)
- *CDC in-country staffing and administration (\$600,000)*

Table 1: Budget Breakdown by Mechanism

**President's Malaria Initiative – ZIMBABWE
Planned Malaria Obligations for FY 2017**

Mechanism	Geographic Area	Activity	Budget (\$)	%
TBD - IRS Project	Nationwide	IRS & Entomological Monitoring	\$4,853,687	32.4%
ZAPIM	Nationwide	ITN Distribution, CM, MIP, SM&E, SBCC, Operational Research	\$4,100,000	27.3%
CDC/IAA	Nationwide	TA	\$649,000	4.3%
GHSC-PSM	Nationwide	Commodities Support	\$4,042,313	26.9%
VectorWorks	Nationwide	Vector Control	\$25,000	0.2%
TBD - Environmental management	Nationwide	Environmental Compliance in IRS	\$30,000	0.2%
MCSP	Manicaland	VHW Support	\$300,000	2.0%
USAID in country staffing and administration	Nationwide	In country staff and administration	\$1,000,000	6.7%
Total			\$15,000,000	100%

Table 2: Budget Breakdown by Activity

**President's Malaria Initiative – ZIMBABWE
Planned Malaria Obligations for FY 2017**

Proposed Activity	Mechanism	Budget		Geographic Area	Description
		Total \$	Commodity \$		
PREVENTIVE ACTIVITIES					
VECTOR MONITORING AND CONTROL					
Entomologic monitoring and insecticide resistance management					
Entomological surveillance and monitoring	TBD - IRS Project	300,000	0	Nationwide	Provide support to local institutions for comprehensive entomological surveillance
Laboratory capacity building for entomological surveillance	ZAPIM	200,000	0	Nationwide	Build laboratory capacity for entomological specimen analysis and data dissemination and use
Procurement of entomologic supplies	TBD - IRS Project	20,000	20,000	Nationwide	Procure laboratory supplies necessary for entomological surveillance
TA for entomological surveillance	CDC/IAA	29,000	0	Nationwide	Two CDC TDYs to provide support for entomological activities.

Subtotal Entomonitoring		549,000	20,000		
Insecticide-treated Nets					
Procurement of ITNs	GHSC-PSM	2,337,623	2,337,623	Nationwide	811,675 rectangular ITNs for EPI and ANC for the entire country.
Distribution of ITNs	ZAPIM	700,000	0	Targeted districts for routine distribution	Further expansion of routine distribution into new districts
Conduct ITN durability monitoring	ZAPIM	100,000	0	Four routine distribution pilot districts	Third year follow-up ITN durability monitoring for ITNs distributed through school-based distribution campaign
TA for Vector Control strategic planning	VectorWorks	25,000	0	Targeted districts for routine distribution	Technical support for rolling out routine distribution
Subtotal ITNs		3,162,62	2,337,623		
Indoor Residual Spraying					
Support IRS activities	TBD - IRS Project	4,533,687	0	Selected districts	Support for IRS in districts selected using recent ento and epi data
Environmental compliance inspection	TBD – Environmental management	30,000	0	Selected districts	External evaluation of environmental compliance for IRS program

Subtotal IRS		4,563,687	0		
SUBTOTAL VECTOR MONITORING AND CONTROL		8,275,310	2,357,623		
Malaria in Pregnancy					
Procurement of SP	GHSC-PSM	156,600	156,600	Selected IPTp districts	Procure 870,000 treatments
Procurement of clindamycin	GHSC-PSM	15,400	15,400	Nationwide	Procure 3,333 treatments
Subtotal Malaria in Pregnancy		172,000	172,000		
SUBTOTAL PREVENTIVE		8,447,310	2,529,623		

