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 funding available to support the plan outlined here is pending finalization of the FY 2020 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.

U.S. PRESIDENT'S MALARIA INITIATIVE

ZAMBIA

Malaria Operational Plan FY 2020

U.S. President's Malaria Initiative Zambia Malaria Operational Plan FY 2020. Retrieved from (www.pmi.gov)

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ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AIDS	Acquired Immune Deficiency Syndrome
AL	Artemether-lumefantrine
AMF	Against Malaria Foundation
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
BMGF	Bill and Melinda Gates Foundation
CDC	Centers for Disease Control and Prevention
CHA	Community health assistant
CHAZ	Churches Health Association of Zambia
CHW	Community health worker
DDT	Dichloro-diphenyl-trichloroethane
DFID	U.K. Department for International Development
DHA-PQ	Dihydroartemisinin-piperaquine
DHIS2	District Health Information System 2
DHO	District Health Office
DHS	Demographic and Health Survey
DQA	Data quality assessment
EDS	Electronic data system
EIR	Entomological inoculation rate
eLMIS	Electronic Logistics Management Information System
EMC	End Malaria Council
EMF	End Malaria Fund
EMLIP	Essential Medicines Logistics Improvement Program
EPI	Expanded Program on Immunizations
EUV	End-use verification
FANC	Focused antenatal care
FETP	Field Epidemiology Training Program
FY	Fiscal year
GDP	Gross Domestic Product
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GRZ	Government of the Republic of Zambia
HIV	Human Immunodeficiency Virus
HFCA	Health facility catchment area
HMIS	Health management information system
HSSCS	Health Sector Supply Chain Strategy
iCCM	Integrated community case management
ICEMR	International Center of Excellence in Malaria Research
IPTp	Intermittent preventive treatment for pregnant women

IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
IVM	Integrated vector management
LLIN	Long lasting insecticide-treated mosquito net
LMU	Logistics Management Unit
LSM	Larval source management
M&E	Monitoring and evaluation
MACEPA	Malaria Control and Elimination Partnership in Africa
MCH	Maternal and Child Health
MDA	Mass drug administration
MIP	Malaria in pregnancy
MIS	Malaria indicator survey
MMV	Medicines for Malaria Venture
MSL	Medical Stores Limited
MoH	Ministry of Health
MOP	Malaria Operational Plan
MRR	Malaria rapid reporting
MSL	Medical Stores Limited
NCSME	National Communication Strategy for Malaria Elimination
NIH	National Institutes of Health
NMEC	National Malaria Elimination Centre
NMEP	National Malaria Elimination Program
NMESP	National Malaria Elimination Strategic Plan
NMSP	National Malaria Strategic Plan
NGO	Non-governmental organization
OP	Organophosphate
OPD	Outpatient department
OR	Operational research
OTSS	Outreach training and supportive supervision
PCR	Polymerase chain reaction
PCV	Peace Corps volunteer
PEPFAR	President's Emergency Plan for AIDS Relief
PHO	Provincial Health Office
PMI	U.S. President's Malaria Initiative
RA	Resident advisor
RAS	Rectal artesunate
RCD	Reactive case detection
RDT	Rapid diagnostic test
SADC	South African Development Community
SBC	Social and behavior change

SMC	Seasonal malaria chemoprevention
SM&E	Surveillance, monitoring, and evaluation
SMEO	Surveillance, monitoring, evaluation, and operations research
SMAG	Safe Motherhood Action Groups
SP	Sulfadoxine-pyrimethamine
TES	Therapeutic efficacy study
TDRC	Tropical Diseases Research Centre
TWG	Technical Working Group
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

I. INTRODUCTION

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Zambia to end malaria. PMI has been a proud partner of Zambia since fiscal year (FY) 2007, helping to decrease child death rates by 37 percent nationwide and malaria deaths by 76 percent since 2010 in PMI focus provinces through investments totaling almost $293 million through FY 2019.

The proposed PMI FY 2020 budget for Zambia is $28 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Zambia for FY 2020. Developed in consultation with the National Malaria Elimination Program (NMEP) and key stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government Zambia as well as other donors and partners.

Zambia at a glance

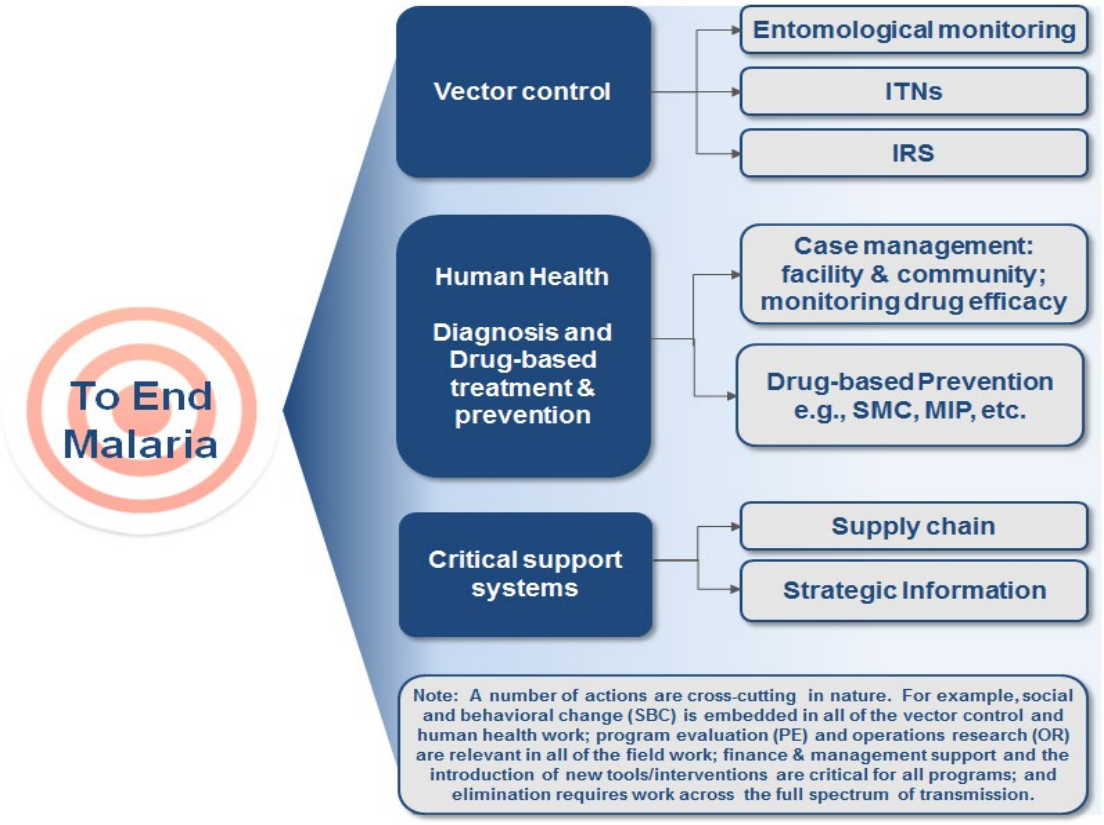
- **Geography:** Landlocked country located on the central plateau of the Southern African region with a land area of over 752,000 square kilometers
- **Climate:** The country is classified as humid subtropical or tropical wet and dry, with patches of semi-arid steppe climate in the southwest. In the north of the country rainfall is 1250mm or more a year, decreasing southwestwards to Livingstone where it is about 690 mm annually. Rainy seasons generally lasts from October/November through April/May, depending on latitude.
- **Population in 2019:** 17.5 million (Central Statistics Office)
- **Population at risk of malaria:** 100% (WHO)
- **Malaria incidence per 1000 population:** 311 (Zambia HMIS)
- **Under-five mortality rate:** 61/1000 (2018 DHS)
- **World Bank Income Classification & GDP:** Lower middle-income – GDP per capita $ 1,539 (World Bank Group)
- **Political system:** Multi-party democracy
- **Trafficking in Persons designations, 2016-2018:** Tier 2 Country (Department of State-Trafficking in Persons Report, June 2019)
- **Malaria funding and program support partners include (but are not limited to):**
  - Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund)
  - U.S. President's Malaria Initiative (PMI)
  - World Health Organization (WHO)
  - Bill and Melinda Gates Foundation (MACEPA Program)
  - Against Malaria Foundation (AMF)

- Isdell: Flowers Cross-Border Malaria Initiative
- Rotary Club
- Zambia End Malaria Council
- South African Development Community (SADC)- Elimination 8
- Mining companies and plantations

- **PMI Support of National Malaria Control Strategy:** As a major partner of the Zambian National Malaria Elimination Program (NMEP within the Ministry of Health (MOH), PMI aims to help the country accelerate toward its goal of malaria elimination as aggressively as resources, epidemiologic realities, and local constraints allow. PMI prioritizes reducing disease burden in high-burden areas in northern Zambia while beginning to invest a portion of its budget (approximately 16% in FY 2019) in pre-elimination settings. (See section III. Overview of PMI's support of Zambia National Malaria Elimination Strategic Plan for additional details).
- **PMI Investments:** Zambia began implementation as a PMI focus country in FY 2007 The proposed FY 2020 PMI budget for Zambia is $28 million, which brings the total PMI investment to nearly $322 million.

PMI organizes its activities and planning levels around the activities in Figure 1, in line with the national malaria strategy.

Figure 1. PMI's Approach to End Malaria



PMI's approach is both consistent with and contributes to USAID's Journey to Self-Reliance framework. Building and strengthening the capacity of Zambia's people and institutions – from the central level to communities – to effectively lead and implement evidence-based malaria control and elimination activities remains paramount to PMI. As denoted in Table 2 (the budget table), nearly all of PMI's planned support for FY 2020 in the areas of vector control, human health, supply chain, and strategic information contains elements of capacity building and system strengthening. PMI/Zambia will continue to rely on and engage with local partners such as the Churches Health Association of Zambia (CHAZ) and is expanding its local partner base to reach religious institutions like the Zambian Interfaith Networking Group and community-based organizations like local Rotary Clubs and the Girl Guides Association of Zambia. Finally, PMI/Zambia will continue to rely on private sector partnerships and is expanding its engagement with mining companies like Konkola Copper Mines.

To accelerate the journey to self-reliance, PMI developed a programmatic inventory to assess the strengths and persistent challenges of Zambia's program (see Annex B). The activities proposed in this MOP are tailored to draw on these strengths and address the weaknesses, which will be monitored to evaluate the effectiveness of capacity building efforts. In addition, while PMI is cognizant that it will take time before Zambia is capable of fully financing its development priorities, PMI will work with other partners (e.g., the Global Fund) to jointly track Zambia's funding commitments across the malaria portfolio.

II. MALARIA SITUATION AND MALARIA CONTROL PROGRESS IN ZAMBIA

While recognized internationally for its ambitious goal of malaria elimination, and for having attained pre-elimination levels in Southern Province, Zambia as a whole remains a highly endemic malaria country, with the entire population considered to be at risk of contracting malaria. Zambians suffer over 5.2 million malaria cases per year (HMIS 2015-2018). Risk is highest in the wetter, rural, impoverished provinces of Luapula, Northern, Muchinga and North Western (11-30 percent prevalence in 2018), and lowest in Lusaka Province (0.1 percent and Southern Province (<0.1 percent). At district level, malaria incidence varies widely, from less than 50 cases to over 500 cases per 1,000 population (*2018 Zambia Malaria Indicator Survey (MIS), HMIS 2018).* Zambia has made significant progress in malaria control in partnership with PMI, the Global Fund, the Bill and Melinda Gates Foundation (BMGF), NGOs such as PATH, CHAZ, research institutions, and others. This is reflected in encouraging trends in several indicators in the 2018 MIS and 2018 HMIS:

- Malaria deaths declined by 76 percent since 2010 in four high burden provinces where PMI/Zambia focused its support.
- The national infection rate in children under five decreased from 22 percent in 2006 to 9 percent in 2018.

- 80 percent of households owned at least one insecticide-treated mosquito net (ITN), an increase from 38 percent in 2006.
- 77 percent of children in rural areas, where risk is greatest, slept under bed nets, an increase from 42 percent in 2008.
- 81 percent of pregnant women received medications to prevent malaria, an increase from 59 percent in 2006.

Figure 2. Trends in Malaria Prevalence

Percent of children age 6-59 months who tested positive for malaria by microscopy

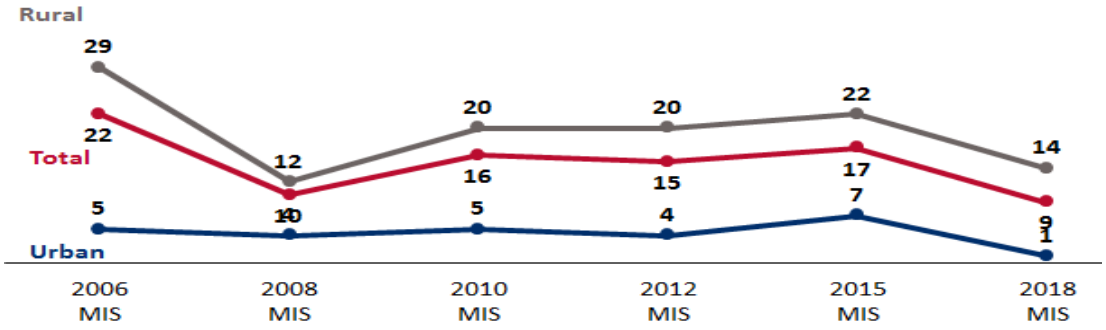


Figure 3. Trends in Prevalence of Low Hemoglobin

Percent of children age 6-59 months with moderate-to-severe anemia (hemoglobin < 8.0 g/dl)

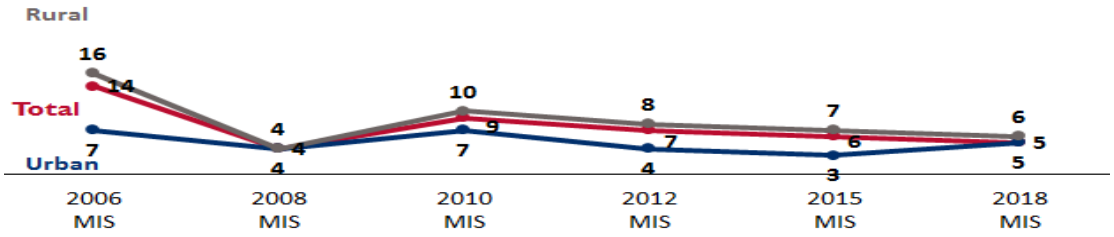


Figure 4. Malaria Parasite Prevalence Among Children Under Five Years of Age (5-59 Months) by Province (2018 MIS)

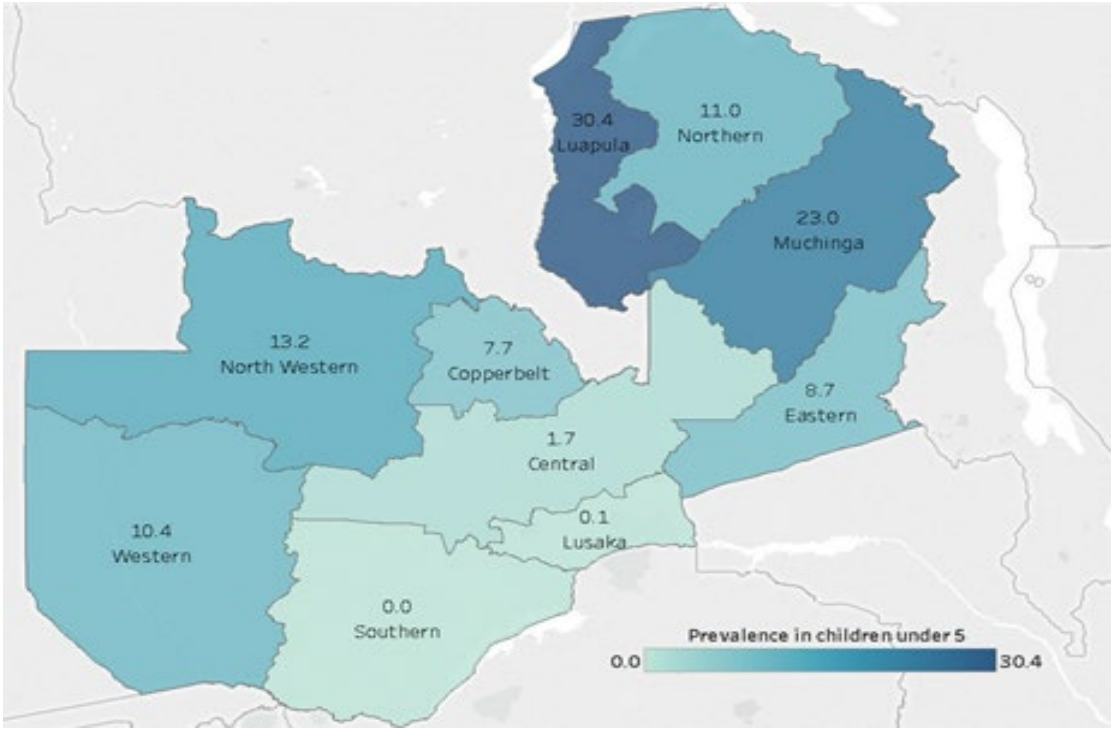


Figure 5. Key Indicators for Malaria Prevention and Treatment Coverage and Impact Indicators from Demographic Health Surveys (DHS) and Malaria Indicator Surveys (MIS) from 2006-2018.

Indicator	2006 MIS	2007 DHS	2008 MIS	2010 MIS	2012 MIS	2013-14 DHS	2015 MIS	2018 MIS
% Households with at least one ITN	38	53	62	64	68	68	74	80
% Households with at least one ITN for every two people		18				27		44
% Population with access to an ITN		34				47	65	67
% Population that slept under an ITN the previous night**		23				35		64
% Children under five years old who slept under an ITN the previous night**	24	29	41	50	57	41	58	69
% Pregnant women who slept under an ITN the previous night**	24	33	43	46	58	41		71
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought[1]		70				75		61
% Children under five with fever in the last two weeks who had a finger or heel stick	n/a	n/a	11	17		49	36	55

Indicator	2006 MIS	2007 DHS	2008 MIS	2010 MIS	2012 MIS	2013-14 DHS	2015 MIS	2018 MIS
% Children receiving an ACT among children under five years of age with fever in the last two weeks who received any antimalarial drugs		29	30	76	85	90	92	97
% Women who received two or more doses of IPTp during their last pregnancy in the last two years, at least one of which was administered during an ANC visit	57	63	60	69	70	73	79	81
% Women who received three or more doses of IPTp during their last pregnancy in the last two years, at least one of which was administered during an ANC visit					51	50	61	67
Under-five mortality rate per 1,000 live births		119				75		61*
% Children under five years of age with parasitemia (by **microscopy,** if done)**	22		10	16	15		17	9
% Children under five years of age with parasitemia (by **RDT**, if done)**								16
% Children under five years of age with severe anemia (Hb<8gm/dl)	14		4	9	7		6	5

Footnotes:

*Indicator source is preliminary data from the 2018 DHS Key Indicator Report rather than 2018 MIS.

**DHS/MICS surveys are generally fielded during the dry season, as opposed to MIS surveys, which are deliberately fielded during the high transmission season, which should be taken into consideration when interpreting these indicators.

[1]Note that this indicator has been recalculated according to the newest definition, care or treatment from any source excluding traditional practitioners wherever possible.

Figure 6. Evolution of Key Malaria Indicators Reported through Routine Surveillance Systems

	2014	2015	2016	2017	2018
# suspect malaria cases[1]	N/A	N/A	N/A	N/A	N/A
# patients receiving diagnostic test for malaria[2]	N/A	N/A	N/A	N/A	N/A
Total # malaria cases[3] (confirmed and presumed)	6,137,475	5,201,875	6,034,650	6,128,085	5, 248,366
# confirmed cases[4]	4,084,712	4,182,608	4,818,762	5,503,010	5,022,912
# presumed cases[5]	2,052,763	1,019,267	1,215,888	625,075	225,454
% of malaria cases confirmed[6]	67%	80%	80%	90%	96%
Test positivity rate (TPR)[7]	N/A	N/A	N/A	N/A	N/A
Total # <5 malaria cases[8]	2,424,395	1,999,849	2,132,139	2,022,175	1,643,137
% of cases under 5[9]	40%	38%	35%	33%	31%
Total # severe cases[10]	150,133	107,802	96,565	74,264	68,112
Total # malaria deaths[11]	3,162	2,337	1,783	1,410	1,214

	2014	2015	2016	2017	2018
# facilities reporting[12]	N/A	N/A	N/A	N/A	N/A
Data form completeness (%)[13]	79%	81%	87%	92%	92.3%

Data sources and comments:
N/A = not available

III. OVERVIEW OF PMI'S SUPPORT OF ZAMBIA'S MALARIA CONTROL STRATEGY

Zambia is in its eleventh year as a PMI focus country and is averaging $30 million per year in PMI support since FY 2017. PMI supports a comprehensive package of malaria control interventions in support of the *National Malaria Elimination Strategic Plan 2017-2021 (NMESP)*, including large-scale purchases of commodities and technical assistance. PMI Zambia works in close consultation with the Ministry of Health to design and implement the annual *Malaria Operational Plan* (www.pmi.gov), which allocates PMI funding by intervention area and geographic focus. The NMESP promotes a stratified approach to implementation at the level of the health facility catchment area (HFCA), whereby malaria incidence thresholds will guide the intervention package toward the goal of malaria elimination (Figures 8B-8D). Since 2014, PMI has focused most of its technical assistance on the high-burden provinces of Luapula, Northern, Muchinga, and Eastern Provinces. Since 2018, additional, modest support in case management technical assistance for Central and Copperbelt, and beginning in 2019 the PMI-funded IRS program has incorporated support for rural and peri-urban areas of Copperbelt.

Consistent with the global *PMI Technical Guidance*, PMI/Zambia's investment strategy focuses on the promotion of high coverage of a set of high-quality, evidence-based malaria control interventions:

- Indoor residual spraying, complemented by entomologic monitoring
- Insecticide treated mosquito nets, distributed both continuously through clinics and schools as well as periodically through mass campaigns
- Malaria in pregnancy interventions, including intermittent preventive treatment
- Case management of malaria, including prompt diagnosis and treatment and pharmaceutical supply chain strengthening
- Data for decision making, gleaned from surveillance, monitoring and evaluation, and operations research activities
- SBC, to promote consistent and correct use of interventions by high proportions of target populations and service providers.
- Elimination activities, as described below.

Since FY 2010, PMI has been allocated $24-25 million year through the MOPs to support interventions #1 through #6 in our "main program," which supports a set of high burden provinces and districts (Luapula, Muchinga, Northern, and Eastern, as well as targeted support to rural Copperbelt and Central). In addition, in FY 2017 PMI/Zambia established a complementary "pre-elimination program" in a set of low-burden districts in Eastern Province. This is funded by a new Congressional earmark for malaria elimination activities, totaling approximately $5 million per year. The aim is to achieve high coverage of the conventional PMI package of interventions, utilizing state-of-the-art mapping and modelling tools while maximizing program learning, so that these districts may serve as pathfinders for the country. Initial funding supported activities in three pre-elimination districts, with a proposed expansion to two additional districts with FY 2020 funds.

The incorporation, since FY 2017, of enhanced activities in pre-elimination districts represented a new strategic direction for PMI/Zambia, where instead of investing all resources in the highest burden areas in order to maximize reduction of morbidity and mortality, PMI would invest a portion in already low-burden areas. Therefore, PMI, in consultation with the NMEP and partners, developed an explicit strategy for investing this district funding stream in the pre-elimination districts. This is illustrated in the schema in Figures 8A through 8D. The approach is consistent with *PMI Technical Guidance* and is responsive to WHO and Zambia NMESP strategic frameworks. It facilitates the vigorous pursuit of elimination and learning about elimination as valuable albeit lesser objectives in their own right, while not distorting or distracting from the main thrust of PMI/Zambia's program.

The NMESP distinguishes between "tactical approaches" that apply in the country's high versus low burden settings. While setting forth ambitious goals, the NMESP recognizes that "the goal of elimination is still distant in some areas, due to the relatively high disease burden, low coverage of interventions, insufficient development of the local health system, and technical and operational constraints."

For *high-transmission settings,* the tactical approach comprises the following recommended actions:

- Achieving effective coverage with malaria curative and preventive services;
- Improving the quality and timeliness of information systems for decision-making to further reduce malaria transmission; and
- Reducing the malaria burden to a sufficiently low level to enable the implementation of parasite-clearance strategies.

On the other hand*, in low transmission settings* or "where recent progress has markedly reduced transmission," the NMESP states that "priority should be given to elimination," and the recommended actions include:

- "Interrupting malaria transmission;

- Reporting and responding to all confirmed cases, and preventing continued transmission;
- Determining the underlying causes of residual transmission; and
- Maintaining and documenting malaria elimination."

At this higher level, PMI strategy fully embraces the national approach. However, as in many countries, at a more granular level PMI Zambia's strategic approach does not align 100 percent with the national strategy. For example, PMI takes a more cautious approach regarding the cost-effectiveness of mass drug administration (MDA), especially in higher transmission settings, as the effect is often transient and attaining high population coverage rates is challenging. No funding for MDA has yet been programmed. However, PMI Zambia may consider collaboration in a trial of MDA in pre-elimination districts in the future, in the context of operations research.

Figure 7. PMI's Geographic Focus 2014-2020

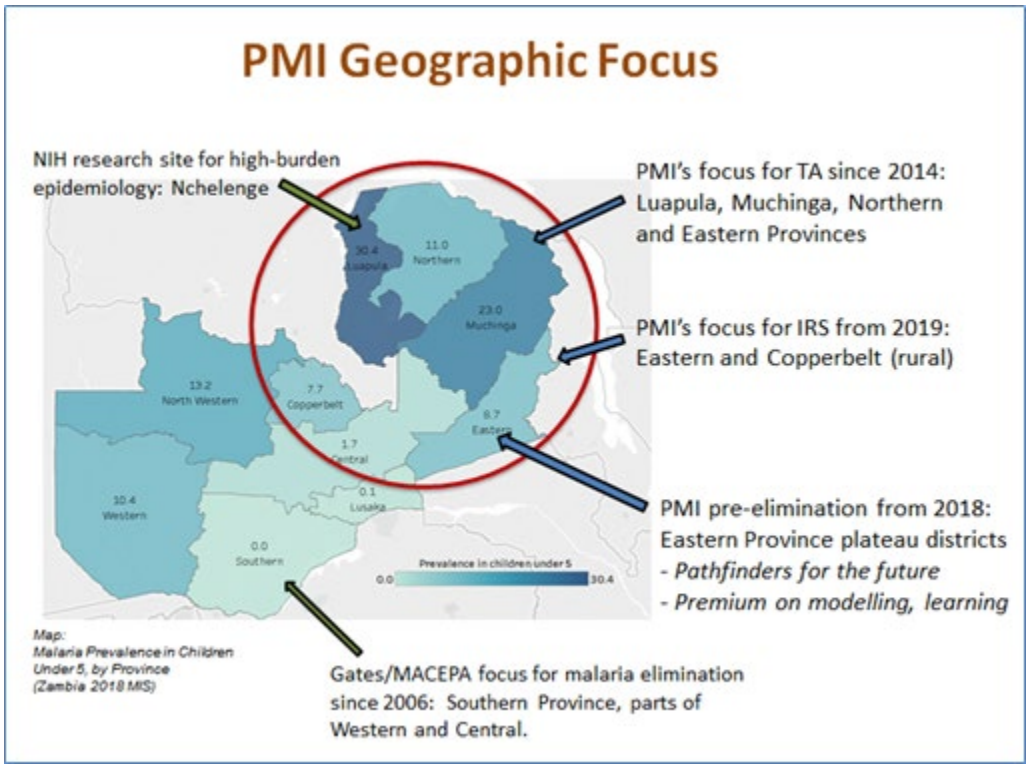


Figure 8. NMESP Intervention Strategy: The Stratified Approach

LEVEL	MALARIA INDICATOR	INTERVENTION PACKAGE/ACTIVITIES	ACCELERATOR
LEVEL 0	0 cases, no local transmission	No malaria, maintenance of malaria-free zone • High quality surveillance and vigilance • Core vector control and case management • Case investigation capacity maintained • Chemoprophylaxis	
LEVEL 1	1–49 cases/1,000 population/yr; Typical range <1% parasite prevalence	Very-Low malaria transmission • High quality surveillance • Vector control (possibly enhanced) • Community and facility-based case management • Case and foci investigation	• Mass drug administration (may be considered under certain circumstances)
LEVEL 2	50–199 cases/1,000 population/yr; Range 0.5%–<5% parasite prevalence	Low malaria transmission • Build high quality surveillance • Vector control (possibly enhanced) • Community and facility-based case management • Establish case and foci investigation capacity	• Mass drug administration
LEVEL 3	200–499 cases/1,000 population/yr; Range 5%–<15% parasite prevalence	Moderate malaria transmission • Improve quality surveillance • Vector control (possibly enhanced) • Facility-based case management; build community case management and outreach • Establish case and foci investigation capacity	• Mass drug administration (may be considered for specific areas with case investigation capacity) • Enhanced vector control if relevant
LEVEL 4	>500 cases/1,000 population/yr; Range >15% parasite prevalence	High malaria transmission • Build quality surveillance • Vector control at high coverage (100% coverage of IRS and sustained high coverage of ITNs) • Facility-based case management; begin to build community case management and outreach • Prepare for case and foci investigation capacity	• Prepare for mass drug administration and conduct MDA where logistic and feasibility considerations are met, especially at lower Level 4 thresholds • Enhanced vector control if relevant

Figure 9. Intervention Strategy: Stratified Approach Based on Incidence in HFCAs

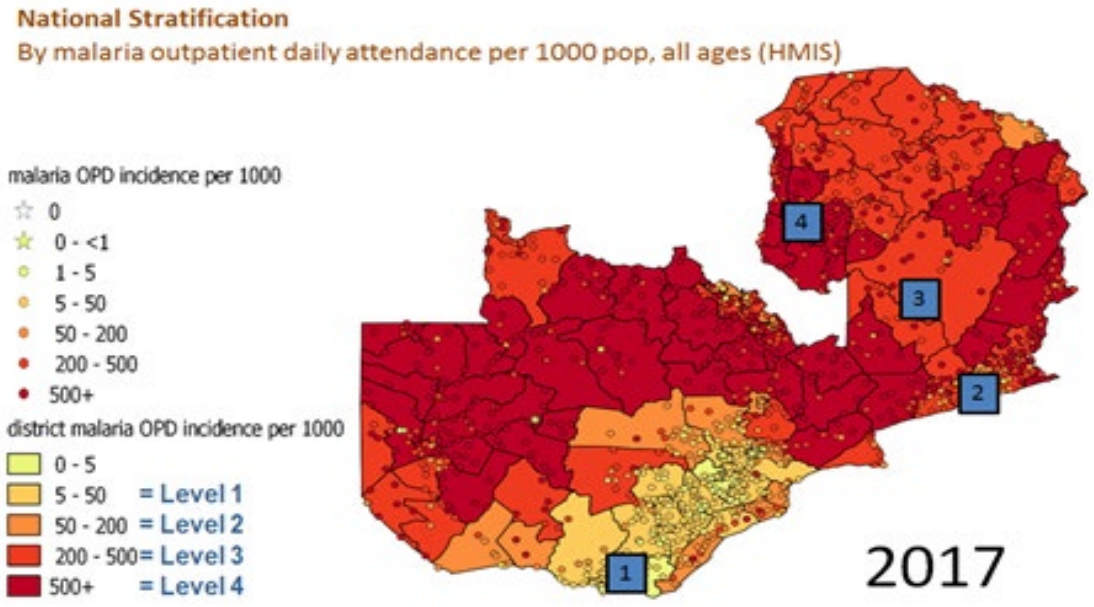
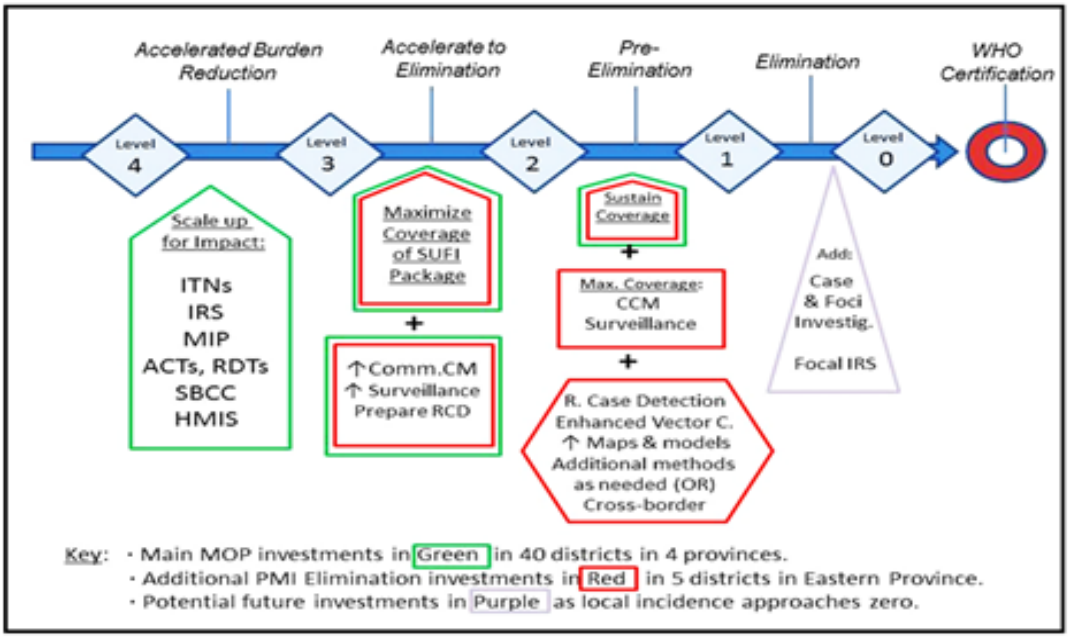


Figure 10. Intervention Strategy: PMI Approach to Supporting NMESP's Intervention Strategy



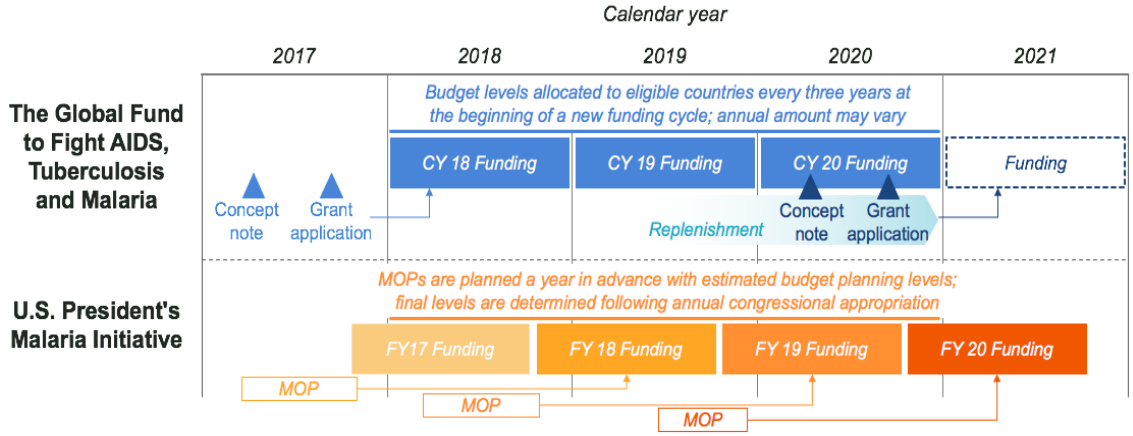
Source: FY 17 and FY 19 MOPs

IV. PARTNER FUNDING LANDSCAPE

PMI emphasizes the importance of partner alignment on malaria control. With the recognition that each of the agencies emphasizes complementary funding support for the national malaria control effort in a given country, over the last year, PMI, Global Fund, and BMGF set out to harmonize financial, supply chain, and programmatic data, and this effort remains ongoing as of the time of this MOP. A harmonized financial taxonomy has been developed for PMI and Global Fund (i.e. mapping cost categories across organizations).

Figure 11 visualizes the annual cycle of PMI funding and the MOP implementation year. As the figure illustrates, any given FY MOP funds activities that take place during the next CY. For example, the FY 2020 MOP funds implementation during CFY 2021. Whereas Global Fund funding (and often, other partners and host country governments) is based on a three-year grant cycle on a calendar year (CY) timeframe during which activities were implemented. Annual PMI country budget allocations depend largely on the U.S. Congress' total overall malaria funding appropriation to USAID in a given fiscal year, as well as other considerations (e.g. previous funding levels, activity and program pipelines, other donor contributions, known commodity needs/gaps, progress on ongoing PMI-supported activities, clear evidence of continued government commitment to malaria control).

Figure 11. PMI and Global Fund Funding Cycle Alignment



Footnote: In some cases, Global Fund's funding may come in partway through the calendar year. Funding levels in "Section IV - Partner Funding Landscape" and commodity procurement amounts listed in "Annex A - Intervention Specific Data" may differ given the lag between the year that funding was planned and the year when procurement orders were placed. Differences may be a reflection of timing and/or based on changes in commodity consumption levels at country level, changes in commodity costs, or other donor orders.

Figures 12 - 14 summarize contributions by external partners and host country government in calendar years 2018-20, with the goal of highlighting total country investments. For Zambia, data is available for PMI (FY 2017-19) and Global Fund (CY 2018-20). As the Global Fund 2021-23 grant funding cycle is not yet underway at the time of this PMI FY 2020 MOP development, Global Fund country investments for the 2021 implementation period and beyond are not yet known. Note that the host country government invests substantial funding into the national-to-local infrastructure and service delivery for malaria and many other programs. However, there has not been a standardized method for attributing those investments to malaria specifically. Thus, it may not yet be possible in the FY 2020 MOP cycle to attribute funding from the host country government. There may be similar challenges for other partners.

Figure 12. Annual Budget by Level 1 Category

Year[1]	Funder	Vector Control	Case Management	Drug-Based prevention[2]	Supply Chain[3]	Monitoring, Evaluation & Research	Other Cross-Cutting and Health Systems Strengthening	Total
FY17/ CY18	PMI	$13.3M	$7.7M	$0.5M	$1.3M	$3.1M	$4.1M	**$30.0M**
	Global Fund	$6.8M	$11.3M	-	$0.8M	$2.1M	$5.5M	**$26.4M**
	Host Gov[4]	-	-	-	-	-	-	**$18.7M**
	Other (PATH/ MACEPA)[5]	-	-	-	-	-	-	**$3.7M**
	Total	**$20.1M**	**$19.0M**	**$0.5M**	**$2.0M**	**$5.2M**	**$9.5M**	**$78.8M**

Year[1]	Funder	Vector Control	Case Management	Drug-Based prevention[2]	Supply Chain[3]	Monitoring, Evaluation & Research	Other Cross-Cutting and Health Systems Strengthening	Total
FY18/ CY19	PMI	$11.0M	$4.9M	$0.4M	$1.0M	$1.5M	$3.2M	**$22.0M**
	Global Fund[6]	$11.3M	$4.4M	-	$0.8M	$1.1M	$5.6M	**$23.2M**
	Host Gov[4]	-	-	-	-	-	-	**$14.2**
	Other (PATH/ MACEPA)[5]	-	-	-	-	-	-	**$3.2M**
	Total	**$16.4M**	**$9.4M**	**$0.4M**	**$1.8M**	**$2.6M**	**$8.8M**	**$39.3M**
FY19/ CY20	PMI	$14.2M	$6.7M	$.4M	$1.6M	$1.8M	$3.2M	**$28.0M**
	Global Fund[6]	$23.7M	$1.5M	-	$.8M	$1.0M	$4.8M	**$31.8M**
	Host Gov[4]	-	-	-	-	-	-	**-**
	Other[5]	-	-	-	-	-	-	**-**
	Total	**$31.4M**	**$8.2M**	**$0.4M**	**$2.4M**	**$2.9M**	**$8.1M**	**$53.3M**

Footnotes:

1. Each year's figures represent the FY for PMI and one CY for Global Fund that most closely align
2. Drug-based prevention, including SMC and MIP where relevant;
3. Covers management of in-country warehousing & distribution of malaria commodities, except for ITNs which are separately captured under "Vector Control"
4. Host government data is provided in the text below and comes from the partner financial contribution review conducted as part of a Mid-term Review in May 2019.
5. "Other" only represents funding provided by PATH/MACEPA and does not include all of the other donors. The data provided in the text below comes from the partner financial contribution review conducted as part of a Mid-term Review in May 2019.
6. Global Fund's contribution includes the Prioritized Above Allocation Request (PAAR) for IRS for CY 2019 and CY 2020.

Note: Categories shown reflect the harmonized financial taxonomy (Levels 1-3) developed by BMGF, Global Fund, and PMI in 2019, as part of a broader data harmonization initiative; potential for categories to continue to evolve through FY 2020 MOP process, as well as for additional donors and host country governments to adopt and reflect funding using the same categories. At this time, the Host Government and other donors do not yet have a harmonized financial taxonomy and so only the total of their malaria financial contribution is represented here.

The Government of the Republic of Zambia (GRZ) has generally increased domestic resources for the national malaria elimination program, including allocating $24 million annually towards the procurement of antimalarial commodities beginning in 2013. However, in 2018 and 2019 GRZ contributions fell from approximately $27.9 million in 2017 to $18.7 million in 2018 and $14.2 million in 2019 as a result of austerity measures. It is unclear whether the situation will improve in 2020 and 2021.

With the exception of PMI, Global Fund provides the largest malaria financial contribution in the country. Over the life of the grant, from 2018 to 2020, the Global Fund is providing $51,274,510 to the Ministry of Health (MOH) and $17,725,490 to CHAZ. The MOH is receiving an additional $12,437,067.50 million through a Prioritized Above Allocation Request for IRS split

between CYs 2019 and 2020. Thus, the current total of funds provided by the Global Fund for the period of 2018 to 2020 is approximately $81.4 million.

PATH/MACEPA, with funding from the BMGF, is also a crucial contributor to malaria financing in the country. PATH/MACEPA contributed approximately $3.7 million in CY 2018 and $3.2 million in CY 2019.

Other partners contributing financially for malaria prevention and treatment efforts across the country include WHO; AMF (anticipated); Isdell: Flowers Cross Border Malaria Initiative; faith-based and community-based organizations such as CHAZ, the Anglican Church, and Rotary Clubs; copper mining companies and sugar plantations; and Macha Malaria Institute.

Figure 13. Annual Budget by Level 3 Category, Detailed Breakdown for PMI and Global Fund

Level 1 Category	Level 1 Category	FY17/CY18[1]		FY18/CY19[1]		FY19/CY20[1]	
		PMI	Global Fund	PMI	Global Fund	PMI	Global Fund
Vector Control	Procure ITNs for Continuous Distribution	$2.4M	$1.7M	$2.0M	$0.6M	$1.5M	-
	Distribute ITNs via Continuous Distribution	$0.9M	$0.1M	$0.4M	$0.0M	-	$0.7M
	Procure ITNs for Mass Campaigns	$0.2M	-	-	-	$3.4M	-
	Distribute ITNs via Mass Campaigns	$0.1M	-	-	-	-	$7.0M
	Other ITN Implementation*	$0.2M	-	$0.2M	-	$0.7M	-
	IRS Implementation[4]	$8.9M	$1.5M	$7.8M	$1.3M	$7.9M	$1.4M
	Procure IRS Insecticide[4]	-	$2.1M	-	$2.2M	-	$2.2M
	Other IRS*	$0.03M	-	-	-	$0.03M	-
	Entomological Monitoring	$0.7M	$0.6M	$0.6M	$0.7M	$0.7M	$0.7M
	SBC for Vector Control[5]	-	$0.05M	-	$0.1M	-	-
	Other vector control measures	-	-	-	-	-	-
	Removing human rights- and gender-related barriers to vector control programs**	-	-	-	-	-	-

Level 1 Category	Level 1 Category	FY17/CY18[1]		FY18/CY19[1]		FY19/CY20[1]	
		PMI	Global Fund	PMI	Global Fund	PMI	Global Fund
Case Management	Active Case Detection**	-	$0.1M	-	$0.04M	-	$0.04M
	Community-based case management	-	$2.1M	-	$1.9M	-	$0.5M
	Facility-based case management	-	$0.6M	-	$0.4M	-	$0.3M
	Private-sector case management	-	-	-	-	-	-
	Procure ACTs	$3.4M	$5.8M	$2.0M	-	$3.1M	-
	Procure Drugs for Severe Malaria	-	-	-	-	-	-
	Procure Other Diagnosis-Related Commodities	$0.1M	$0.3M	$0.04M	-	$0.04M	-
	Procure Other Treatment-Related Commodities	-	-	-	-	-	-
	Procure RDTs	$1.1M	$1.0M	$0.7M	$1.6M	$1.6M	$0.2M
	Therapeutic Efficacy	-	-	-	-	-	-
	SBC for Case Management[5]	-	$0.3M	-	$0.3M	-	$0.4M
	Other Case Management	$3.2M	-	$2.2M	-	$2.1M	-
Drug-Based Prevention[2]	Procure SMC-Related Commodities	-	-	-	-	-	-
	SMC Implementation	-	-	-	-	-	-
	Prevention of Malaria in Pregnancy Implementation	$0.5M	-	$0.4M	-	$0.4M	-
	Procure IPTp-Related Commodities	-	-	-	-	-	-
	IPTi**	-	-	-	-	-	-
	SBC for Drug-Based Prevention[5]	-	-	-	-	-	-
	Other Prevention**	-	-	-	-	-	-

Level 1 Category	Level 1 Category	FY17/CY18[1]		FY18/CY19[1]		FY19/CY20[1]	
		PMI	Global Fund	PMI	Global Fund	PMI	Global Fund
Supply Chain[3]	In-Country Supply Chain[3]	-	-	-	-	$1.0M	-
	Supply Chain Infrastructure	-	$0.05M	-	$0.50M	-	-
	Ensuring Quality	-	$0.7M	-	$0.8M	-	$0.8M
	Pharmaceutical Management Systems Strengthening	$1.3M	-	$1.0M	-	$0.6M	-
	Supply Chain System Strengthening	-	-	-	-	-	-
Monitoring, Evaluation & Research	Reporting, Monitoring, and Evaluation	$2.6M	$0.4M	$1.5M	$0.2M	$1.5M	$0.0M
	Program and data quality, analysis and operations research	-	$0.9M	-	$0.8M	-	$0.8M
	Surveys	$0.4M	$0.8M	-	$0.1M	$0.2M	$0.2M
	Other Data Sources**	-	-	-	-	-	-
	Support for FETP*	$0.1M	-	-	-	$0.1M	-
Other Cross-Cutting and Health Systems Strengthening	Integrated service delivery, quality improvement, and national health strategies**	-	-	-	-	-	-
	Financial management systems**	-	$0.1M	-	$0.1M	-	$0.1M
	Community responses and systems**	-	$1.7M	-	$1.8M	-	$1.1M
	Support for PCV and SPAs*	$0.02M	-	$0.05M	-	-	-
	Cross-Cutting Human Resources for Health**	-	-	-	-	-	-
	Central and Regional Program management[6]	$0.1M	$0.4M	$0.1M	$0.4M	$0.1M	$0.4M
	In-Country Staffing and Administration*	$1.7M	-	$1.6M	-	$1.9M	-
	Other Program Management**	-	$3.1M	-	$3.3M	-	$3.2M

Level 1 Category	Level 1 Category	FY17/CY18[1]		FY18/CY19[1]		FY19/CY20[1]	
		PMI	Global Fund	PMI	Global Fund	PMI	Global Fund
	SBC Unspecified[5]	$2.3M	-	$1.5M	-	$1.3M	-
Total		**$30.0M**	**$26.4M**	**$22.0M**	**$17.3M**	**$28.0M**	**$25.3M**

Footnotes:

1. Each year's figures represent the FY for PMI and CY for Global Fund that most closely align;
2. Drug-based prevention, including SMC and MIP where relevant;
3. Covers management of in-country warehousing & distribution of malaria commodities, except for ITNs which are separately captured under "Vector Control";
4. May include cost of IRS insecticides if full cost of IRS implementation including commodities was bundled within single line in prior year's Table 2;
5. SBC was not historically split in the PMI budget across intervention areas, hence the row “SBC (unspecified)” for the FY 2020 MOP cycle. Going forward, SBC proposed activities will be categorized across vector control, case management, and prevention (new categories). 6. PMI Proposed Activity "National-level support for case management" rolls up under "Case Management" Level 1

Note: Categories shown reflect the harmonized financial taxonomy (Levels 1-3) developed by BMGF, Global Fund, and PMI in 2019, as part of a broader data harmonization initiative; potential for categories to continue to evolve through FY 2020 MOP process, as well as for additional donors and host country governments to adopt and reflect funding using same categories.