CASE MANAGEMENT

Diagnosis and Treatment

Procurement of RDTs	GHSC-PSM	265,000	265,000	Nationwide	Final quantifications will be based upon the findings of the 2017 assessment of case and consumption data. Current estimate based on case data and existing stock surplus. Purchase approximately 500,000 RDTs for use at primary health care facilities and by VHWs.
Procurement of artesunate suppositories	GHSC-PSM	17,690	17,690	Nationwide	200 mg and 50 mg doses, 19,440 of each
Procure malaria diagnostic supplies	GHSC-PSM	50,000	50,000	Nationwide	Purchase laboratory supplies and reagents to support microscopy diagnosis of malaria
Case management TDY	CDC/IAA	10,000	0	Nationwide	One CDC TDY to support supervision/ QA for CM
Facilitate supportive supervision and training of malaria case management, including MIP, for health facility workers	ZAPIM	750,000	0	Selected districts	Mop-up and refresher training based on more accurate records of health workers trained to date; supportive supervision and mentoring.

Assessment, training and supervision of VHWs	MCSP	300,000	0	Manicaland Province	In Manicaland Province all 7 districts, support training and supervision on malaria case management for VHWs at the community level on ACTs, RDTs, and MIP prevention.
Assessment, training and supervision of VHWs	ZAPIM	750,000	0	Selected districts	Training and supervision on malaria case management for VHWs at the community level on ACTs, RDTs, and MIP prevention.
Strengthen malaria diagnostic capacity	ZAPIM	400,000	0	Nationwide	Increase access to quality analysis for malaria surveillance, build human capacity through training and supportive supervision, improve local platforms for teaching laboratory skills.
Subtotal Diagnosis and Treatment		2,542,690	332,690		
Pharmaceutical Management					
Supply chain strengthening	GHSC-PSM	1,100,000		Nationwide	Support ZAPS, including operational costs, technical assistance, trainings, quantification support and logistics. Improve LMIS reporting, based on results of the assessment.

Subtotal Pharmaceutical Management		1,100,000	0		
SUBTOTAL CASE MANAGEMENT		3,642,690	332,690		
HEALTH SYSTEM STRENGTHENING / CAPACITY BUILDING					
SUBTOTAL HSS & CAPACITY BUILDING		0	0		
SOCIAL AND BEHAVIOR CHANGE COMMUNICATION					
Support malaria SBCC	ZAPIM	600,000	0	Nationwide	Support malaria BCC for ITNs, MIP, IRS, and case management, particularly for the VHWs
SUBTOTAL SBCC		600,000	0		
SURVEILLANCE, MONITORING, AND EVALUATION					
End-use verification	GHSC-PSM	100,000	0	Nationwide	Quarterly surveys to assess availability of malaria commodities in health facilities and warehouses.

Epidemic detection, investigation, and response	ZAPIM	100,000	0	Selected districts	Support improving detection algorithms and training plus supervision to improve capacity to analyze and monitor the malaria trends, and improve preparedness for epidemic detection and response in “moderate” (annual malaria incidence 6-100 cases/1,000 population) to “high burden” (annual malaria incidence >100 cases/1,000 population)
Support & facilitate SM&E activities	ZAPIM	300,000	0	Nationwide	Support quarterly district health team meetings, provincial SM&E review meetings, training support and supervision across all levels.
Quarterly Supervision/QA for SM&E	ZAPIM	200,000	0	Selected districts	On the spot training/ supervision at facility level to improve data collection; technical assistance at the district level to conduct supervision and use data for decision making.
Technical assistance trip to support SM&E	CDC/IAA	10,000	0	Selected districts	One CDC TDY to support on-going M&E activities in country.
SUBTOTAL SM&E		710,000	0		

OPERATIONAL RESEARCH					
SUBTOTAL OR		0	0		
IN-COUNTRY STAFFING AND ADMINISTRATION					
USAID		1,000,000			
CDC		600,000			
SUBTOTAL IN-COUNTRY STAFFING		1,600,000	0		
GRAND TOTAL		\$15,000,000	\$2,862,313		