* Category currently funded by PMI only

** Category currently funded by Global Fund only

Figure 14. Annual Budget, Breakdown by Commodity

Year[1]	Funder	ITNs for Continuous Distribution	ITNs for Mass Distribution	IRS Insecticide[4]	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
FY17/CY18	PMI	$2.4M	$0.2M	-	$3.4M	$1.1M	-	-	-	**$7.0M**
	Global Fund	$1.7M	-	$2.1M	$5.8M	$1.0M	-	-	-	**$10.6M**
	Total	**$4.1M**	**$0.2M**	**$2.1M**	**$9.2M**	**$2.1M**	**-**	**-**	**-**	**$17.6M**
FY18/CY19	PMI	$2.0M	-	-	$2.0M	$0.7M	-	-	-	**$4.7M**
	Global Fund	$0.6M	-	$2.2M	-	$1.6M	-	-	-	**$4.4M**
	Total	**$2.6M**	**-**	**$2.2M**	**$2.0M**	**$2.4M**	**-**	**-**		**$9.2M**
FY19/CY20	PMI	$1.5M	$3.4M	-	$3.1M	$1.6M	-	-	-	**$9.5M**
	Global Fund	-	-	$2.2M	-	$0.2M	-	-	-	**$2.5M**
	Total	**$1.5M**	**$3.4M**	**$2.2M**	**$3.1M**	**$1.8M**	**-**	**-**	**-**	**$12.0M**

Footnotes:

1. Each year's figures represent the FY for PMI and CY for Global Fund that most closely align.
2. PMI commodity costs are fully loaded, including costs for the ex-works price of the commodity, quality control, freight, insurance, and customs.
3. Global Fund commodity costs in table above only include ex-works commodity value in a given year. Additional costs, including quality control, freight, insurance, and customs totaled $7.7 million over the CY 2018-2020 period;

4. IRS insecticide; for PMI, IRS insecticide commodity costs may be inextricable from IRS implementation costs in historical data – field left blank where this is the case.

Note: Categories shown reflect the harmonized financial taxonomy (Levels 1-3) developed by BMGF, Global Fund, and PMI in 2019, as part of a broader data harmonization initiative; potential for categories to continue to evolve through FY 2020 MOP process, as well as for additional donors and host country governments to adopt and reflect funding using same categories.

V. ACTIVITIES TO BE SUPPORTED WITH FY 2020 FUNDING

Please see the FY 2020 budget tables (Tables 1 and 2) for a detailed list of activities PMI proposes to support in Zambia with FY 2020 funding. Please refer to www.pmi.gov/resource-library/mops for the latest tables. Key data used for decision-making can be found in Annex A.

ANNEX A: INTERVENTION-SPECIFIC DATA

1. VECTOR CONTROL

NMEP objective
● To provide access to modern vector control at high coverage (100 percent of population live in areas covered by IRS or in households covered by ITNs). In the MIS 2018 survey, 84 percent of households reported either owning at least one ITN, receiving IRS in the past 12 months, or both. By the more stringent criteria of owning one net per two people or receiving IRS in the past 12 months, the figure was 61 percent. The goal is to rapidly accelerate the combined coverage of ITNs and IRS toward 100 percent. ● Where specifically appropriate, implement additional interventions such as larviciding and environmental manipulation; baited traps; etc. (This aspect of NMEP strategy is not supported by PMI.) ● All activities should be supported by vector surveillance (i.e. bionomics and insecticide resistance status) to direct and update action.
NMEP approach
● Indoor Residual Spraying (IRS): Zambia allocates IRS resources to nearly all districts in the country for IRS, unlike most PMI focus countries. From 2011 to 2018, IRS resources were typically rationed out such that 20-30 percent of the population in each district would receive IRS in a targeted approach, with prioritization. Since 2016, the stated MOH target for IRS is an ambitious 80 percent of the full national population. In recent years, annual operational coverages have been increasing toward this goal, as resources have permitted. So, for example, in 2017-18 campaign, 35 percent of households were sprayed nationwide according to the MIS. In the ongoing 2019-20 campaign, the NMEP has increased the national target to 65 percent of the population, based on the increased availability of resources (PMI + GF + GRZ). Per longstanding Zambian practice, targeting of IRS at sub-district level is based on criteria such as operational feasibility, high burden, history of past spraying, and population density. Each local area which has been targeted for spraying should achieve the WHO-recommended threshold of >85 percent coverage of eligible structures. WHO recommended insecticides will be used in rotation to mitigate the reported vector resistance to insecticides in Zambia as per Zambia Insecticide Resistance Management Plan. ● Insecticide treated nets (ITNs): ITNs will be distributed in periodic mass campaigns to populations who live in local areas which have not received IRS, with prioritization of high burden areas, aiming for one ITN per 1.8 persons in targeted communities. The NMEP planning approach allows for an operational buffer of 10 percent co-deployment of IRS and ITNs, so as to minimize cases where local areas might receive neither intervention. Thus the 2020-21 ITN campaign will target areas not reached in the preceding 2019 and 2020 IRS campaigns, and will aim to reach an estimated 45 percent of the population (35 percent to

coverage the gap from IRS plus the 10 percent buffer). Mass ITN campaigns had been conducted every three years to ensure universal coverage, but the last such universal coverage campaign took place in 2017-18.

- Of note, this approach to ITN mass campaigns is not consistent with PMI recommendations, but is reflective of the MOH's prioritization of IRS for vector control nationally. While PMI and other partners are providing technical assistance to help the national strategy succeed, it remains unclear whether there is capacity to implement the fine-scale mosaic of IRS versus ITN targeting which is envisioned, outside of the handful of mSpray-supported districts.
- Continuous distribution will operate during non-campaign years per longstanding Zambian policy, and will target vulnerable groups, namely young children and pregnant women. Continuous distribution of ITNs is nationwide through channels such as antenatal care (ANC) and Expanded Program for Immunization (EPI), and in selected primary schools where support is available.
- Larval source management (LSM): Larval control is part of the integrated vector management (IVM) strategy of the NMEP, but has not been widely implemented in vector control, as attention and resources have been primarily invested in the IRS and ITN strategies, and is difficult to implement in the innumerable rural breeding sites during the rainy season. Although LSM is part of the IVM strategy, implementation has been funded on a very limited basis, typically at the city council level in large urban centers, in which objectives for malaria control and nuisance mosquito control overlap.
- Entomological surveillance: The NMEP and partners will ensure the operation of a nationwide network of entomologic monitoring sites, supplemented by spot-checks if needed, and supervised by qualified entomologists and vector control specialists. The purpose of this surveillance system will be to inform the monitoring and decision-making needs of the NMEP and partners, in terms of optimizing vector control interventions and implementing the insecticide resistance management plan.

PMI objective, in support of NMEP

- Oversight, planning and coordination: PMI provides technical assistance and facilitation for multi-sectoral national technical and governing bodies including the Vector Control Technical Working Group, the Technical Advisory Committee of Insecticide Resistance Management, and ad hoc task forces and organizing committees such as the 2019 ITN Mass Campaign Planning Task Force
- Technical assistance and commodity support: PMI is the country's largest partner in supporting entomologic surveillance, IRS campaigns, and ITN distribution, eclipsing even the Global Fund. Through the annual work planning process, PMI works within its MOP allocations to align these contributions with those of other partners, such as Global Fund, MACEPA, and Tropical Diseases Research Centre (TDRC), in support of the NMESP.

- IRS and ITNs for vector control: PMI provides national-level technical assistance to improve MOH capacity to plan, manage, and implement these priority interventions using a range of GRZ and partner resources; provides operational and commodity support for implementing IRS and ITN campaigns in selected districts and provinces; provides commodity support for ITN distribution through routine channels nationwide as well as operational support in selected provinces and districts.
- Cross-cutting: PMI provides health system support of benefit to vector control in such areas as management training; SBC; surveillance; data integration and visualization; program and evaluation and, occasionally, in operations research.
- PMI's technical strategy in vector control does not align fully with the national approach in all respects. Notably PMI advocates universal access to ITNs and does not fund larval source management. While PMI did support use of DDT in Zambia through 2010, PMI is currently unable to procure or spray with DDT for the foreseeable future, due to the current absence of a WHO pre-qualified supplier. However, PMI Zambia remains committed to support the country to meet its goals of providing access to evidence-based, high-quality vector control to 100 percent of households. In spite of these differences in strategic approach, we find common ground in our shared goal of maintaining or improving upon Zambia's already high rates of household coverage with effective vector control. In the 2018 MIS, 84 percent of households reported owning at least one ITN and/or receiving IRS within the past 12 months.

PMI-supported recent progress (past ~12-18 months)

Entomologic surveillance:

- PMI-supported MOH, project, and community personnel have been conducting entomological surveillance in 6-7 districts on a monthly basis since 2014 and providing the NMEP data on local malaria vectors for decision-making. Two community sites have been established in each district, one in an area of year-on-year IRS implementation (sprayed site), and the other in a historically unsprayed area (control site).
- In early 2019, the geographic distribution of entomologic sites changed to reflect the geographic shift in IRS operations from 2019 (see IRS section). Three sentinel districts (six sites) were transitioned to the NMEP's Global Fund-supported program: namely Isoka in Muchinga, Mwense in Luapula, and Kasama in Northern. Three new sentinel districts (six sites) were established—two in Copperbelt Province (in Lufwanyama and Chililabomwe districts) and one in Nchelenge district (Luapula). Sites in Eastern Province did not change. As a contribution to the national surveillance system falling outside of the PMI IRS program, the NMEP requested PMI continue to support one additional sentinel district in Luapula (Milenge) and a longstanding sentinel district in Serenje (Central Province).
- Entomologic reports were generated bi-annually, shared with the NMEP and partners, and posted on the PMI website

ITNs:

- In 2018, PMI chaired the ITN task force and assisted the country in quantifying 2020 and 2021 mass distribution campaign needs and developing a clear implementation timeline. Support was given, and data provided, to request AMF 2020 and 2021 campaign support.
- In 2018, PMI procured a total of 800,000 ITNs to support continuous routine ANC/EPI distribution in six provinces.
- PMI supported the NMEP to review guidelines for continuous distribution of ITNs and provided technical and material support to the NMEC, as well as the District Health Director to implement school based distribution in Nchelenge, Luapula Province.
- Through an ITN field assessment in Northern and Luapula provinces, PMI helped identify issues in continuous ITN implementation including non-existence of ITN guidelines in health facilities resulting in inconsistent reporting, poor record keeping, and discrepancies in reporting format. PMI is currently taking steps to address these challenges.
- During 2018, PMI provided technical and material assistance to the NMEC to conduct the second phase of the ITN durability monitoring in Katete and Lundazi districts and in Eastern Province. The final durability monitoring data will be available in 2021.

Indoor Residual Spraying:

- Implementation of Zambia's IRS program in 2018 was built upon lessons learned as the country entered its eleventh year of PMI support for IRS. The program continued to implement IRS in the same four provinces that had been sprayed in 2017: Eastern (3 districts), Luapula (10 districts), Muchinga (7 districts) and Northern (9 districts). See map in Section 1.C.
- In 2018, the start of the campaign was moved forward by a month and timelines were compressed to compensate for the documented short residual efficacy of Actellic CS (Pirimiphos-methyl) under local conditions (3-5 months, as compared with the 7-8 month transmission season). To optimize enumeration and operational coverage in three pre-elimination districts, the satellite-based mSpray system was deployed. This enhanced planning, mop-up visits, and determination of true spray coverage.
- In 2018, the PMI-supported campaign targeted 617,000 structures in the same four high burden provinces. By the end of 34 days of IRS operations, the campaign reported finding 644,677 structures and spraying a total of 579,490 structures, yielding a spray coverage of 90 percent. A total of 2,818,176 people were protected by IRS, including 89,959 (3.2 percent) pregnant women and 411,416 (14.6 percent) children under five years old.
- The program trained a total of 2,089 people to deliver IRS in 2018. These included 1,564 spray operators, 295 team leaders, 147 supervisors, and 83 team leader assistants (used in

mSpray districts). To improve on community mobilization, the program engaged village headman on a more consistent basis than had been attempted in previous years.

- At the national level, PMI technical assistance was provided to produce national guidelines on IRS, harmonize national IRS M&E tools, and support data visualization for decision making using Tableau. A PMI-supported capacity assessment highlighted management deficiencies and quality concerns, especially in the area of on-time procurement and other weaknesses in planning and timely implementation. These findings have informed planning for Global Fund and PMI-support to the NMEP going forward.
- IRS is inherently challenging, and each year has brought its share of problems. In PMI areas, extra SBC investments including engaging traditional leaders during the actual spray campaign have been needed to combat "IRS fatigue" in certain communities, especially towns and areas with transient populations such as fishermen along Lake Tanganyika. PMI IRS operations in 2018 were suspended in Mpulungu District in Northern Province due to an ongoing USAID Office of the Inspector General investigation of data fraud associated with pilfering of pesticide during the 2017 season, prompting increase investments in supervisory staff in all districts. In certain areas, the later start meant that IRS teams found residents de-camped *en masse* to the forest to collect edible caterpillars, delaying completion of the campaign by one to two weeks. In response to chronically high refusal rates in Nchelenge district, PMI commissioned an SBC barrier analysis, which demonstrated longstanding and multifaceted challenges to community acceptance of IRS. In the non-PMI supported districts, a continuing concern in 2018 was the late start of IRS campaigns due to delayed release of funds, pesticide procurement delays, and other bottlenecks.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

Entomologic surveillance:

- PMI will continue to support NMEP to generate data on key entomological indicators including malaria vector species composition, insecticide resistance, vector density, human biting behavior (when and where biting occurs), and measures of transmission (parity rate, sporozoite rate, and blood meal sources) in seven districts.
- The total number of sites (14) and locations will remain constant from 2018. PMI will continue to support the NMEP's plans to scale up and operationalize national entomologic surveillance to a total of 22 sentinel sites (inclusive of the PMI-supported sites); the additional sites will be supported by Global Fund and MACEPA. For example, PMI plans to support needed training of entomology personnel and enhance supervision at the national lab.

ITNs:

- PMI will support the NMEP to build capacity at the national level in the planning, logistics, and monitoring and evaluation of the 2020-2021 mass campaign.

- PMI will assist the NMEP to plan at the national and provincial level in Luapula, Muchinga, and Northern Provinces for the 2020-2021 ITN mass distribution campaign.
- The PMI program will support ANC/EPI, continuous distribution of ITNs in Luapula, Northern, Muchinga and Eastern Provinces. PMI will also support school based distribution in Nchelenge district in Luapula province and in three pre-elimination districts (Chadiza, Katete, Sinda) in Eastern province.
- PMI will commission an assessment of the extent and drivers of ITN misuse. The information obtained will be used to improve social and behavior change activities to promote appropriate ITN use and to mitigate negative environmental impacts, such as on fishing grounds.

Indoor Residual Spraying:

- PMI will continue to support IRS implementation and build the capacity of the NMEP, provincial health offices (PHOs), and district health offices (DHOs) in all areas of IRS implementation in the 20 selected districts—nine districts in Eastern, ten in Copperbelt, and one in Luapula.
- The PMI-supported IRS program, in close collaboration with MOH, through the NMEP, PHOs, and DHOs, will coordinate the technical, financial, and operational aspects of IRS implementation in the targeted districts. The MOH, through DHOs, will assign its technical staff to serve during the spray period as district IRS coordinators and supervisors. The PMI program will work with DHOs to recruit and train SOPs, team leaders, and supervisors. Each year, the IRS program will conduct spray operations from early October through early November in each target district, which is one month earlier than was feasible with the shorter-acting pesticide that has been available in the 2014-2018 campaigns (Pirimiphos-methyl).
- The PMI program will also provide technical assistance to the NMEP and district health offices on the transition to the use of DDT for IRS in the districts where the PMI program has sprayed in 2018 located in Muchinga, Northern, and the remainder of Luapula Province. The assistance will include support to incorporate environmental compliance best practices, operational planning, facilitation of trainings, and monitoring and supervision visits during the campaign. In addition, the project will also assist the Global Fund Program Management Unit of the MOH on procurement best practices, particularly ordering of insecticides and IRS commodities.

1.A. ENTOMOLOGICAL MONITORING

Key Goal
Determine the geographic distribution, bionomics, and insecticide resistance profiles of the main malaria vectors in the country to inform vector control decision-making.

Do you propose to increase, decrease, or maintain funding allocation levels for this activity? Why, and what data did you use to arrive at that conclusion?

PMI Zambia will maintain funding allocation levels for entomological monitoring at levels comparable to FY 2019. This is based on the following rationale:

- For the foreseeable future, the national entomologic surveillance network will depend on external partner funding and technical assistance. This is based on review of Global Fund implementation budgets, the NMESP gap analysis and mid-term review exercise in May 2019, among other sources. NMEP staff will take the lead work in operating a set of Global Fund-funded sites in one set of provinces, while MACEPA support in Southern Province and PMI support in its focus areas will continue to be required.
- The NMEP expectation is that PMI will continue to provide direct support to a set of sites and will generate data on key entomological indicators including malaria vector species composition, insecticide resistance, vector density, human biting behavior (when and where biting occurs), and measures of transmission (parity rate, sporozoite rate, and blood meal sources) in seven districts.
- A well-funded program is necessary to inform future vector control interventions, given Zambia's fluid and challenging vector control setting. Key issues include the high rates of resistance to pyrethroids in both major vectors (*An. gambiae s.l.* and *An. funestus s.l.*), and to DDT in *An. gambiae;* the recent introduction of new insecticide classes; the policy of rotating to new classes in the near future; widespread reintroduction of DDT by the GRZ, sourced from a non WHO-prequalified manufacturer; and the need to make sound investment decisions around procurement of conventional versus PBO versus other next-generation ITN products; among others.

Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

Where is entomological monitoring taking place, what types of activities are occurring, and what is the source of funding?

Supporting Data

Figure A1. Districts with Entomological Monitoring in Zambia, 2019

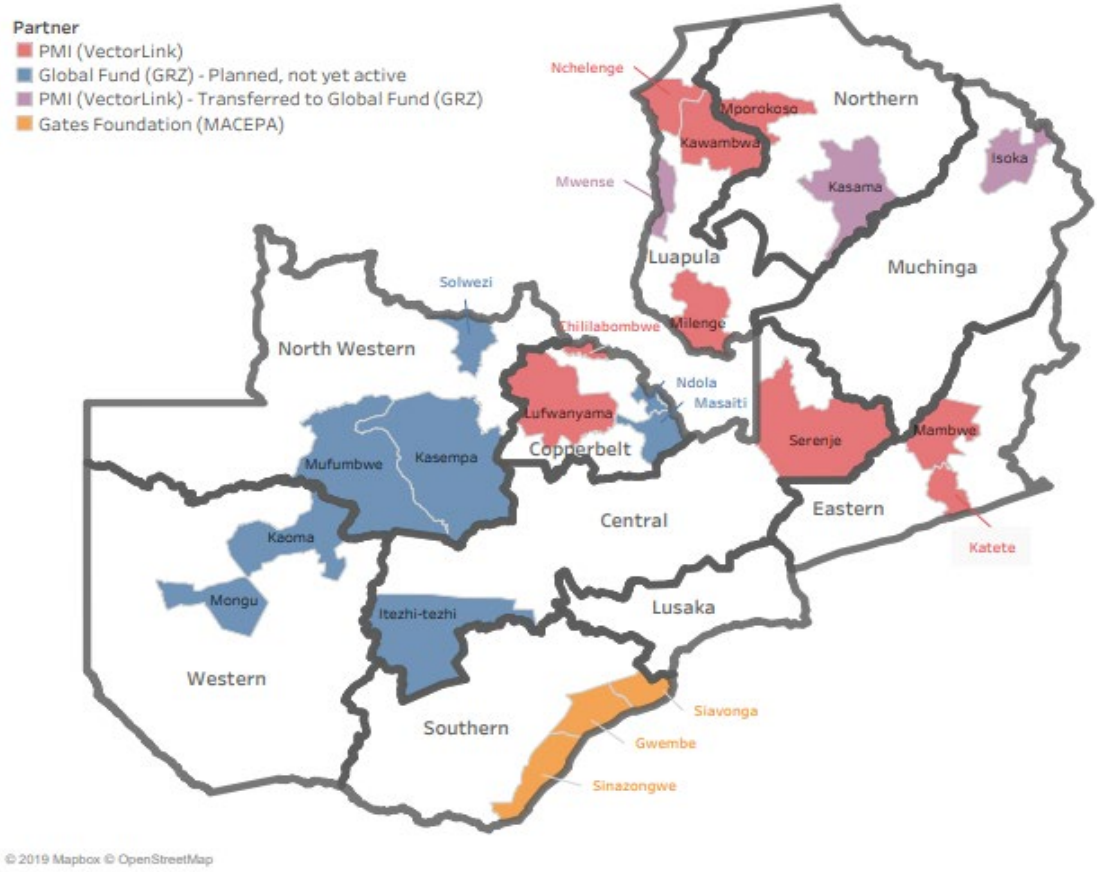


Figure A2. Districts with Active Entomologic Monitoring Site(s) in 2019, *by Type of Entomologic Monitoring*

Province	District	Surveillance	Insecticide Resistance	Cone Bioassays
Central	Serenje	●	●	
Copperbelt	Chililabombwe	●	●	●
	Lufwanyama	●	●	●
Eastern	Katete	●	●	●
	Mambwe	●		●
Luapula	Kawambwa			●
	Milenge	●	●	●
	Mwense	●	●	●
	Nchelenge	●	●	●
Muchinga	Isoka	●	●	●
Northern	Kasama	●	●	●
	Mporokoso			●
Southern	Gwembe	●	●	
	Siavonga	●	●	
	Sinazongwe	●	●	

Note: Sites are supported by GRZ, MACEPA or PMI.

Figure A3. Distribution of Malaria Vectors, with Bionomic Data

Site	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Resting Location	Preferred Host	Peak Sporozoite Rate	Annual* EIR**
Nsalamba (IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Aug (IN) Dec (OUT) *An. gambiae* s.l. Dec-Feb (IN) Dec-Feb (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Indoor	N/A	N/A	Total sporozoite rate for IRS sites *An. funestus* s.l. Mar 0.035 (IN) Nov 0.022 (OUT) *An. gambiae* s.l. Nov 0.143 (IN) 0 (OUT)	Total EIR Post-IRS for IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 1.173 (IN) 0.520 (OUT) *An. gambiae* s.l. 0.153 (IN) 0 (OUT)
Namyala (non-IRS)	*An. gambiae* s.l.	*An. funestus* s.l.	*An. funestus* s.l. Jun (IN) Jun (OUT) *An. gambiae* s.l. Feb (IN) Dec (OUT)	*An. funestus* s.l. Outdoor *An. gambiae* s.l. Indoor and outdoor	N/A	N/A	Total sporozoite rate for non-IRS sites *An. funestus* s.l. Dec 0.044 (IN) Jan 0.067 (OUT) *An. gambiae* s.l. Mar 0.048 (IN) Nov 0.048 (OUT)	Total EIR Post-IRS for non-IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 2.761(IN) 1.642 (OUT) *An. gambiae* s.l. 0.246 (IN) 0.176 (OUT)

Site	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Resting Location	Preferred Host	Peak Sporozoite Rate	Annual* EIR**
Kalonga (IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Aug (IN) Aug (OUT) *An. gambiae* s.l. Apr (IN) June (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Indoor	N/A	N/A	Total sporozoite rate for IRS sites *An. funestus* s.l. Mar 0.035 (IN) Nov 0.022 (OUT) *An. gambiae* s.l. Nov 0.143 (IN) 0 (OUT)	Total EIR Post-IRS for IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 1.173(IN) 0.520 (OUT) *An. gambiae* s.l. 0.153 (IN) 0 (OUT)
Simeo Mwaba (non-IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Oct (IN) Oct (OUT) *An. gambiae* s.l. Oct (IN) Oct and Apr (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Indoor	N/A	N/A	Total sporozoite rate for non-IRS sites *An. funestus* s.l. Dec 0.044 (IN) Jan 0.067 (OUT) *An. gambiae* s.l. Mar 0.048 (IN) Nov 0.048 (OUT)	Total EIR Post-IRS for non-IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 2.761(IN) 1.642 (OUT) *An. gambiae* s.l. 0.246 (IN) 0.176 (OUT)

Site	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Resting Location	Preferred Host	Peak Sporozoite Rate	Annual* EIR**
Mbalani (IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Feb (IN) Feb (OUT) *An. gambiae* s.l. Feb (IN) Feb (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Indoor	N/A	N/A	Total sporozoite rate for IRS sites *An. funestus* s.l. Mar 0.035 (IN) Nov 0.022 (OUT) *An. gambiae* s.l. Nov 0.143 (IN) 0 (OUT)	Total EIR Post-IRS for IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 1.173(IN) 0.520 (OUT) *An. gambiae* s.l. 0.153 (IN) 0 (OUT)
Robert (non-IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Feb (IN) Feb (OUT) *An. gambiae* s.l. Feb (IN) Feb (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Indoor	N/A	N/A	Total sporozoite rate for non-IRS sites *An. funestus* s.l. Dec 0.044 (IN) Jan 0.067 (OUT) *An. gambiae* s.l. Mar 0.048 (IN) Nov 0.048 (OUT)	Total EIR Post-IRS for non-IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 2.761(IN) 1.642 (OUT) *An. gambiae* s.l. 0.246 (IN) 0.176 (OUT)

Site	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Resting Location	Preferred Host	Peak Sporozoite Rate	Annual* EIR**
Lunga (IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Apr (IN) Apr (OUT) *An. gambiae* s.l. Feb (IN) Feb (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Indoor	N/A	N/A	Total sporozoite rate for IRS sites *An. funestus* s.l. Mar 0.035 (IN) Nov 0.022 (OUT) *An. gambiae* s.l. Nov 0.143 (IN) 0 (OUT)	Total EIR Post-IRS for IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 1.173(IN) 0.520 (OUT) *An. gambiae* s.l. 0.153 (IN) 0 (OUT)
Miyambo (non-IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Apr (IN) Apr (OUT) *An. gambiae* s.l. Feb (IN) Feb (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Outdoor	N/A	N/A	Total sporozoite rate for non-IRS sites *An. funestus* s.l. Dec 0.044 (IN) Jan 0.067 (OUT) *An. gambiae* s.l. Mar 0.048 (IN) Nov 0.048 (OUT)	Total EIR Post-IRS for non-IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 2.761(IN) 1.642 (OUT) *An. gambiae* s.l. 0.246 (IN) 0.176 (OUT)

Site	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Resting Location	Preferred Host	Peak Sporozoite Rate	Annual* EIR**
Shibesa (IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Apr (IN) Apr (OUT) *An. gambiae* s.l. Apr (IN) Apr (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Indoor	N/A	N/A	Total sporozoite rate for IRS sites *An. funestus* s.l. Mar 0.035 (IN) Nov 0.022 (OUT) *An. gambiae* s.l. Nov 0.143 (IN) 0 (OUT)	Total EIR Post-IRS for IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 1.173(IN) 0.520 (OUT) *An. gambiae* s.l. 0.153 (IN) 0 (OUT)
Chebele (non-IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Oct Feb (IN) Dec (OUT) *An. gambiae* s.l. Feb (IN) Feb (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Indoor	N/A	N/A	Total sporozoite rate for non-IRS sites *An. funestus* s.l. Dec 0.044 (IN) Jan 0.067 (OUT) *An. gambiae* s.l. Mar 0.048 (IN) Nov 0.048 (OUT)	Total EIR Post-IRS for non-IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 2.761(IN) 1.642 (OUT) *An. gambiae* s.l. 0.246 (IN) 0.176 (OUT)

Site	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Resting Location	Preferred Host	Peak Sporozoite Rate	Annual* EIR**
Chibobo (IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Feb (IN) Feb (OUT) *An. gambiae* s.l. Feb (IN) Feb (OUT)	*An. funestus* s.l. Outdoor *An. gambiae* s.l. Outdoor	N/A	N/A	Total sporozoite rate for IRS sites *An. funestus* s.l. Mar 0.035 (IN) Nov 0.022 (OUT) *An. gambiae* s.l. Nov 0.143 (IN) 0 (OUT)	Total EIR Post-IRS for IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 1.173(IN) 0.520 (OUT) *An. gambiae* s.l. 0.153 (IN) 0 (OUT)
Chishi (non-IRS)	*An. funestus* s.l.	*An. gambiae* s.l.	*An. funestus* s.l. Feb (IN) Apr (OUT) *An. gambiae* s.l. Apr (IN) Apr (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Outdoor	N/A	N/A	Total sporozoite rate for non-IRS sites *An. funestus* s.l. Dec 0.044 (IN) Jan 0.067 (OUT) *An. gambiae* s.l. Mar 0.048 (IN) Nov 0.048 (OUT)	Total EIR Post-IRS for non-IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 2.761(IN) 1.642 (OUT) *An. gambiae* s.l. 0.246 (IN) 0.176 (OUT)

Site	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Resting Location	Preferred Host	Peak Sporozoite Rate	Annual* EIR**
Chikowa (IRS)	*An. gambiae* s.l.	*An. funestus* s.l.	*An. funestus* s.l. Feb (IN) Jan (OUT) *An. gambiae* s.l. Feb (IN) Feb (OUT)	*An. funestus* s.l. Outdoor *An. gambiae* s.l. Outdoor	N/A	N/A	Total sporozoite rate for IRS sites *An. funestus* s.l. Mar 0.035 (IN) Nov 0.022 (OUT) *An. gambiae* s.l. Nov 0.143 (IN) 0 (OUT)	Total EIR Post-IRS for IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 1.173(IN) 0.520 (OUT) *An. gambiae* s.l. 0.153 (IN) 0 (OUT)
Chasela (non-IRS)	*An. gambiae* s.l.	*An. funestus* s.l.	*An. funestus* s.l. Feb (IN) Feb (OUT) *An. gambiae* s.l. Jan (IN) Jan (OUT)	*An. funestus* s.l. Indoor *An. gambiae* s.l. Outdoor	N/A	N/A	Total sporozoite rate for non-IRS sites *An. funestus* s.l. Dec 0.044 (IN) Jan 0.067 (OUT) *An. gambiae* s.l. Mar 0.048 (IN) Nov 0.048 (OUT)	Total EIR Post-IRS for non-IRS sites (Nov'17-Mar'18) *An. funestus* s.l. 2.761(IN) 1.642 (OUT) *An. gambiae* s.l. 0.246 (IN) 0.176 (OUT)

**The EIRs were calculated across all IRS and non-IRS sites, not at the site level; this is due to limited sample size at each individual site, which would limit valid inferences from being made. Note that this is in contrast to the method typically used in other PMI countries.

Conclusion

An. funestus s.l. was the predominant primary malaria vector in six of the seven sentinel districts where PMI-supported entomological surveillance was conducted in 2017-18; *An. gambiae* s.l. was the predominant vector in Mambwe. *An. funestus* s.l. was highly endophilic at most of the sites, thus IRS remains an appropriate malaria intervention for this part of Zambia. The nationwide entomologic surveillance network consisted largely of PMI- and MACEPA-supported sites in 5 of 10 province through 2017, but has since expanded with GRZ and Global

Fund support into 3-4 additional provinces. PMI has adjusted its support to reflect the shifting of its IRS investments into the Copperbelt. Going forward, the focus will be on consolidating the current network and ensuring timely, accurate data from all sites.

Key Question 2

What is the current insecticide resistance profile of the primary malaria vectors?

Supporting Data

Figure A4. 2017/2018 Susceptibility Status of *An. funestus* s.l. in PMI-Supported sites

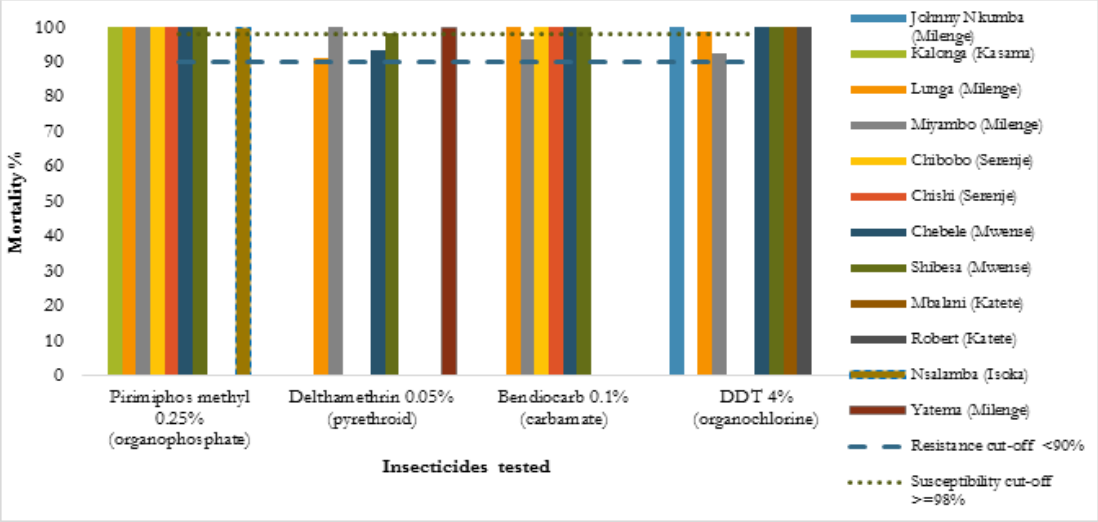


Figure A5. 2017/2018 Susceptibility Status of *An. gambiae* s.l. in PMI supported sites

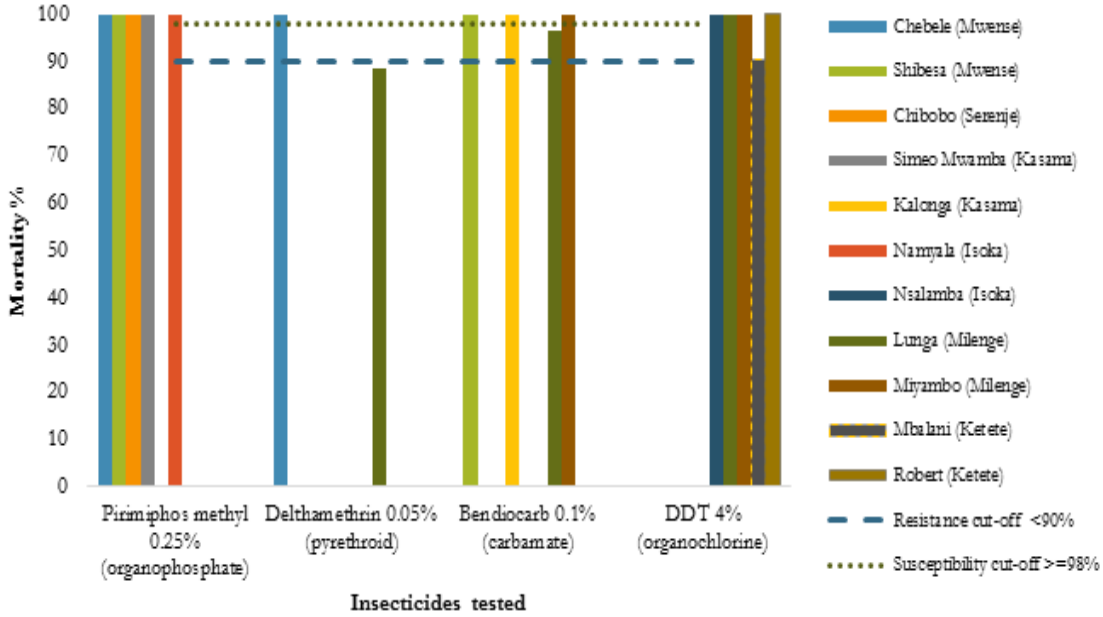


Figure A6. Susceptibility Status of *An. funestus* s.l. and *An. gambiae* s.l. Collected from Isoka and Mwense to Clothianidin in February 2018

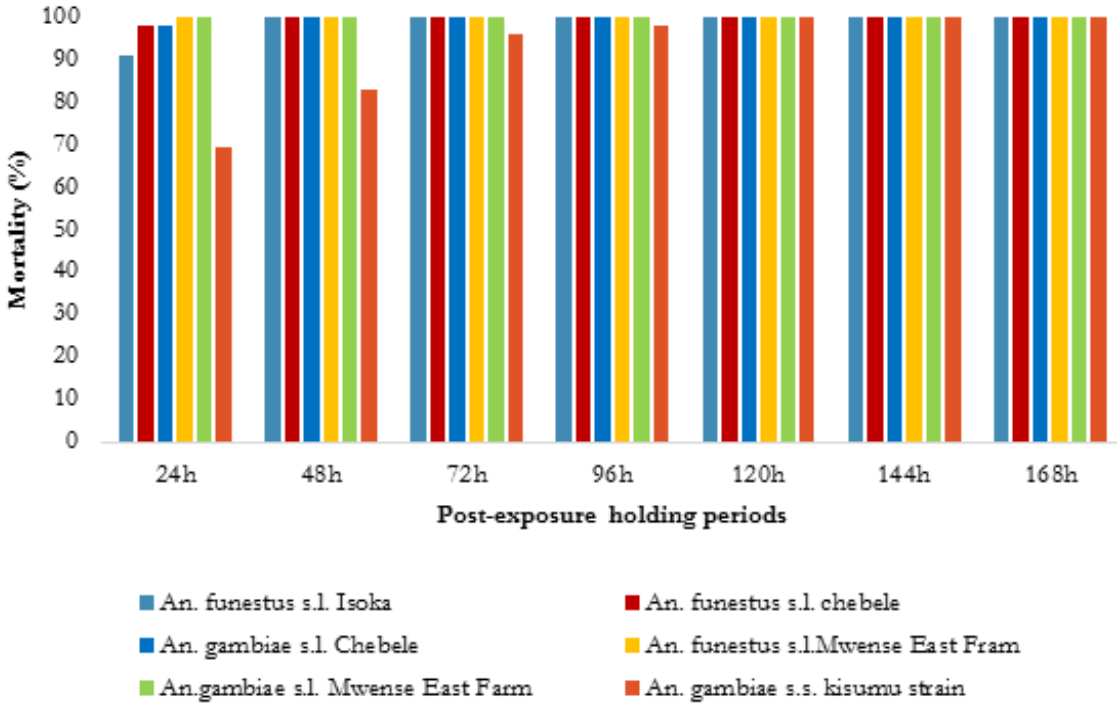


Figure A7. Mortality of *An. funestus* s.l. Collected from Shitambulli to Discriminating Concentrations of Chlorfenapyr in March 2018

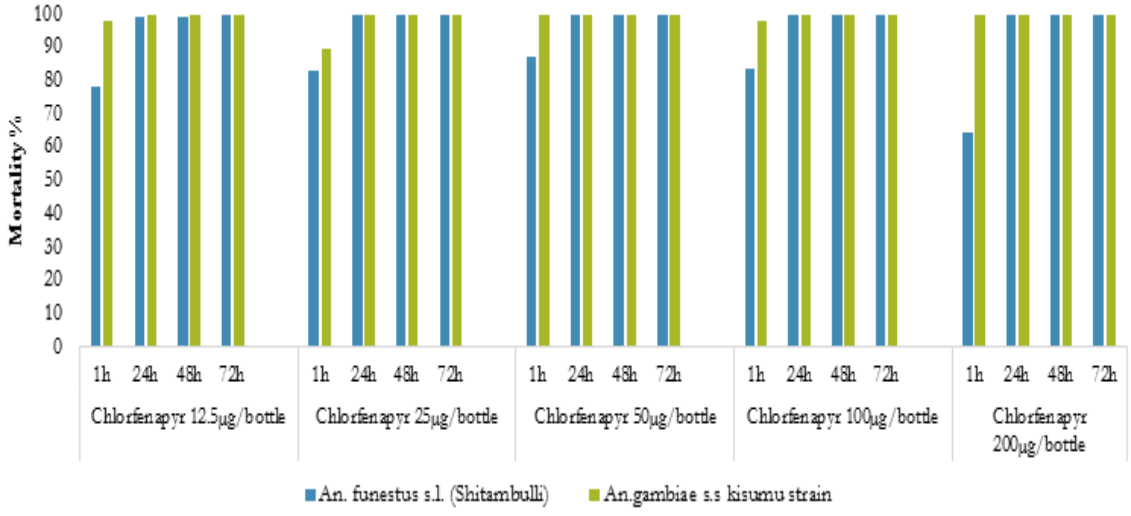
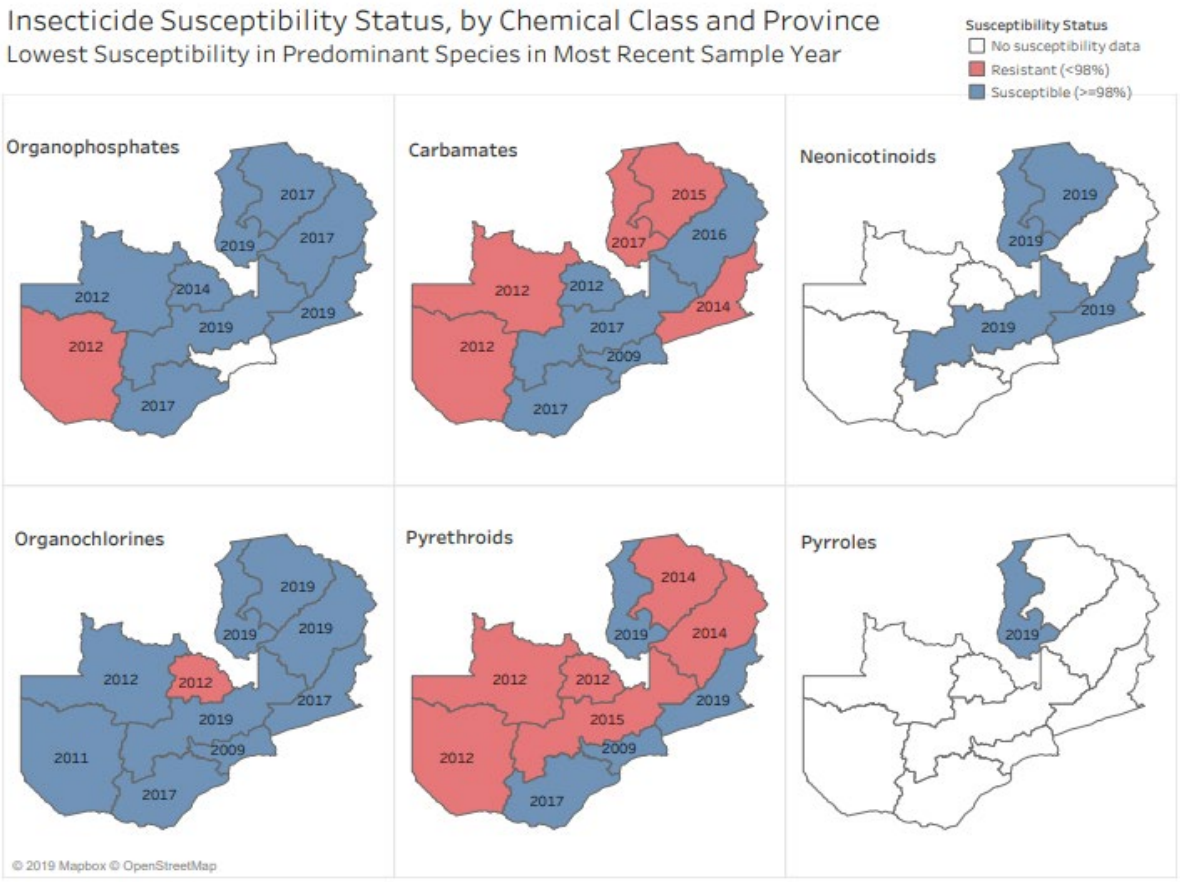


Figure A8. Nationwide insecticide susceptibility status, by province



Conclusion

This data suggests that the dominant local vectors were susceptible to the insecticides deployed in the PMI-supported 2019 and 2018 IRS campaigns in the PMI focus provinces: namely, organophosphate in Luapula, Northern, Muchinga and organophosphate and clothianidin in Eastern. Although resistance to Pirimiphos methyl has not yet emerged, all IRS programs are preemptively rotating away from organophosphates in the 2019 season, in accordance with national insecticide resistant management policies. The data also suggests that chlorfenapyr would be an option for preemptive rotation away from clothianidin in the future, should the product receive WHO PQ listing. DDT resistance remains a concern in *An. gambiae* in some localities, and pyrethroid resistance remains widespread.

Key Question 3

What are the in-country considerations that impact your funding allocation in this category?

Supporting Data

- Funding constraints, as described under “Key Goal,” above.

- Large-scale, ambitious deployment of IRS using a mosaic of pesticides, as described in the IRS sections.

Conclusion

As described in the above-noted sections

1.B. INSECTICIDE-TREATED NETS (ITNs)

PMI Goal
Achieve high ITN coverage and usage of effective nets in endemic PMI-supported areas (in the context of the current insecticide resistance); and maintain high coverage and use with consistent ITN distribution (via campaigns and/or continuous channels in a combination that is most effective given country context).

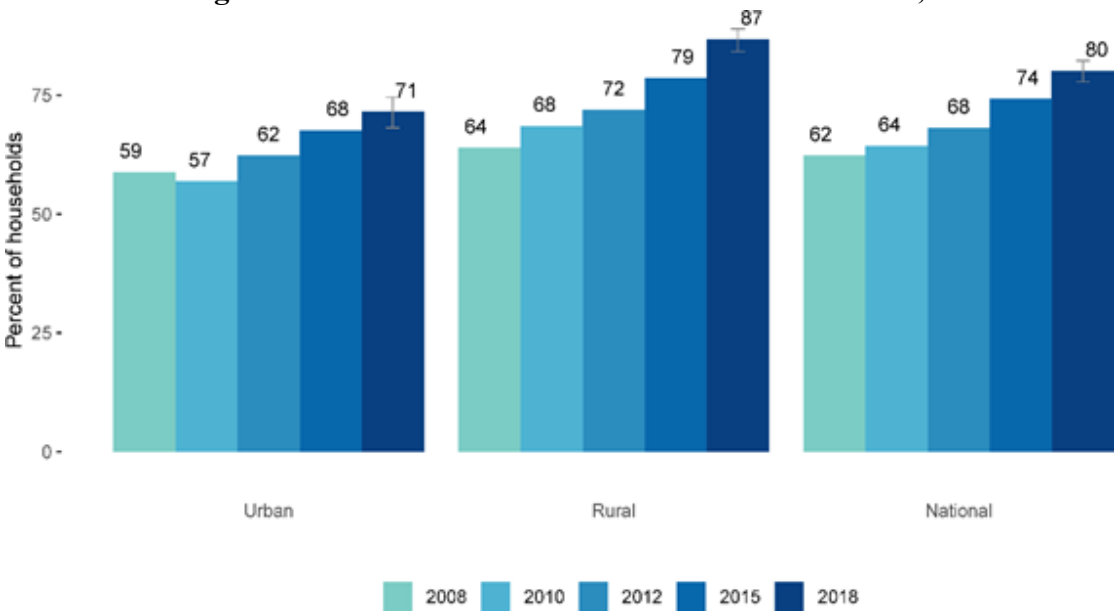
Are you proposing to increase, decrease, or maintain funding allocation levels for ITN distribution and SBC activities? Why? What data did you use to arrive at that conclusion?
In FY 2020, based on forecasting and quantification figures, PMI will maintain consistent ITN procurement for continuous ANC, EPI, and school based distribution channels. Sufficient 2020 and 2021 mass distribution campaign ITNs were procured with FY 2019 funds and will therefore not be procured in FY 2020. SBC ITN activities will target proper net care, and increased net use, with special emphasis on pregnant women and children under five years of age. Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

How has net ownership evolved since the start of PMI in the country? Are households fully covered?

Supporting Data

Figure A9. Household Possession of at Least One ITN, 2008-2018



Source: MIS 2018

Conclusion

Overall, household-level possession of at least one ITN has risen nationally and in rural areas since 2008. Coverage has risen about 20 percent since 2008 in rural areas, from 64 percent in 2008 to 87 percent in 2018. In urban areas, household-level possession of at least one ITN increased slightly in 2018 compared to 2015, going from 68 percent in 2015 to 71 percent in 2018. When compared to 2008, there has been a general increase in coverage in urban areas but this increase has not matched the increase reported in rural areas.

Key Question 2

What proportion of the population has access to an ITN? In contrast, what proportion of the population reports using an ITN? What is the ratio between access and use? Does it vary geographically?

Supporting Data

Figure A10. Trends in ITN Access and Use, *Percent of Household Population with Access to an ITN and Who Slept Under an ITN the Night Before the Survey*

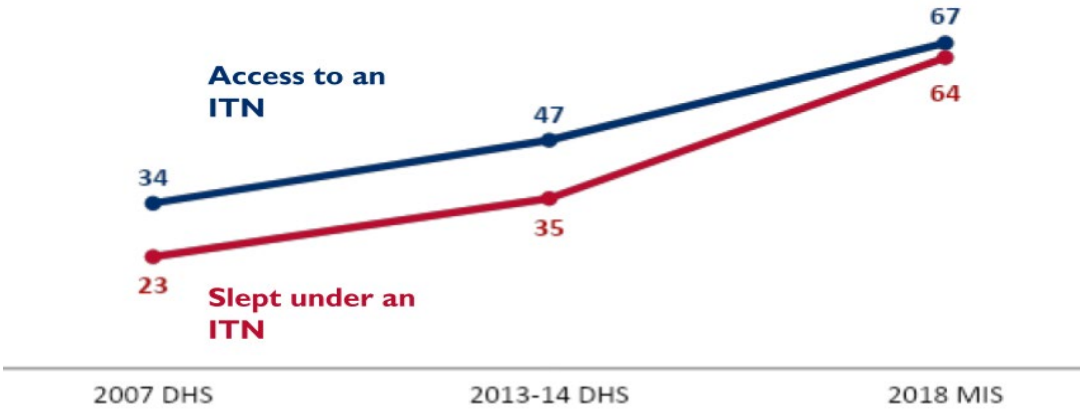
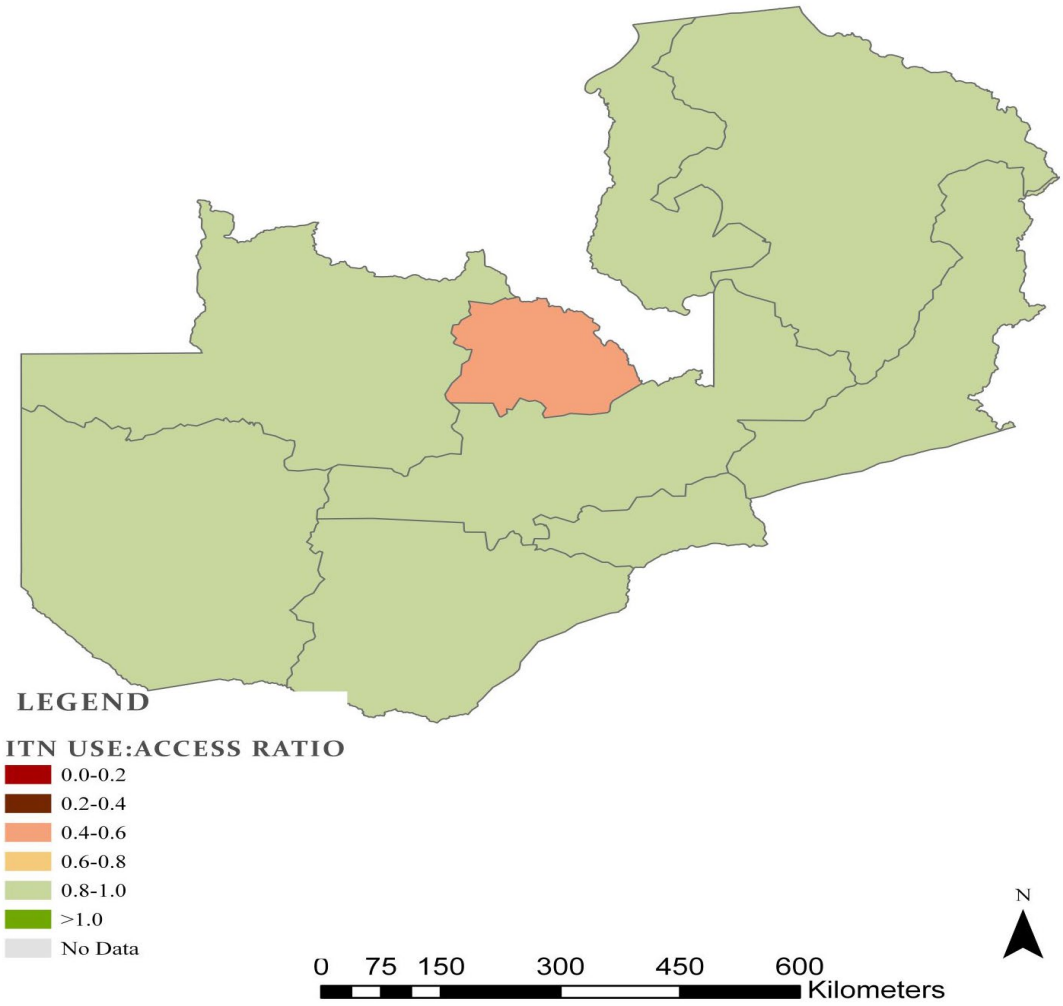


Figure A11. ITN Use: Access Ratio



Source: MIS 2018

Conclusion

There has been a positive trend in both increased access to ITNs and number of people who slept under an ITN the night before the survey. The ITN use: access ratio is between 0.8 to 1 in all provinces, except Copperbelt where the ITN use: access ratio is between 0.4 to 0.6.

Key Question 3

In areas where ITN access is high but use is low, what is known about the key barriers and facilitators to use?

Supporting Data

Figure A12. Key Barriers and Facilitators to ITN Use

Facilitator	Type of Factor	Data Source	Evidence
Household Availability of ITNs	Environmental	MIS - 2018	ITN coverage in rural areas has risen from 64% in 2008 to 87% in 2018.
Knowledge of ITNs	Internal	MIS - 2018 SBC Formative Research Report, 2019	Among women 15-49 years of age, 85.7% reported mosquito nets as a prevention method. This finding is supported by a recent cross-sectional household survey, which found that 98% of respondents correctly identified mosquito bites as a cause of malaria.
High Self Efficacy Around ITN Use	Internal	SBC Formative Research Report, 2019	82% of respondents indicated they could hang a bed net under where their child was sleeping.
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Safety Concerns About Insecticides	Internal	Breakthrough Action Zambia Desk Review - 2018	Children were reported to be less likely to sleep under an ITN than adults due to concerns over the safety of the insecticide for children and fetus.

Discomfort/ Inconvenience	Internal	National Communication Strategy for Malaria Elimination 2017-2021	Physical inability to hang nets
Concern ITN insecticide may be harmful to children	Internal	Breakthrough Action Zambia Desk Review - 2018	ITN safety concerns
Low Perceived Risk During Dry Season	Internal	Breakthrough Action Access and Use Report, 2019 SBC Formative Research Report, 2019	The Access and Use Report suggest there is strong seasonal decline in ITN use during the dry season. This is likely due to low perceived risk during the dry season. A recent cross-sectional household survey found 59% of respondents strongly agreed or somewhat agreed that people can only get malaria during the rainy season.
Discomfort/Inconvenience	Internal	National Communication Strategy for Malaria Elimination 2017-2021 SBC Formative Research Report, 2019	Results from recent focus groups, as well as insights from the NCSME, suggest some individuals don't use ITNs due to the initial smell and itching.

Conclusion

Knowledge about the benefits of sleeping under an ITN is generally high across all demographics. Optimal net availability of at least one ITN per two people is fairly low and should be an area of continued focus. The ITN use: access ratio is quite high except for in Copperbelt Province. Where ITNs are available, additional information is needed to understand the internal and social factors that may be limiting net use among the general population with special focus on pregnant women and children under five years of age. A greater understanding of factors limiting net use is needed in areas with low net use, especially in the Copperbelt. PMI will explore the reason for this lower use: access ratio.

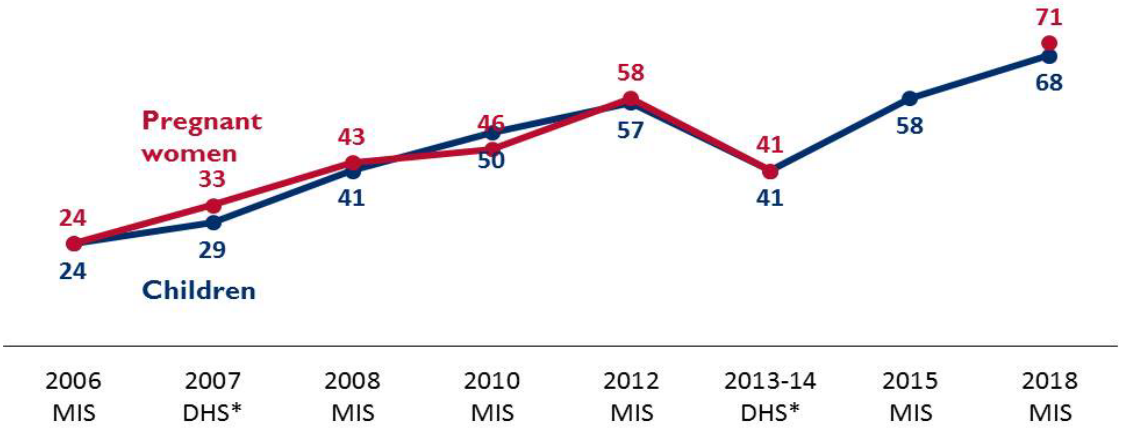
Key Question 4

What percent of pregnant women and children under 5 report sleeping under an ITN?

Supporting Data

Figure A13. Trends in ITN Use Among Children and Pregnant Women

Percent of children under 5 and pregnant women age 15-49 who slept under an ITN the night before the survey



Note: DHS surveys are generally fielded during the dry season, as opposed to MIS surveys, which are deliberately fielded during the high transmission season, which should be taken into consideration when interpreting these indicators.

Conclusion

ITN usage progress has steadily increased over the years – tracking the improvements in ITN ownership. In the 2018 MIS, 71 percent of pregnant women and 68 percent of children under five years of age slept under a net the previous night which is higher than the general population and shows these vulnerable groups are being appropriately prioritized. Resources will need to be invested in net use efforts to continue increasing this positive trend.

Key Question 5

What channels are used to distribute ITNs?

Supporting Data

Figure A14. Total ITNs procured in Zambia from CY 2015 to CY 2019

	*CY 2015	*CY 2016	CY 2017	CY 2018	CY 2019
EPI	1,506,206	924,011		483,516	430,263
ANC				543,956	477,810
Schools	398,470				332,326
Community					
Mass Campaign			7,986,453	2,538,388	

*EPI and ANC numbers were combined in CY 2015 and CY 2016.

No community-specific ITNs have been procured in Zambia.
Until CY 2017, no routine distribution nets were procured during campaign years; however, the national policy has recently been updated and ITNs will be distributed through routine distribution channels concurrently with the 2020 and 2021 campaigns.

In CY 2015, ITNs for school based distribution were procured for a pilot study in Luapula Province targeting four districts. In CY 2019 ITN school based distribution was conducted in parts of Eastern, Luapula and Western Provinces.

Conclusion

In the NMESP 2017 to 2021, emphasis is placed on accelerating scale-up of vector control through IRS and ITNs. ITNs are being provided to people living in high burden areas but in IRS ineligible structures, and to vulnerable groups such as pregnant women and children under five years of age. PMI will support continuous distribution of ITNs through ANC, EPI, and selected primary schools as well as through the next mass campaign in 2020 and 2021.

Key Question 6

What is the estimated need for ITNs over the next three calendar years? What volume of ITNs are available from partners and the public sector for the next three calendar years?

Supporting Data

Figure A15. Gap Analysis Table for ITNs

Calendar year	2019	2020	2021
ITN Needs			
Total targeted population [1]	17,381,168	17,885,422	18,400,556
Household registration population [2]	22,282,657	22,929,111	23,571,126
Continuous distribution needs			
Channel #1: ANC [3]	1,002,719	1,031,816	1,060,701
Channel #2: EPI [4]	891,306	917,164	942,845
Channel #3: School distribution	0	0	0
Estimated Total ITN need for continuous channels	**1,894,025**	**1,948,980**	**2,003,546**
Mass campaign distribution needs			
Mass distribution campaigns	0	5,324,655	0
Estimated total ITN need for campaigns	0	5,324,655	0
Total ITN Need (inclusive of routine channels and campaigns)	**1,894,025**	**7,273,635**	**2,003,546**
Partner Contributions			
ITNs carried over from previous year	0	0	654,983
ITNs from MOH	0	0	0

Calendar year	2019	2020	2021
ITNs from Global Fund (CHAZ) - ANC/EPI	594,000	297,761	0
ITNs from PMI - school based distribution	0	30,000	0
ITNs planned with PMI funding - routine	694,000	600,000	540,000
ITNs planned with PMI funding - mass campaigns MOP 19	0	2,128,000	0
Proposed Against Malaria Foundation (AMF) - mass campaigns	0	0	0
Proposed Global Fund - mass campaigns	0	4,872,857	0
Total ITNs available	**1,288,000**	**7,928,618**	**1,194,983**
Total ITN surplus/gap	**-606,025**	**654,983**	**-808,563**

Footnotes:

1. Annual population estimates reflect the 2010 Census of Population and Housing projections by the Zambian Central Statistical Office (CSO).
2 These figures are based on a 2017 household registration survey, which showed a 28.2% variance with the CSO population of 17,381,168 and 17,885,422 for 2019 and 2020 respectively.
3. This represents 4.5% ANC of the total population of 22,282,657 (2019) and 22,929,111 (2020) based on the 2017 household registration survey. This assumption was guided by NMEP.
4. This represents 4.0% EPI of the total population of 22,282,657 (2019) and 22,929,111 (2020) based on the2017 household registration survey. This assumption was guided by NMEP.

Conclusion

The ITN need calculation is based on 38 percent of the total population, 8,713,071, with 10 percent operational buffer added. If the assumption is 1 net per 1.8 persons, and a 10 percent buffer, the total need is 5,324,654. PMI has committed 2,128,000 standard ITNs with a request for AMF to fill the gap of 3,196,655 PBO nets.

Key Question 7

What is the current status of durability monitoring?

Supporting Data

Figure A16. Current Status of Durability Monitoring

Campaign Date	Sites	Brands	Baseline	12-month	24-month	36-month
February 2017	Lundazi District (Eastern Province)	Olyset	X	X		
	Katete District (Eastern Province)	Permanet	X	X		

Conclusion

Monitoring is ongoing. Conclusions will be presented at the end of the monitoring activity, following the 36-month data collection point scheduled in 2021.

Key Question 8

What are the in-country considerations that impact your funding allocation in this category?

Supporting Data

Zambia prioritizes IRS as the main vector control method for Zambia deploying ITNs to high burden areas where structures have been deemed IRS ineligible, and to vulnerable groups such as pregnant women and children under five years of age. Implementation of this vector control strategy may prove challenging during ITN campaign years where accurate and on-time IRS spray data must be readily available for a seamless ITN mass distribution campaign. The ease of operationalization is expected to vary depending on funding source for the IRS campaigns (Figure A19). In PMI-supported areas, data on spray coverage is expected to be appropriately granular and readily available for sharing with ITN campaign planners in all areas, with heightened precision in the mSpray/Reveal supported areas. In GRZ/Global Fund areas, the ITN task force assessed HFCA- and district-level knowledge of local areas receiving IRS to also be adequate for ITN planning, provided IRS implementers adhere to national best practices At MOP writing, the 2019 IRS campaign season is underway and will serve as the country's first experience coordinating both campaigns to ensure every household receives either IRS or ITNs for full nationwide vector control coverage.

Conclusion

Given FY 2020 is not a mass distribution campaign year, PMI ITN support will focus on increasing net coverage through ANC, EPI, and where feasible school and community-based routine distribution channels. In past years the NMEC has prioritized mass campaigns over other ITN distribution channels and has historically not procured ITNs for ANC and EPI channels during a year when mass distribution is undertaken. However, given the mass distribution campaign will take place over a two year period--and following WHO guidance--Zambia will need ITNs for routine distribution in both 2020 and 2021. SBC activities will focus on addressing specific behavioral barriers to net use (net hanging techniques, net use discomfort, and net insecticide safety concerns) including an emphasis on interpersonal communication through ANC and under five clinics, and community level interventions.

1.C. INDOOR RESIDUAL SPRAYING (IRS)

Key Goal
Ensure high spray coverage, with an appropriate insecticide, in targeted endemic PMI-supported areas

Do you propose to increase, decrease, or maintain funding allocation levels for this activity? Why, and what data did you use to arrive at that conclusion?
PMI Zambia will maintain a high level of support for IRS, but with a slightly decreased funding allocation as compared to FY 2019. This is based on the following rationales, among others:

- A modest decrease of six percent in IRS funding (approx. $500,000) is necessary to meet the increased needs for case management commodities (esp. ACTs and RDTs). The goal is to maintain total structure coverage while finding savings through efficiencies and absence of start-up cost as compared to 2019.
- Consistent with IRS best practice and with MOH expectations, the PMI program should provide IRS to the newly configured target areas for at least three years. PMI adjusted its geographic focus in 2018 and again in 2019, in response to MOH requests to: (1) increase population coverage levels in targeted provinces, and (2) displace PMI operations away from three high burden provinces which are targeted by the MOH for DDT.
- The new focus area of the Copperbelt Province presents excellent opportunities to leverage and enhance private sector resources in vector control, especially in the mining sector. Initial receptivity in the lead-up to the 2019 campaign is promising, but it is expected that the potential for collaboration can be realized fully only over the course of several years.
- The MOH prioritizes IRS as the leading vector control strategy. In 2017, the government officially launched the NMESP 2017-2021, which aims to graduate Zambia from striving for malaria control to malaria elimination. In line with the guidelines included in the NMESP, the approach changed from the historic targeting of 50-60 percent of structures per district in 2017 to targeting 80 percent of the population per district across the country. The MOH clearly expects its major malaria control partners (e.g. Global Fund, PMI, MACEPA) to provide significant technical assistance and/or commodity assistance to aid the MOH in implementing high-quality, on-time, well managed IRS campaigns.

Evidence suggesting impact of IRS, in combination with other interventions, has been obtained from both epidemiologic and entomologic datasets. The two graphics below provide illustrative examples:

Figure A17. Biting Rate of *An. funestus* s.l., 2015-2019, from PMI-Supported Sentinel Sites in Four Focus Provinces.

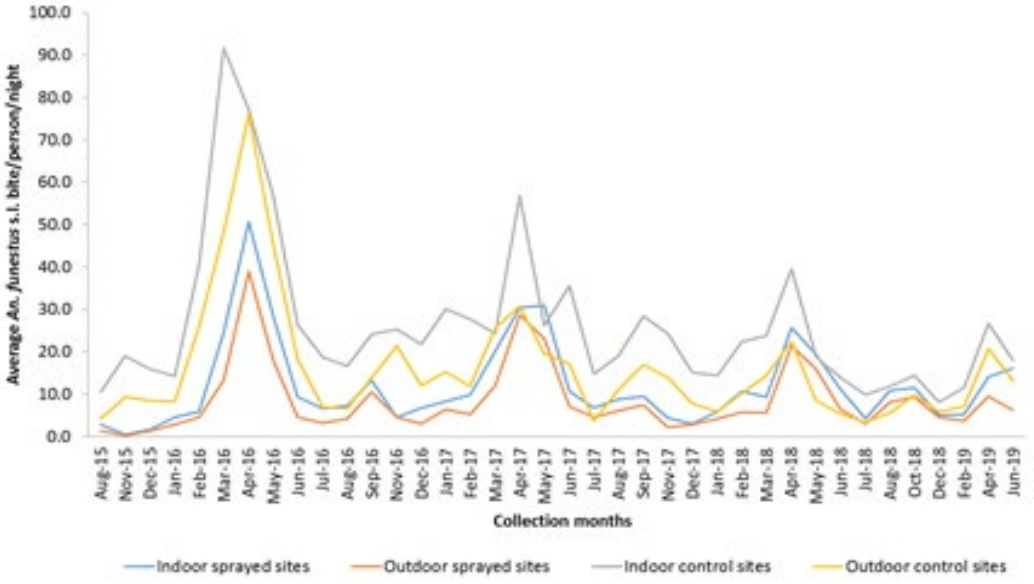
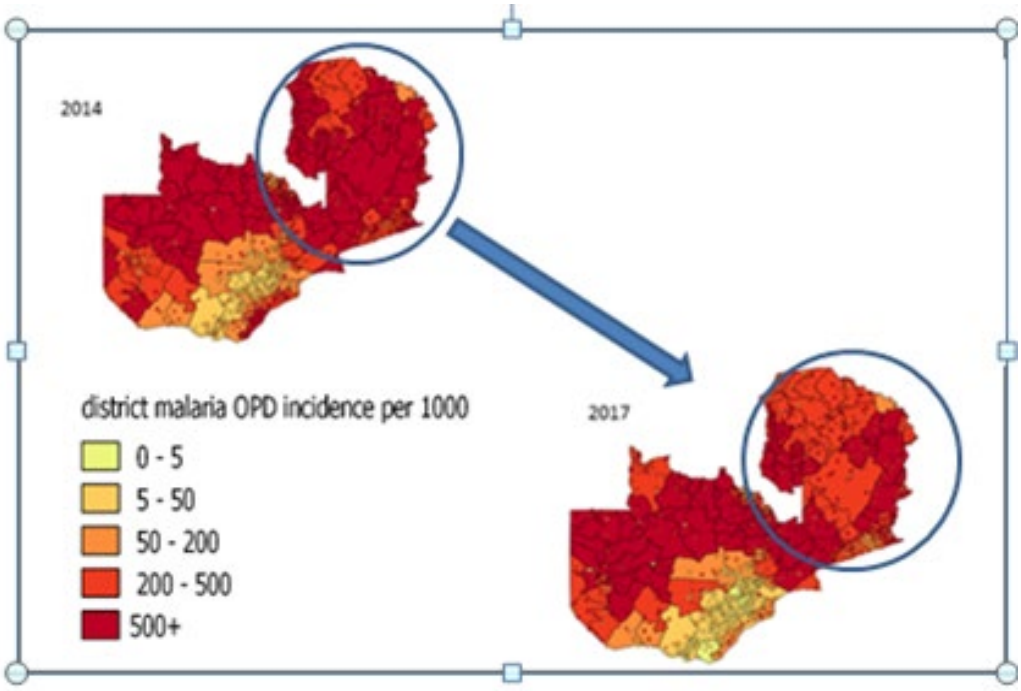


Figure A18. Case Incidence by District, 2014-17, Highlighting PMI-Supported IRS Operational Area



Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

What areas are targeted for IRS and why?

Supporting Data

Macro-level geographic targeting:

Focus areas in 2014-17: Zambia is unusual for targeting almost all districts in the country. During this period, the *de facto* national approach was to ration IRS resources to most rural districts to provide IRS for up to 20-50 percent of the population. PMI focused its IRS support on the four high-burden provinces of Luapula, Muchinga, Northern, and Eastern, reaching approximately 50-60 percent of the population, and with an increase to >80 percent in Luapula in 2017. This was part of a more comprehensive package of support for malaria control interventions including ITNs, case management, MIP, and surveillance. This approach allowed for synergies in term of USG programming and epidemiologic impact. The pesticide deployed was Pirimiphos-methyl, as explained in the MOPs from this era.

Focus areas in 2018: Based on NMEP directive to intensify IRS coverage toward the goal of 80 percent population coverage in each district, PMI concentrated its resources to spray with Pirimiphos-methyl in Luapula, Muchinga, and Northern effectively shifting its IRS resources out of six districts in Eastern Province. In the context of its new pre-elimination program, PMI sprayed three districts in Eastern using clothianidin. The plan was for the GRZ to spray the six districts of Eastern Province with clothianidin from non-PMI resources. Unfortunately, most government funding did not materialize in time for the 2018 spray season, so coverage in those areas reduced as compared to that in 2017.

Focus areas in 2019 and beyond: The PMI-supported IRS operations again adjusted its geographical scope following the MOH 2018 decision to deploy DDT for IRS across the country, including in three of the provinces that PMI has been supporting since at least 2014: Luapula, Muchinga, and Northern. PMI and the NMEP subsequently reached a consensus that PMI would only support districts targeted to receive non-DDT insecticides, due to the previously mentioned PMI guidance against procuring DDT from non WHO-prequalified manufacturers. Based on the Technical Advisory Committee meeting held in January 2019, non-DDT insecticides (specifically clothianidin) will be used in: Eastern Province due to moderate DDT resistance and successful deployment of clothianidin there in 2018; Copperbelt Province, due to predominance of DDT-resistant *An. gambiae* there; and in Nchelenge district, due to successful field testing of clothianidin + deltamethrin in 2018; as well as in other non-PMI parts of the country (see Figure A20). Consistent with the Advisory Committee recommendation that insecticides should be rotated every two years, the NMEP decided on clothianidin in Eastern Province as it was deployed there in 2018 for the first time, and on clothianidin + deltamethrin in Nchelenge district based on the TDRC/Bayer trial conducted there from 2015 to 2017. Desirous of programmatic stability - in order to allow for operational efficiencies and sustained population protection - PMI/Zambia obtained assurance from the MOH that this new geographic

configuration would remain stable for the foreseeable future, and at least for three consecutive years.

Figures A19 and A20. IRS implementation map, 2019, by district and major funding source. GRZ districts deploy DDT, while the PMI and Global Fund districts deploy Clothianidin-based insecticide.

Figure A19. IRS Funding Partners by District

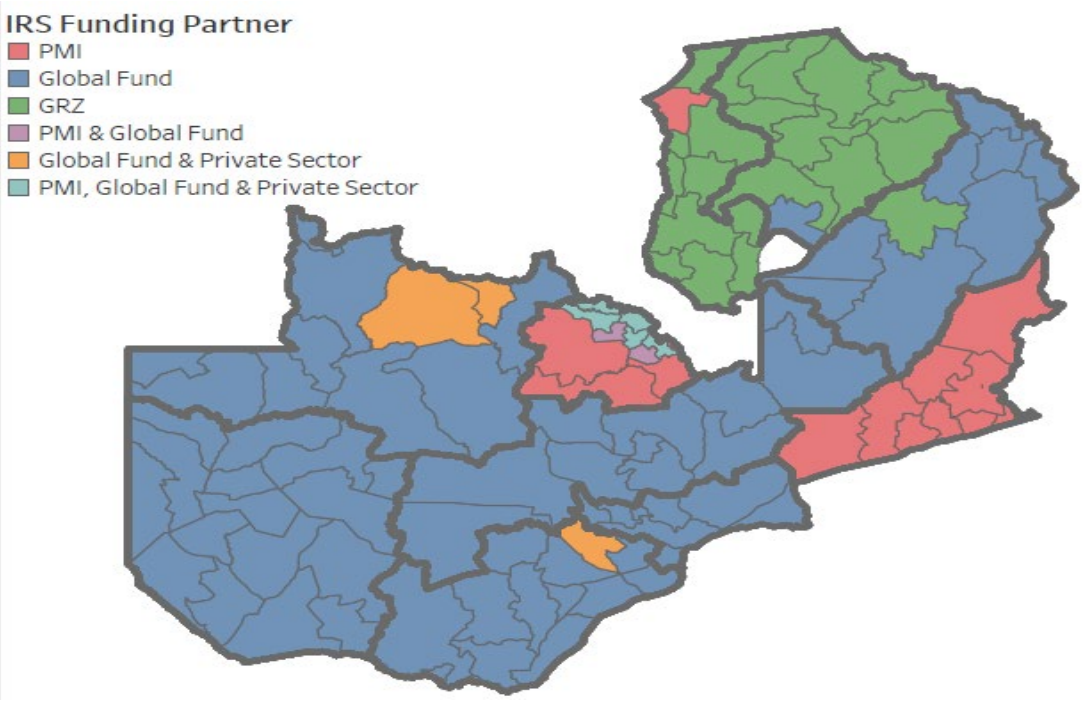
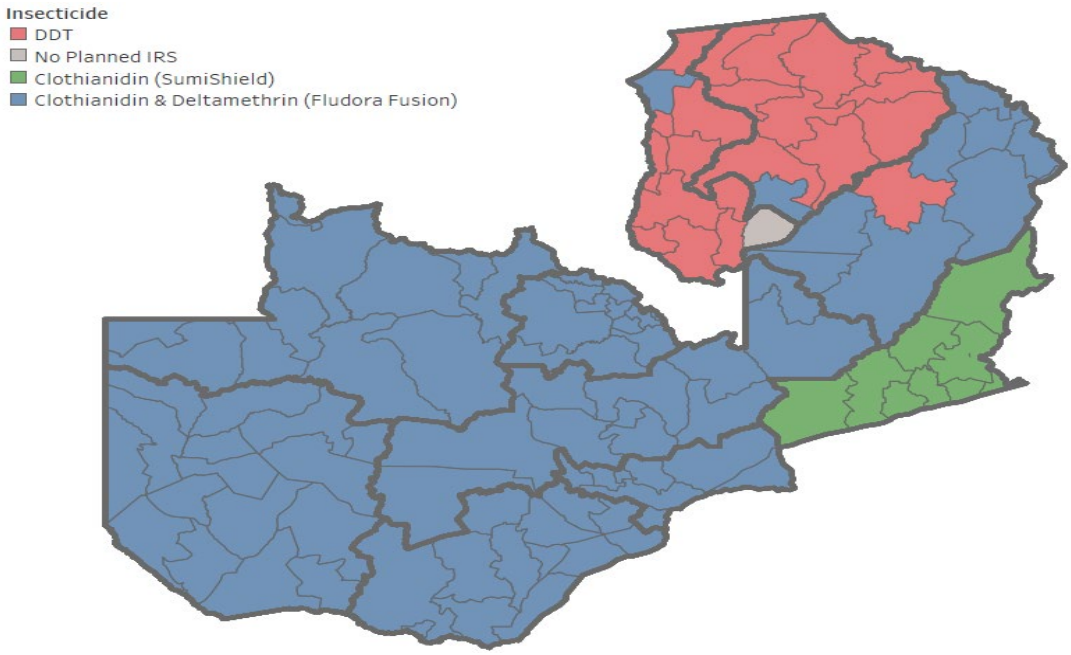


Figure A20. National IRS Plan, 2019



Micro level targeting:

Zambia's approach to IRS differs from that in countries where IRS campaigns aim to spray every inhabited dwelling in districts which PMI "covers." For additional information on this approach, please see the FY 2019 MOP. In 2019, PMI-supported operations are applying a *de facto* classic, blanket approach, targeting all sprayable areas and to benefit 80-90 percent or more of local populations. In some districts, a limited number of local areas are excluded during the micro-planning exercise with the MOH based on criteria of urbanicity (e.g. densely settled central Chipata); longstanding history of >20 percent refusal rates (e.g., Katete BOMA); and highly isolated structures (<5 structures per km2) as in certain rural areas in Eastern Province.

Conclusion

In summary, PMI's geographic niche is to support IRS operations in a set of districts which meet three main criteria: (1) prioritized for non-DDT pesticide per the Technical Advisory Committee findings and NMEP guidance; (2) rural; and (3) PMI focus area.

Accordingly, in 2019 and going forward, PMI will support IRS in the areas previously described. (Also shown in Figure A19):

- All nine districts of Eastern Province, including the high burden districts and the 3-5 pre-elimination program districts
- Three rural districts in Copperbelt (Lufwanyama, Masaiti, and Mpongwe) as well as the rural and peri-urban communities of the seven urbanized districts of the Copperbelt (Chingola, Chilabombwe, Kitwe, Kalulushi, Luanshya, Ndola, and Mufulira).

- Nchelenge district in Luapula Province, an NIH-funded ICEMR study site that represents a unique opportunity to maximize malaria control program learning given its highly challenging, swampy environment.

The GRZ and Global Fund support will be directed to all provinces and districts not covered by PMI. In Southern Province, MACEPA will continue to provide entomologic, SBC, and other technical support for IRS operations to complement GRZ/Global Fund resources. In a few focal areas, mines and plantations will provide complementary support of various kinds to IRS operations, e.g. on the Copperbelt some large mines cover training and logistic costs.

Key Question 2

In PMI-supported areas, what spray coverage rates have been achieved in the past 5 years?

Supporting Data

Figure A21. Spray Coverage Rates 2016-2020

Calendar Year	Number of Districts Sprayed	District Names**	Number of Structures Sprayed	Coverage Rate	Population Protected
2016	35	Eastern (9 districts), Luapula (10 districts), Muchinga (7 districts), Northern (9 districts)	559,550	91%	2,626,718
2017	36	Eastern (9 districts), Luapula (10 districts), Muchinga (7 districts), Northern (10 districts)	634,410	93%	3,005,878
2018	29	Luapula (26 districts), Eastern (3 districts)	579,490	90%	2,818,176
2019*	20	Eastern (9 districts), Luapula (1 district), Copperbelt (10 districts)	617,000	TBD	TBD
2020*	20	Eastern (9 districts), Luapula (1 district), Copperbelt (minimum 3 districts) Others TBD	617,000	TBD	TBD

*Denotes targets **If more than 15 districts, list regions/provinces.

Conclusion

Spray coverage as measured in the above tables (structures sprayed out of structures found) is an important indicator of IRS operational quality, and PMI-supported operations have performed well in this regard. Thus, the overall approach of PMI-supported spray operations will remain similar.

However, IRS impact will be greatest if spray teams can also maximize the proportion of structures, they find out of eligible structures which truly exist on the ground. The PMI/Zambia program will continue to deploy a satellite-based system where feasible, affordable, and consistent with program objectives (e.g. in district targeted for elimination in short-term, and in districts where PMI is targeting a subset of all sprayable areas). Based on several years' experience with the technology in PMI and MACEPA-supported IRS operations in Zambia, such a system can effectively complement the usual PMI support for IRS, namely:

- Mapping and enumeration before spraying;
- Guiding teams during IRS and monitoring their performance, and
- Collection of household and operational data which can be analyzed during and after the spray season.

Depending on local needs and campaign objective, one, two or all three functions may be utilized during a campaign.

Key Question 3

What is the residual efficacy of the insecticides used for IRS in PMI-supported areas?

Supporting Data

There are two pesticides deployed in PMI-supported areas, clothianidin and clothianidin + deltamethrin. As depicted in the following graph, the residual efficacy of SumiShield (clothianidin) was found in PMI-supported monitoring to reach seven months' efficacy against wild type anophelines in 2018-19. Fludora Fusion (clothianidin + deltamethrin) was found to have eight months' efficacy against Kisumu strain mosquitoes in a manufacturer-sponsored trial in Nchelenge district in 2017-18 (not shown). The second graph depicts findings for Actellic CS (Pirimiphos-methyl), which was deployed through 2017 in the absence of viable alternatives, and demonstrated only four to five months efficacy against wild type anophelines.

Figure A22. Residual Efficacy of SumiShield with "T" Representing Number of Months.

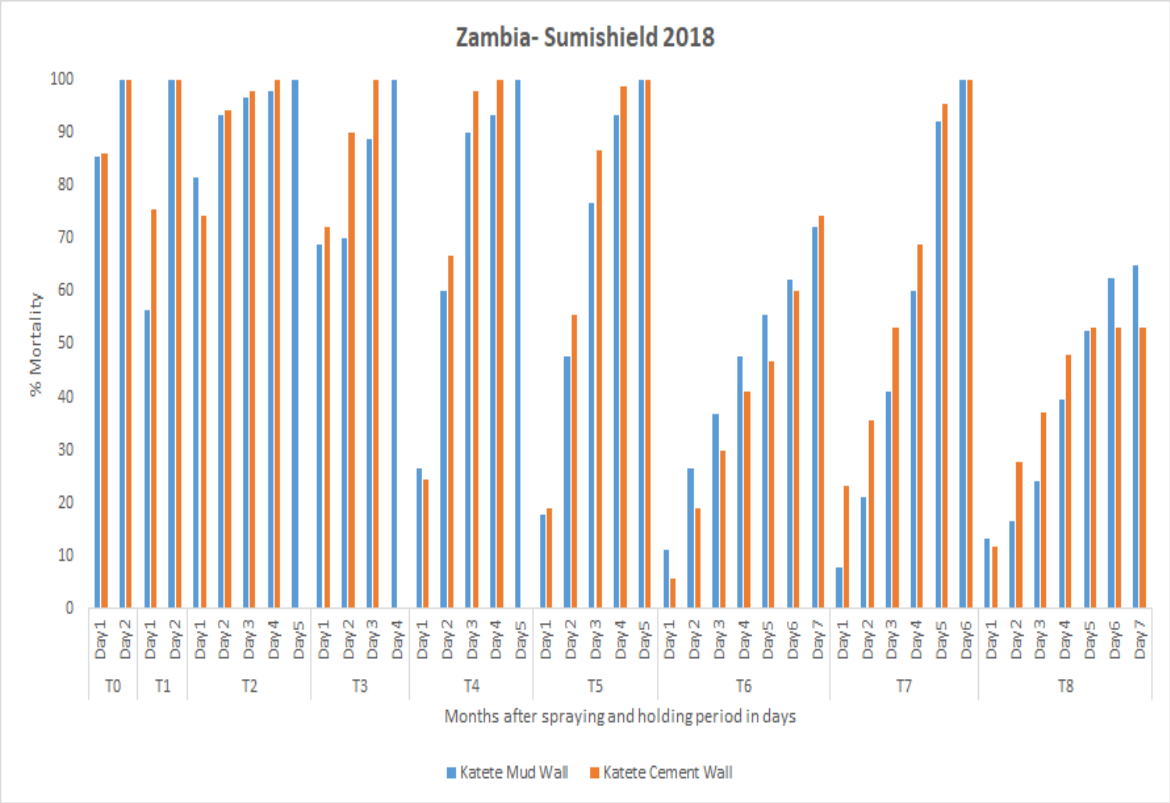
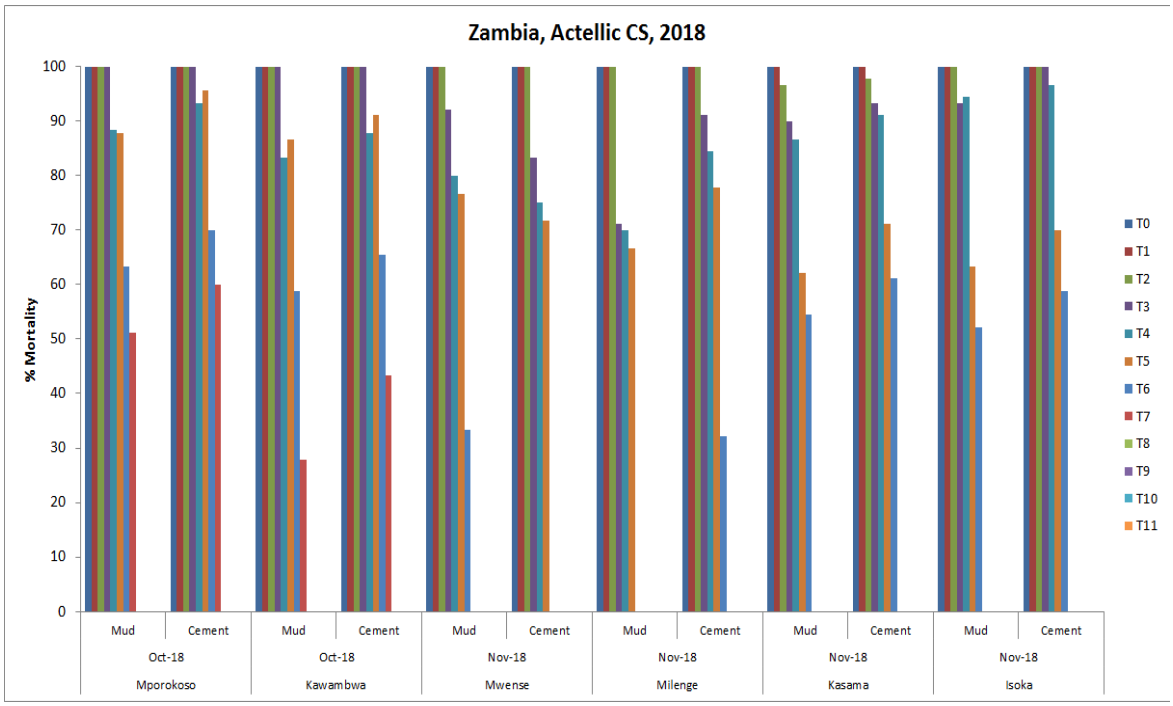


Figure A23. Residual Efficacy of Actellic with "T" Representing Number of Months.



Conclusion

Actellic CS (Pirimiphos-methyl) demonstrated sub-par longevity under local conditions, and will not be deployed in the 2019 campaign in favor of the longer acting clothianidin-based products. The residual efficacy of these products appears to be suitable from Zambia-based monitoring, with the caveat that the Eastern Province monitoring (SumiShield) showed questionably adequate efficacy in month six, and the Nchelenge trial (Fludora Fusion) was not conducted on wild type mosquitoes. The products' efficacy will be monitored carefully following application in the 2019 campaign.

Key Question 4

What is the plan for insecticide rotation? What insecticide will be used next in PMI-supported areas?

Supporting Data

Figure A24. PMI Insecticide Rotation Schedule

Year	Luapula Province	Eastern Province (3 pre-elim districts)	Eastern Province (6 districts)	Muchinga Province	Northern Province	Copperbelt Province
2017	organo-phosphate	organo-phosphate	organo-phosphate	organo-phosphate	organo-phosphate	No PMI IRS
2018	organo-phosphate	clothianidin (SumiShield)	organo-phosphate	organophosphate	organo-phosphate	No PMI IRS
2019	[Nchelenge district] clothianidin+delta (Fludora-Fusion)	clothianidin (SumiShield)	clothianidin (SumiShield)	No PMI IRS	No PMI IRS	clothianidin+delta (Fludora-Fusion)
2020*	[Nchelenge + TBD] clothianidin+delta (Fludora-Fusion)	TBD**	clothianidin (SumiShield)	No PMI IRS	No PMI IRS	clothianidin+delta (Fludora-Fusion)

*Denotes planned insecticide classes;

** Will need to be responsive to the NMEP's policy of insecticide rotation every two years. Preference for these 3 districts would be to use a new insecticide. If unavailable, options to consider in consultation with the VC TWG may be using clothianidin again (with assurance of no insecticide resistance, through routine testing) vs. rotating back to an organophosphate vs. coordinating with the NMEP and the Global Fund to use DDT in this area with PMI assistance in environmental compliance vs. other PMI recommended options.

Conclusion

According to the national IRM policy, pesticides should be changed after two years' application. Assuming that PMI will continue to be unable to procure DDT, the notional four-year plan for insecticide rotation in PMI focus areas would be as follows:

- Eastern Province 6 districts: Start clothianidin in 2019, continue in 2020, change to new class in 2021.
- Eastern Province 3 pre-elimination districts: 2nd year of clothianidin in 2019, change to new class in 2020.
- Copperbelt and Nchelenge: Start clothianidin + deltamethrin in 2019, continue in 2020, change to new class in 2021.

Of note: Pirimiphos-methyl maintains an excellent susceptibility profile, and an organophosphate could be considered for resumed use in the future.

Key Question 5

Are any PMI-supported areas considering withdrawing IRS? If so, what programs are in place to cover anticipated increases in malaria cases and promote consistent net use and care-seeking behaviors?

Supporting Data

No, the plan for the foreseeable future is to continue to support high coverage of IRS in Eastern Province, the rural Copperbelt, and Nchelenge district in Luapula.

Conclusion

See description of planned program above.

Key Question 6

What are the in-country considerations that impact your funding allocation in this category?

Supporting Data

As mentioned, Zambia's NMESP places heavy emphasis on IRS, with prioritization over ITNs as the primary vector control strategy. The stated goal is to provide up to 80 percent of the population of Zambia with IRS. This policy is influenced by renewed interest in IRS at the highest level of national and MOH leadership, in the setting of revived promotion of DDT among the SADC government ministers. The NMEP has developed ambitious plans to implement IRS in virtually all districts in the country, using a mosaic of insecticides, with resources from the Global Fund (including an early 2019 Prioritized Above Allocation Request), government revenues, PMI, mines and plantations.

Conclusion

PMI Zambia will continue to devote a relatively large portion of its support to IRS, given the strong emphasis placed by the MOH on this intervention. In 2019 and beyond, this support will fall under two broad categories:

- Implementation of IRS and entomological monitoring in the targeted PMI-supported provinces.
- Technical assistance to NMEP and MOH on IRS, with an emphasis on the GRZ planned transition to the use of DDT for IRS.

Details have been provided in previous sections.

2. HUMAN HEALTH

2.A CASE MANAGEMENT in health facilities and communities

NMEP objective

The national objective is to ensure that 100 percent of all suspected malaria cases in all districts receive parasitological (microscopy or RDT) analysis and 100 percent of parasitologically confirmed malaria cases receive prompt (within 24 hours) and effective antimalarial treatment. Universal coverage, service for anyone who requires it, with early diagnosis and effective treatment is a key strategy in reducing morbidity and mortality. Microscopy should be used where there is a well-functioning laboratory with staff well-trained in malaria diagnostics. RDTs are to be used in health facilities where there is no microscopy or no well-trained laboratory staff, when a laboratory is closed or too busy to handle the workload, and at the community level by CHWs trained in iCCM.

NMEP approach

Figure A25. Case management policy overview:

Status of Case Management Policy in Zambia According to the *Guidelines for the Diagnosis and Treatment of Malaria in Zambia* (MOH, 5th Edition, 2017)	
What is the first-line treatment for uncomplicated *P. falciparum* malaria?	Artemether-lumefantrine (AL) Dihydroartemisinin-piperaquine (DHA-PQ) (alternate)*
What is the second-line treatment for uncomplicated *P. falciparum* malaria?	None
What is the treatment for severe malaria?	Injectable artesunate (first line) Intramuscular Artemether or Intramuscular/Intravenous Quinine (alternate)
In pregnancy, what is the first-line treatment for uncomplicated *P. falciparum* malaria in the first trimester?	Oral quinine + clindamycin
In pregnancy, what is the first-line treatment for uncomplicated *P. falciparum* malaria in the second and third trimesters?	Artemether-lumefantrine DHA-PQ (alternate)
In pregnancy, what is the first-line treatment for severe malaria?	Injectable artesunate

Is pre-referral treatment of severe disease recommended at peripheral health facilities? If so, with what drug(s)?	Rectal artesunate** Injectable artesunate**
Is pre-referral treatment of severe disease recommended for community health workers? If so, with what drug(s)?	Rectal artesunate
If pre-referral rectal artesunate is recommended, for what age group? (note: current international guidelines do not recommend administering to those ≥ 6 years)	For children less than 6 years old

*to be used only in non-mass drug administration areas
**if these two options are not available, intramuscular quinine is recommended

Health facilities overview:

Government-run health facilities, which provide the great majority of the health care in Zambia, offer a basic health care package of high-impact interventions. Services included in the basic health care package are provided free-of-charge or on a cost-sharing basis, depending on the location and level of the system. In rural districts, these services are free. Church-affiliated facilities are common and are well integrated into the government system in terms of service delivery practices and reporting. CHAZ is an inter-denominational umbrella organization for coordinating church health services in Zambia that has over 110 health facilities including hospitals, health centers, health posts, and community-based organizations, and 11 health training schools, most of which are staffed by Government of Zambia health workers. Altogether, these institutions are responsible for over 50 percent of formal health services in the rural areas of Zambia The private sector accounts for just 14 percent of all health facilities nationally, the vast majority of which are found in the large cities, especially on the Copperbelt and in Lusaka.

Cross-sectional surveys consistently suggest that the great majority of rural households seek health care from formal institutions (facility or CHWs, e.g. 88.6 percent in the recently released *2019 In-Depth Vulnerability and Needs Survey*), but this may reflect under-reporting of use of traditional healers and self-care.

The following are the levels of health care facilities offered throughout the country; malaria control interventions are delivered in all of them.

- ·Community
- ·Health posts (district level)
- ·Health centers (district level)
- ·Level 1 hospitals (district level), Level 2 hospitals (provincial level), and Level 3 hospitals (central level).

Systems for quality improvement include biannual performance assessments of health facilities by district and province offices, and the Outreach Training and Supportive Supervision (OTSS) program. Due to worsening financial constraints impacting supervisors' mobility, these programs have been curtailed except in provinces where partner funding has been available (e.g. PMI in Luapula, Northern, Muchinga, Eastern and parts of Copperbelt and Central; CHAZ in Southern, North Western and Eastern).

Community health worker overview:

Zambia has invested heavily in scaling up community case management of malaria in the context of iCCM. According to the national guidelines, in the iCCM approach the community health workers (CHWs) and community health assistants (CHAs) are provided with diagnostic tools and medicines for the management of common childhood illnesses including the treatment of uncomplicated malaria. CHAs serve as a bridge between health facilities and communities, and play an important role in coordinating iCCM. The CHAs are expected to coordinate the work of the CHWs.

The roles of CHWs and CHAs in the management of uncomplicated malaria include:

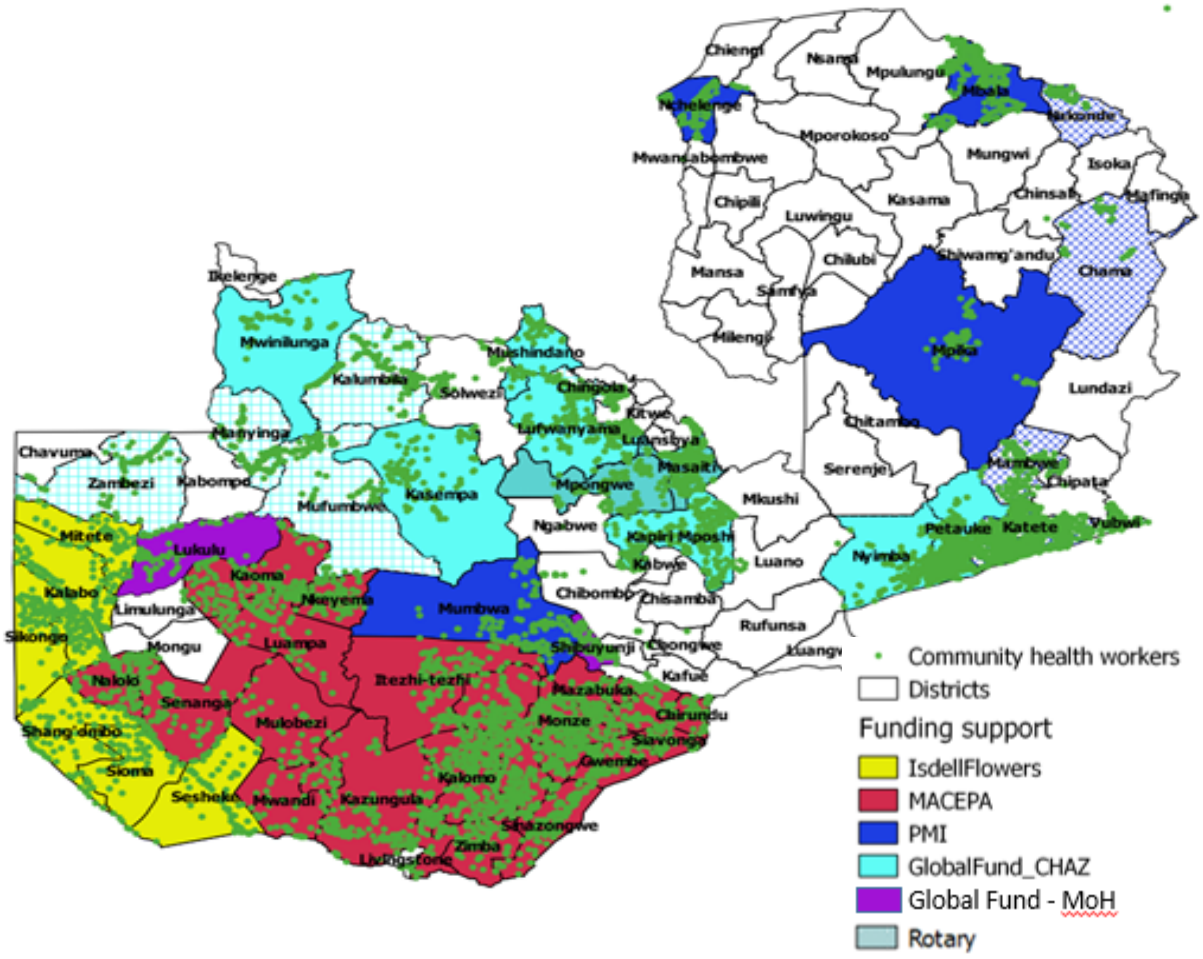
- Carrying out diagnoses according to their training and recognizing danger signs.
- Using RDTs in all cases of fever to confirm malaria before treatment.
- Administering the first-line medicine.
- Administering pre-referral treatment when danger signs are recognized.
- Instituting measures to reduce body temperature.
- Following up with patients, particularly children under five years of age.
- Providing education to the community on the need for compliance to treatment, recognition of danger signs, and prevention of malaria.
- Advising when to return if the condition persists.

In the lower-level epidemiologic settings (<200 cases/1000 pop/yr), the CHWs or CHAs also venture out to test and treat asymptomatic households and neighbors in a reactive case detection (RCD) approach (a.k.a. "Step D," a.k.a. "Active Response"). CHWs are trained in a one-week harmonized curriculum which covers iCCM, RCD, and SBC. Under the RCD program, which is based on the model developed in Southern Province, CHWs follow up as high a portion of passively detected cases which were diagnosed at community or facility level ("index cases") as feasible, typically from 2-40 percent cases depending on setting. Whereas iCCM implementation is supposed to be universally applied, the implementation of RCD is supposed to be scaled up only in the lower epidemiologic settings where it would be expected to be cost effective in terms of commodities and CHW time. However, due to inconsistent messaging, some high-burden districts have pursued RCD with premature enthusiasm. The MOH leadership and partners have been attempting to curb this practice with mixed results to date.

As of September 2019, just over 8000 CHWs had been trained, deployed, and were registered in DHIS2 (Map), which is approximately half the national need. The national goal is to deploy CHWs at a ratio of 1:500 population, but in lower burden rural settings a ratio of 1:750 has been found to be acceptable. In 2018, the CHWs reported 639,996 cases tested under passive case management (of which 37 percent tested positive) and 483,645 under active response (of which 33 percent tested positive). The 2019 CHW activity figures were on pace to exceed 2018. CHW activity was highest in Eastern (33 percent of passive testing activity), Southern (16 percent) and Western (27 percent), reflective of enhanced funding from partners (PMI, MACEPA, and Isdell: Flowers, respectively). CHAZ under Global Fund in several provinces and the Rotary Club on the Copperbelt contributed to this remarkable achievement in the scale up of CHWs for malaria case management and surveillance.

CHWs are unpaid volunteers, but depending on resource availability typically receive various incentives such as starter kits (bicycles, t-shirts, hats, medication boxes), lunch allowances for meetings, per diems during trainings, and so on. In contrast, the CHAs are MOH employees, but their deployment has been quite limited to date due to human resource system bottlenecks and financial constraints (fewer than 1,500 deployed and on the payroll out of national target of 5,000 by 2020).

Figure A26. CHWS Deployed in Malaria Community Case Management, Zambia, 2019



Source: DHIS2, MACEPA

PMI objective, in support of NMEP

- PMI supports the national strategy with significant investments in case management commodities, as well as technical assistance.
- PMI-provided commodities and related supply chain strengthening efforts are generally directed centrally, for distribution and impact throughout the country. PMI is a major source of ACTs and RDTs for the country, and has also played a role in filling gaps in microscopy supplies and severe malaria medication including artesunate injectable and rectal artesunate.
- Technical assistance is more circumscribed geographically. Since 2014, PMI has focused consistently on the high burden provinces of Luapula, Northern, Muchinga and Eastern. Except for a gap in 2017-18, PMI has also been providing technical assistance in Central and Copperbelt province.

- Technical assistance has focused on the training of clinical and laboratory personnel in diagnosis and treatment and CHWs in iCCM, as well as training of national, provincial, and district level staff in providing OTSS for quality assurance of malaria diagnostics and case management.
- PMI has not procured DHAP-PQ, which in Zambia has been used largely for mass drug administration. PMI has also been more cautious than the NMEP and some partners in funding the expansion of reactive case detection (RCD) in higher burden areas, where the cost-effectiveness of testing and treating asymptomatic individuals is questionable, and the need to prioritize limited case management resources to maximize coverage of symptomatic individuals is clear.

PMI-supported recent progress (past ~12-18 months)

- PMI procured 6,600,390 million ACT treatment courses in FY 2018 for the treatment of malaria at health facility and community levels. PMI procured 13,244,400 RDTs in FY 2018 for the testing of suspected malaria cases at health facility and community levels.
- PMI supported OTSS in 6 out of 10 provinces in the country. This is a well-established, high priority program under the case management unit of NMEP. In 2018 and the first half of 2019, with PMI funding, over 1,520 healthcare workers received on-the-job supervision and training in 6 provinces (OTSS program). For comparison, in 2018 these 6 provinces had a reported total of 13,165 of health care workers in the relevant clinical categories. (Source: MOH.) All facilities with microscopes in each province are selected for OTSS visits. Due to resource constraints, only a subset of other facilities are included in OTSS in a given year, prioritized by highest burden and poorest performance.
- PMI supported the continued decentralization and routine implementation of OTSS at provincial and district level, building capacity and reducing the reliance on central supervisors. Two biomedical scientists/laboratory technologists were financed to attend the WHO Accredited Malaria Microscopy Competence Assessment and Training Workshop in Nairobi.
- Working in close coordination with the NMEP and partners such as CHAZ, World Vision and MACEPA, PMI supported iCCM training for 61trainers, 208 supervisors, and 1,808 CHWs in eight focus districts in four focus provinces. After training, CHWs spent one month "on attachment" at their local facilities, and were supported to return to those facilities to submit reports and pick up supplies on at least a monthly basis. The CHW supervisors conducted bi-annual supportive field visits to the CHWs in their communities.
- PMI supported the NMEC in the printing and distribution of job aids for quality malaria microscopy, RDT use, and management of malaria, including severe malaria.
- In Zambia, the era of reluctance to use RDTs is long past. Instead, PMI found it necessary to advocate at all levels for more rational, discerning use of RDTs, in terms of discouraging

indiscriminate screening of asymptomatic clinic attendees, and restricting widespread implementation of RCD to the high-burden catchment areas.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

- **Commodity support**. Continue to procure and support the distribution of ACTs, RDTs, and severe malaria medications to fill gaps and avert stock outs. Focus area: nationwide. In order to ensure that newly deployed CHWs have the necessary commodities to work with, PMI will support the procurement of RDTs and ACTs to avoid stock outs, especially in the early scale up, where experience in Southern Province showed this is common. In addition, technical assistance will be provided to the Medical Stores, the DHOs and health facilities.
- **Continue to improve the quality of parasitological diagnosis in the public sector** through training and supportive supervision of health care providers at the health facility and community levels. PMI will support work at the provincial, district, facility, and community level to improve the appropriate use of diagnostics (microscopy and RDTs), including interpreting test results and managing patients based on results. Operationalize the national slide bank as a tool for training and proficiency testing. Strengthen the use of malaria RDTs. Focus areas: Luapula, Northern, Muchinga, Copperbelt, Central and Eastern Provinces, with increased intensity in five (expanding implementation from the original three) pre-elimination districts in Eastern.
- **Continue to strengthen malaria case management at the facility level** through training and support for the supervision of healthcare providers in the treatment of uncomplicated and severe malaria. PMI will support the NMEC to improve overall malaria case management at the health facility level by supporting the NMEC to roll out the most recent version of the *Guidelines for the Diagnosis and Treatment of Malaria in Zambia* to health providers. PMI will continue to support the printing and distribution of job aids for malaria case management such as algorithms/flow charts as part of the training material package, the supervision and mentorship of health providers in managing patients based on results (i.e. adhering to test results), and treatment in line with the classification of malaria (uncomplicated malaria in normal and special risk groups, severe malaria, and pre-referral treatment). Where there is a need, PMI will support training of health workers at health facilities with inpatient services on the use of injectable artesunate for severe malaria during the OTSS and mentorship visits. Focus areas: Luapula, Northern, Muchinga, Copperbelt, Central and Eastern Provinces, with increase intensity in five (formerly three) pre-elimination districts in Eastern.
- **Continue to strengthen malaria case management at the community level** by expanding access to and strengthening malaria case management at the community level. PMI will continue to support training of CHWs and CHW supervisors in iCCM using the iCCM harmonized curriculum. In selected districts, PMI will also work with the MOH to provide supportive supervision of the CHWs as they implement iCCM. In general, PMI supports a

strategy of saturating select districts to achieve economies of scale in operations and to achieve impact, rather than "sprinkling" the intervention across many districts. Against a background of optimizing coverage of the usual interventions, the aim will be to implement iCCM at scale, with robust systems to ensure that commodities flow from health facilities to CHWs and malaria case data flows reliably from CHWs to health facilities and districts. Focus areas: Luapula, Northern, Muchinga and Eastern Provinces, with increased intensity in five (formerly three) pre-elimination districts in Eastern. Coordinate closely with other partners who provide support in these geographies, such as CHAZ/Global Fund, and Rotary Club.

- **Support scale-up** of community referrals for severe malaria, building on the 2017-18 pilot in Serenje district. Beginning in Chama district, Muchinga, PMI will aid the MOH to replicate a successful Zambian model in which CHWs in remote rural localities, supported by community networks, were trained, equipped and deployed to identify children <6 with suspected severe malaria, administer rectal artesunate (RAS), and transport them to a health facility via bicycle ambulance. The NMEP and the Case Management TWG aim for scaled-up deployment of RAS, which has been in the national guidelines for years but to date has seem minimal uptake.
- **Continue to support SBC activities focused on case management** in PMI focus provinces. Activities will include promotion of prompt care seeking; health talks during ANC visits that encourage pregnant women to take at least four doses of IPTp; engagement with traditional leaders to encourage community members to seek malaria testing and treatment services; health talks during safe motherhood week; production and printing of job aids for CHWs and community change champions; and radio spots focused on the importance of early care seeking behavior.

PMI Goal

Improve access to and utilization of timely, quality, and well-documented malaria testing and treatment by providing facility- and community-based health workers with training, supervision, and malaria commodities to be able to provide high quality, effective care.

Do you propose to increase, decrease, or maintain funding allocation levels for this activity? Why, and what data did you use to arrive at that conclusion?

PMI Zambia will maintain a high level of support for malaria case management, with an increased proportion of the overall MOP allocation compared with recent years due to the anticipated commodity gaps.

- Funding for commodity support will increase due to the threat of national stockouts, as described in the Supply Chain section of the MOP.

- Funding for technical assistance will be maintained at comparable levels, due to large unmet needs. For example, CHW training and deployment has reached just 50 percent of national targets. In OTSS, best practice would be to conduct health facility visits quarterly, but due to resource constraints OTSS rounds are currently conducted twice per year at most. To increase scope and build capacity, PMI intends to explore potential for funding both CHW training and OTSS implementation through government-to-government mechanisms.
- PMI will continue to invest in the scale up of rectal artesunate deployment in community-based referrals for severe malaria. This is based on a successful 2017 pilot in 45 communities in the high burden districts of Serenje, which was supported by Medicines for Malaria Venture (MMV) and collaborators. The pilot built on existing structures, including an existing bicycle ambulance transport system, and increased access to timely, quality care for severe malaria with a four-fold increase in severe malaria cases identified in the community and a 96 percent reduction in the case fatality rate at health facilities. (Source: MMV 2018.)
- The steady progress in Zambia over the past decade and more demonstrates that the country setting is conducive for impactful investments in this area. But in light of Zambia's constrained resource environment, a reduction of support by PMI would jeopardize hard-won gains in a range of malaria case management indicators, such as children receiving appropriate medication (improved from 76 percent in 2010 MIS to 96 percent in 2018 MIS); and parasitological confirmation of reported malaria cases (improved from 31 percent in 2010 HMIS to 96 percent in 2018 HMIS).

Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

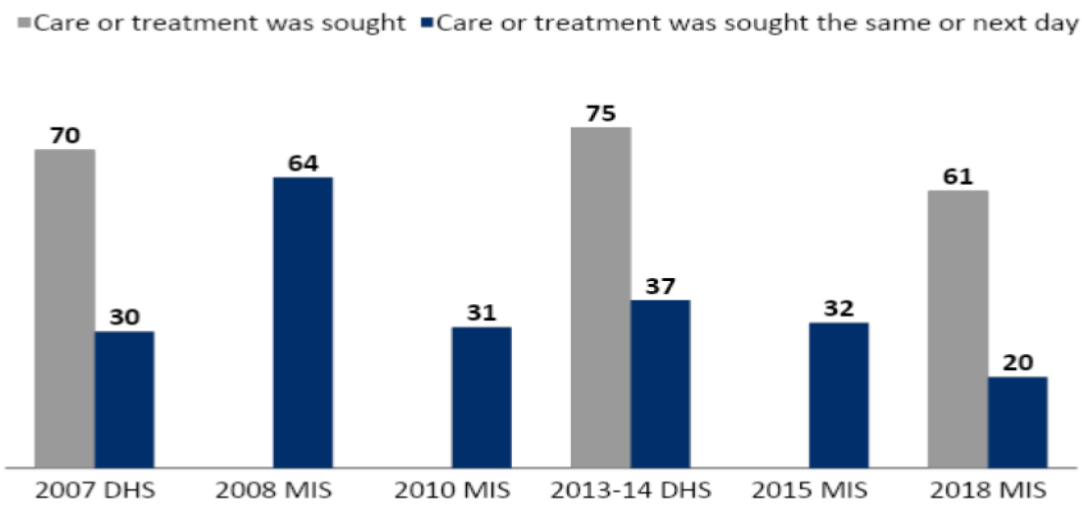
Key Question 1

What is the status of care-seeking?

Supporting Data

Figure A27. Trends in care seeking for fever

Among children under 5 with fever in the 2 weeks before the survey for whom:



*Excludes treatment or advice from a traditional practitioner

According to the 2018 Zambia Malaria Indicator Survey (MIS), prompt care-seeking for children with fever was low, as only 19.7 percent sought treatment from a health facility/provider on the same day or next day. Unlike most indicators in the MIS, this showed a worsening from the 2010 and 2015 MIS. Promptness of treatment seeking was found to be moderately higher in urban (24.1 percent, n=62) than in rural areas (16.4 percent n=507).

Conclusion

Although the small sample size limits the confidence with which we can conclude that there is a worsening trend in prompt treatment seeking, the finding that 80 percent of children with fever were not seen by a health care worker within 1-2 days is concerning. Of note, in spite of greater delays in seeking treatment, a steadily increasing proportion of febrile children are eventually brought to care, tested, and treated with appropriate medications. (See graph under Question 3.)

The delays in treatment seeking may be linked to findings that just 72 percent of respondents recognized fever as a symptom of malaria and 35 percent knew the location and role of CHW(s) in their community.

The programmatic response will include PMI investments in the following measures, among others:

1. Continue to scale-up of community case management of malaria, to reduce barriers to care-seeking such as time and cost of travel.

2. Increase the effectiveness and reach of SBC investments, to improve the population's knowledge, attitudes, and practices regarding recognition of fever and the dangers of malaria
3. Conduct operations research to evaluate the potential impact of a proactive approach to deploying CHWs in iCCM, whereby CHWs would visit households to search out cases of fever and provide prompt testing and treatment services.
4. Improve quality of services provided at health facilities and by CHWs, to improve community perceptions on the value of seeking out care from health care workers. (For example, through training, supervision, mentoring.)
5. Assure adequate supplies of commodities, to increase community confidence that the need medications and testing supplies will be available when then seek care.

Key Question 2

What is known about the major barriers and facilitators to care-seeking?

Supporting Data

Please refer to table in Key question 3 of SBC section which addresses care-seeking behaviors.

Conclusion

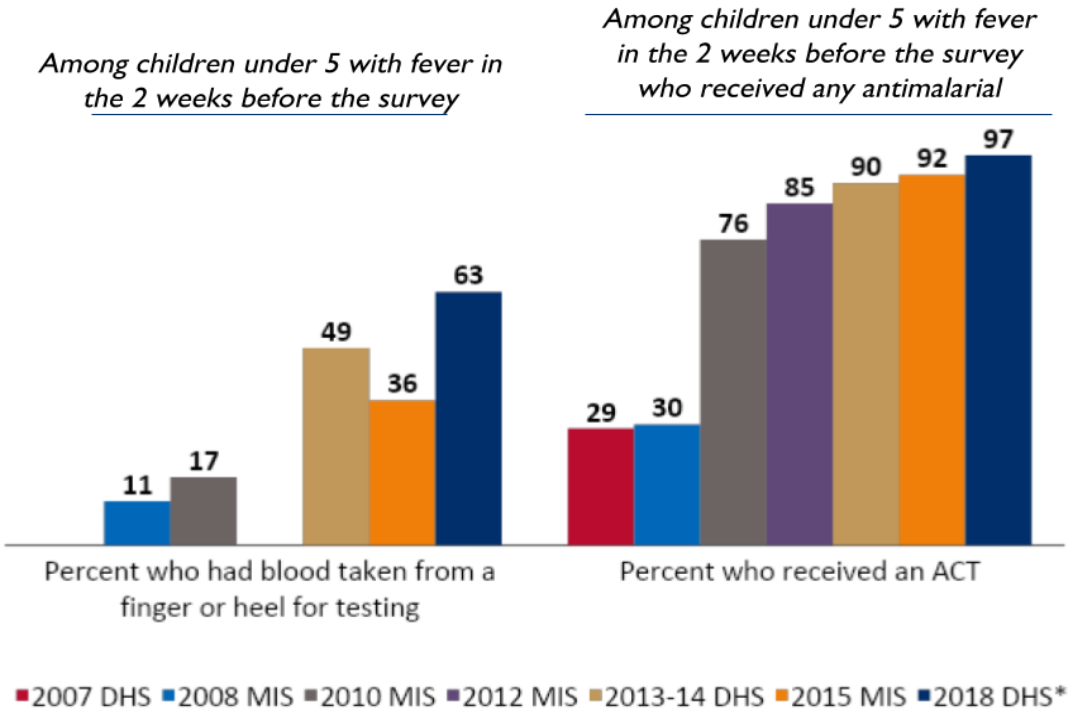
Due to the predominantly rural setting of the PMI focus provinces, lack of access to care is likely an important contributor to care-seeking delays for most of the population. Therefore, strengthening iCCM is a priority across and PMI continues to work closely with the MOH, the Global Fund, and MACEPA to ensure that resources are deployed for iCCM and surveillance in a complementary fashion.

Key Question 3

How have malaria testing and treatment practices evolved over time?

Supporting Data

Figure A28. Trends in diagnosis and treatment of children with fever



*Preliminary Data

Figure A29. Reduction in Unconfirmed (Clinically Reported) Malaria Outpatient Attendance, 2014–2019, in PMI-focus provinces (Source: PATH/NMEP)

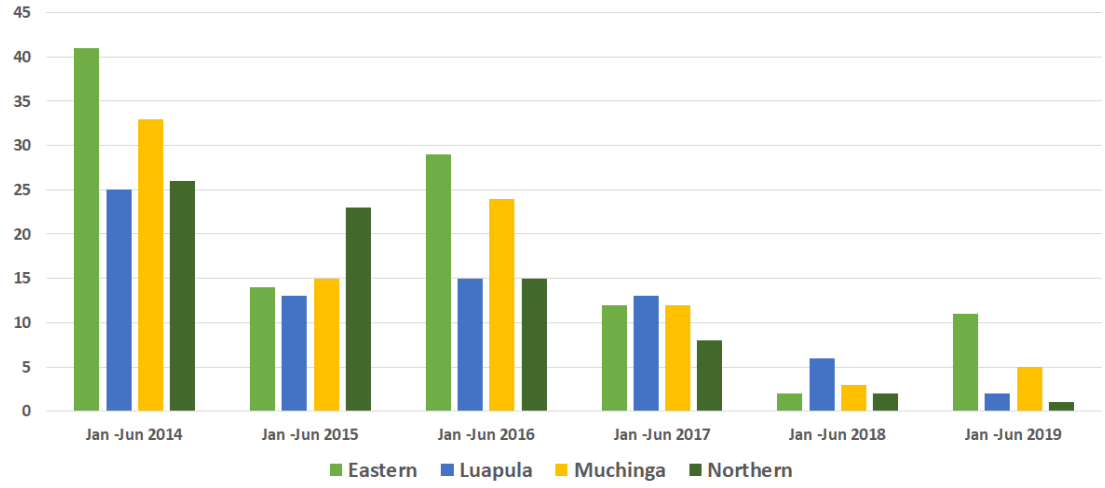
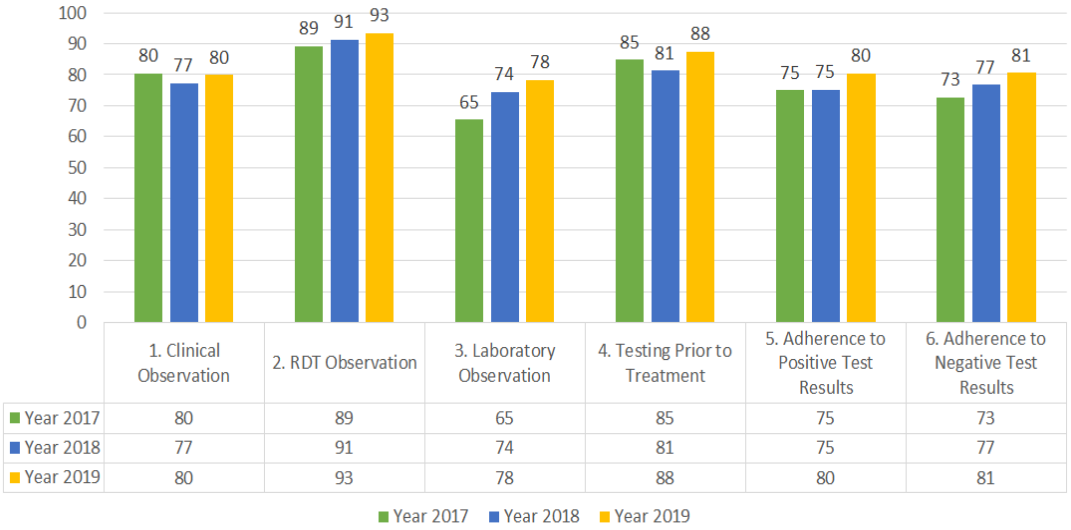


Figure A30. OTSS Composite Health Facility Scores, 2017–2019, From PMI-focus Provinces (Source: PATH/NMEP)



Conclusion

The trends in these indicators suggest that investments in improved case management practice services have been effective. A higher proportion of febrile children are being tested and treated appropriately. A higher proportion of malaria cases reported by districts have been confirmed through RDTs or microscopy. And observations of clinical practice demonstrated improved adherence to quality guidelines. These data also demonstrate much room for improvement. For example, according to the MIS data collected in May 2018, over one-third of febrile children were not being tested for malaria. There remains persistent diagnosis of malaria based on clinical symptoms rather than RDT or microscopy results and inappropriate treatment practices. National policies calling for timely use of artemisinin-based combination therapy (ACT) after a positive test result or an alternative prescribed treatment regimen after a negative test result still do not obtain universal adherence.

Programmatic implications include:

- Further investments toward the national goal of increased coverage by CHWs
- Endorsement of the OTSS approach, which is documented to improve clinical practice in health facilities over time
- Continued support for training and supervision to institutionalize the culture of testing before making a diagnosis of malaria.

Key Question 4

What is known about provider behavior in relation to testing and treatment practices?

Supporting Data

Figure A31. Facilitator and Barriers to Appropriate Testing and Treatment Practices

Facilitator	Type of Factor	Data Source	Evidence
Access to CHW's	Environmental	SBC Formative Study - 2019	Three out of every four people reported having a CHW in their localities. More households in rural areas (82%) reported to have CHWs than households in urban areas (63%).
Febrile children tested for malaria	Environmental	MIS, 2018	Approximately 90% of children seen by health care workers for fever received a diagnostic test.
Children taking ACTs for malaria	Internal	MIS, 2018	Ninety six percent of children ages 0-59 months with fever are taking antimalarial drugs which were ACTs
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Promptness of care seeking for children with fever	Internal	MIS, 2018	Promptness is care seeking for children with fever has decreased from 64% in 2008 to 20% in 2018.

Conclusion

There is limited data on provider behavior to testing and treatment practices in Zambia. The data that does exist from the beneficiary side shows fairly high access to CHWs and high RDT and ACT use by facility health workers. While it is difficult to ascertain local clinical practices from household surveys, it is assumed that many of the finger/heel sticks are likely malaria RDTs, which have been scaled up throughout the country since 2007. Antimalarial treatment practices among febrile children have seen a slight decrease since 2008. This indicator remains standard in an MIS, but has become difficult to interpret. Due to the increasing availability of malaria RDTs, it is assumed that this declining percentage of antimalarial treatments offered to children with fever is largely due to health care providers offering more appropriate treatment advice as a result of parasitological confirmation of clinical diagnoses. In short, it may be that fewer patients with symptomatic fever are being given antimalarial drugs in part because RDT results indicate that they do not have malaria. Over time, promptness to care has decreased since 2006, which is not the desired outcome. This requires further data exploration but could be due both to a declining percentage of fever cases among children and a declining percentage of fever reported as malaria. Programming will continue to focus on achieving even higher CHW coverage and will maintain support for training and supervision to institutionalize the culture of testing before making a diagnosis of malaria.

Key Question 5

What is the current and planned support for case management at health facilities and in the communities by CHWs?

Supporting Data

Please Figure A26 and narrative in this Case Management section.

Conclusion

Please Figure A26 and narrative in this Case Management section.

Key Question 6

What is the estimated need for RDTs for FY 2020?

Supporting Data

Figure A32. Gap Analysis of RDT Needs, 2019 - 2021

Calendar Year	2019	2020	2021
RDT Needs			
Total country population [1]	17,381,168	17,885,422	18,400,556
Population at risk for malaria	17,381,168	17,885,422	18,400,556
PMI-targeted at-risk population	17,381,168	17,885,422	18,400,556
OPD attendance [2]	24,853,363	6,971,830	7,018,227
Estimated attendance at community-level [3]	6,213,341	2,987,927	3,007,812
Patients presenting with fever at OPD [4]	7,629,982	3,485,915	3,509,114
Patients presenting with fever at Community level [5]		472,093	475,234
Estimated Fever Cases in levels 0, 1, and 2 - 32% [6]		1,266,562	1,274,991
mRDT Positivity rate at levels 3 and 4 - 12% [7]		151,987	152,999
Index follow-up in the levels 0, 1, and 2; and 20 individuals per index case tested [8]		3,039,750	3,059,979
Index follow-up in levels 3 & 4 - 60 index tests/CHW/year [9]		1,946,640	2,001,146
Adjustment for retests, training and QA/QC - 10%		894,440	904,547
Prevalence of malaria OPD - 16% [10]	1,220,797		
5% index testing applied on facility positives and 20 individuals per index case tested	1,220,797		
Number of mRDTs Required (estimates *3 expected test/person)		29,516,512	29,850,060
Total RDT Need - Adjusted for program growth [11]	**18,076,944**	**33,943,989**	**34,327,569**

Calendar Year	2019	2020	2021
Partners contributions (to PMI target population if not entire area at risk)*			
RDTs carried over from previous year [12]		5,073,681	
RDTs from Government	0	0	0
RDTs from Global Fund [13]	13,410,425	6,925,200	0
RDTs from other donors		0	0
RDTs planned with PMI funding [14]	9,740,200	9,579,975	5,400,000
Total RDTs	**23,150,625**	**21,578,856**	**5,400,000**
Total RDT surplus/gap	**5,073,681**	**-12,365,134**	**-28,927,569**

Footnotes:

[1.] Geographic coverage: Annual population estimates reflect the 2010 Census of Population and Housing projections by the Zambian Central Statistical Office (CSO). The population of people at risk of malaria is 100% as it is assumed that malaria elimination is still low.

[2.] OPD attendances captured by HMIS represent 80% of National coverage for 2019 and 70% for 2020-2021

[3.] This assumes that 20% of attendances for 2019 are seen at the community-level and a further assumption was made that this covers both patients presenting with fever and index follow ups. For 2020-2021, this assumes that 30% for attendances are seen at the community level. These assumptions are based on the Malaria Rapid Reporting System.

[4.] This assumes 30.7% of patients present with fever at OPD for 2019. For 2020-2021, this assumes 50% of patients present with fever at OPD. This is based on an NMEP-supported study from Chongwe Rural Health Center by Chanda et al.

[5.] This assumes 15.8% based on the 2018 Malaria Indicator Survey (MIS)

[6.] This is based on the 2018 Malaria Indicator Survey (MIS)

[7.] This is based on the 2018 Malaria Indicator Survey (MIS)

[8.] This assumes every positive will be followed up for index testing and will attract 20 follow-ups each.

[9.] This assumes 32,444 CHWs are planned to be trained in total in 2020, and are expected to grow in total based on the 2.8% population growth in 2021 to 2022.

[10.] This is based on the 2014 Malaria Indicator Survey (MIS).

[11.] A 20% growth rate was estimated for 2019 and a 15% growth rate was estimated for 2020 to 2021. 18,076,944 was adopted from the 2017 final forecasts of the F&Q exercise, while the team recommended the service-based forecast estimate of 33,943,989 mRDTs for 2020. The increase in mRDT needs in 2019 to 2020 is being driven by the new elimination focused strategy that calls for increased community-level index case identification and index case follow-up. As part of this elimination strategy, the program is currently focused on training community health workers (CHW) to perform the index case testing and follow-up. The training program has increased the number of CHW from 5000 at the beginning of this year to about 11000. The NMEC is expecting have 28000 trained CHW by April 2020.

[12.] The monthly forecast is about 2.8 million tests. Therefore, the expected carry over is only about 1.8 months of stock (MOS), compared to the expected 6 MOS safety stock desired at the end of any given year.

[13.] The figure includes both the CHAZ and MOH/PMU contributions.

[14.] The quantity includes MOP 19 and MOP 18 reprogrammed funds.

Key Assumptions:

- 30% of the attendances are seen the community, based on the Malaria Rapid Reporting System (MRR).
- OPD attendances captured by HMIS represent 70% of national coverage.
- 15.8% fever prevalence rate at the community-level, based on the 2018 Malaria Indicator Survey (MIS).
- 50% prevalence rate of fever for OPD cases, based on a study from Chongwe Rural Health Center by Chanda et al.
- 11% and 89% of suspected fever cases are found in low transmission zones (levels 0, 1, and 2) and in high transmission zones (levels 3 and 4) respectively. This is based on the stratification of health facilities by provinces. • One index case will generate 20 follow-up cases in low transmission zones.
- All confirmed index cases identified in high transmission zones (level 3 and 4) will be followed up on by CHWs with a target of 60 cases each per year to maintain competence.

Conclusion

The RDT gap table is based on technical expert input following the 2019 quantification exercise and is pending the consensus from NMEC and contributions from stakeholders. At a high level, the Figure A33 shows that a funding gap is anticipated. The revised gap analysis will feed into the next Global Fund grant for procurement of commodities beginning in 2021.

Key Question 7

What is the estimated need for ACTs for FY 2020?

Supporting Data

Figure A33. Gap Analysis of ACT Needs for 2019-2021

Calendar year	2019	2020	2021
ACT Needs			
Population of Zambia based on CSO [1]	17,381,168	17,885,422	18,400,556
Population at risk for malaria	17,381,168	17,885,422	18,400,556
PMI-targeted at-risk population	17,381,168	17,885,422	18,400,556
Total ACT needs - Annual patient need only [2]	**14,612,153**	**13,186,461**	**15,944,903**
Partners contributions			
ACTs carried over from previous year	0	0	9,115,972
ACTs from Government	5,382,030	0	0
ACTs from Global Fund	2,911,500	7,583,610	0
ACTs from Global Fund/CHAZ	0	222,118.00	0
ACTs planned with PMI funding	3,500,040	14,496,705	4,200,000
Total ACTs Available	**11,793,570**	**22,302,433**	**13,315,972**
Total ACT surplus/gap	**-2,818,583**	**9,115,972**	**-2,628,931**

Footnotes:

1. Geographic coverage: Annual population estimates reflect the 2010 Census of Population and Housing projections by the Zambian Central Statistical Office (CSO). The population of people at risk of malaria is 100% as it is assumed that malaria elimination is still low.
2. The 2017 forecast was maintained for 2019. For the 2020 forecast, the team agreed to take an average of the two forecast methodologies (consumption and service-based). Calculations for each methodology are included in the adjacent cells.

The consumption-based and service-based forecasts for ACTs were significantly different from the facility-level consumption data for ACTs, with the forecasts far exceeding the expected consumption based on the confirmed number of malaria cases facility-level. This is a trend that has been seen repeatedly in the data from the last 3 years. Given this concern, the current recommendation for the 2020 forecast is to take an average of the two forecast methodologies with the following recommendations:

1. strengthen the service data to ensure it is accurately capturing all the suspected and confirmed malaria cases at facility and community levels;
2. review the case management practices at the facility and community-level to ensure ACTs are only being prescribed as per policy recommendations;
3. strengthen the supply chain to mitigate loss or diversion of commodities while re-enforcing accurate information capturing; and
4. conduct close monitoring of the commodity pipeline with frequent forecast reviews reconciled against service-level data to ensure that consumption is consistent with expected service requirements.

Conclusion

The ACT gap table is based on technical expert input following the 2019 quantification exercise and is pending the consensus from NMEC and contributions from stakeholders. At a high level, Figure A33 shows that a funding gap is anticipated. The revised gap analysis will feed into the next Global Fund grant for procurement of commodities beginning in 2021.

Key Question 8

What is the projected need for severe malaria treatment and any other treatments as applicable?

Supporting Data

Figure A34. Gap Analysis of Artesunate Suppository Needs, 2019-2021

Calendar Year	2019	2020	2021
Artesunate suppository needs			
Total country population [1]	17,381,168	17,885,422	18,400,556
Rural population 60% [1]	0	10,731,253	11,040,334
Under 5 population 20% [1]	0	2,146,251	2,208,067
Population at risk of severe illness 8% (6-72 months) [2]	0	171,700	176,645
PMI-targeted at-risk population	0	171,700	176,645
Prevalence - % likely to fall ill with severe malaria [3]	0	90%	70%
Number of severe malaria cases expected to require pre-referral treatment at community level (6 - 72months)	0	154,530	123,652
Total artesunate suppository needs [4] - (patient need only)	**0**	**309,060**	**247,303**
Partners contributions			
Artesunate suppositories carried over from previous year	0	0	
Artesunate suppositories from Government	0	0	0
Artesunate suppositories from Global Fund	0	22,822	0
Artesunate suppositories from other donors	0	0	0
Artesunate suppositories planned with PMI funding	0	8,094	28,000
Total artesunate suppositories available	**0**	**30,916**	**28,000**
Total artesunate suppositories surplus/gap	**0**	**-278,144**	**-219,303**

Footnotes:

[1.] Annual population estimates reflect the 2010 Census of Population and Housing projections by the Zambian Central Statistical Office (CSO). From this data, it was assumed that approximately 60% of the population is rural and approximately 20% of the population consists of children between 6 months to 72 months.

[2.] According to "MAMaZ Against Malaria Mid-term Report, November 2017," 8% of the target population is likely to have a severe illness, but not necessarily severe malaria.

[3.] The likelihood of children developing severe malaria and testing positive for malaria is 90% and 70% for 2020 and 2021 respectively. This assumption is based on the Malaria Indicator Survey (MIS) 2018.

[4.] It was assumed that every case will be administered with one suppository, while the cases are referred to hospitals. However, due to anticipating loss due to diarrhea (one of the symptoms of severe malaria), one more suppository was added.

Figure A35. Gap Analysis of Injectable Artesunate Needs, 2019-2021

Calendar Year	2019	2020	2021
Injectable artesunate needs			
Projected number of complicated cases [1]	30,620	59,742	41,785
Projected # of severe cases among children	0	0	0
Projected # of severe cases among adults	30,620	59,742	41,785

Calendar Year	2019	2020	2021
Percentage allocated to artesunate injectable	30,620	59,742	41,785
Total injectable artesunate vials needs (patient need only) [2]	**185,026**	**496,456**	**347,233**
Partners contributions			
Injectable artesunate vials carried over from previous year	0	214,974	51,082
Injectable artesunate vials from government	300,000	0	0
Injectable artesunate vials from Global Fund	100,000	100,000	0
Injectable artesunate vials from other donors	0	0	0
Injectable artesunate vials planned with PMI funding	0	232,564	200,000
Total injectable artesunate vials available	**400,000**	**547,538**	**251,082**
Total injectable artesunate vials surplus/gap	**214,974**	**51,082**	**-96,151**

Footnotes:

1. The data was calculated using quarterly cases and a linear projection of service statistics method from HMIS data. Severe malaria cases in children below one year old were considered negligible. This includes severe malaria in all two groups of patients in the two tables to the right hand side **(54,569 and 5,173)**. Cases of children under one year were considered negligible, hence added to the first group of cases except MIP.
2. 2019 Artesunate Inj vials determined by cases segmented by age group and dose requirement (children inclusive). This was based exclusively on the service statistics method. Dosing Table used below to determine the vials needed.

Conclusion

The injectable artesunate gap table and the rectal artesunate gap tables are based on the consensus from NMEC and contributions from stakeholders. Overall, the gap table shows that a funding gap is anticipated. The gap analysis will be reviewed with NMEC for consensus and will then feed into the next Global Fund grant for procurement of commodities beginning in 2021.

Key Question 9

Are the first-line ACTs effective and monitored regularly?

Supporting Data

Figure A36. Most recently completed and ongoing antimalarial therapeutic efficacy studies

Year	Sites	Treatment arms	PCR-corrected ACPR>90%?	Where molecular resistance work was completed or the plan, if any, for molecular resistance work
2016	Katete, Mansa, Gwembe	AL, ASAQ, DP	Yes (preliminary)	NMEC Molecular Laboratory with quality assurance at CDC Atlanta
2019 (analysis ongoing)	Isoka, Mpongwe, Sernje	AL, ASAQ, DP	pending	not known

Footnotes - ACPR: adequate clinical and parasitological response; AL: artemether-lumefantrine; ASAQ: amodiaquine-artesunate; DP: Dihydroartemisinin-piperaquine; PARMA: PMI-supported Antimalarial Resistance Monitoring in Africa

Conclusion

Although final data is pending, the 2016 study indicates ACTs remain efficacious in Zambia.

Key Question 10

Are there other key items, such as lab strengthening, private sector support, etc. that should be considered?

Supporting Data Zambia

N/A

Conclusion

N/A

Key Question 11

What are the in-country considerations that impact your funding allocation in this category?

Supporting Data

As discussed under the Supply Chain section, the country is facing increasing pressure on malaria commodities due to fiscal challenges.

Conclusion

See Supply Chain section.

2.B. DRUG-BASED PREVENTION

NMEP objective
The NMESP 2017 to 2021 does not provide specific objectives for intermittent preventive treatment of malaria in pregnancy (IPTp) or Malaria in Pregnancy. The information provided highlights malaria in pregnancy policy which is noted below under NMEP approach.
NMEP approach
The National Malaria Elimination Strategic Plan 2017 to 2021 includes three strategies to reduce the malaria burden in pregnant women: 1. the provision of free IPTp with at least four doses of SP during pregnancy, 2. the provision of free ITNs, and 3. free prompt diagnosis and treatment of clinical malaria. These interventions are implemented as part of routine focused antenatal care. Treatment for uncomplicated malaria is quinine in the first trimester and artemether-lumefantrine (AL) in the second and third trimesters. Severe malaria in pregnant women is treated with intravenous quinine in the first trimester and injectable artesunate in the second and third trimesters.

PMI objective, in support of NMEP

PMI's support of drug-based prevention strategy aligns with the NMEP national approach. This includes the provision of free IPTp, ITNs, and prompt diagnosis and treatment, although most of PMI's IPTp support takes place in the four high burden provinces of Luapula, Northern, Muchinga, and Eastern and not at a national level.

PMI-supported recent progress (past ~12-18 months)

- The strategy to increase IPTp coverage in Zambia includes targeting rural areas. PMI continued to support supervision and training of health center clinical staff in FANC on the updated policies through clinical care teams.
- PMI supported the training of provincial and district level health workers and supervision of provincial, district, and health facility level health workers on the implementation of NMEP IPTp guidelines in four high malaria burden provinces (Luapula, Northern, Muchinca, and Eastern).
- PMI supported the orientation of 419 MOH staff to the revised ANC guideline.
- National and community level SBC efforts for MIP focused on the use of nets during pregnancy, and early ANC in the first trimester for the first visit and monthly ANC starting in the second trimester. uptake. These behaviors were promoted through national and local radio, national television spots, and Safe Motherhood Action Groups (SMAGs).
- PMI supported routine distribution of ITNs through ANC/EPI.
- Given the GRZ commitment to procure SP in FY 2018, PMI did not procure any SP during this time period. However, procurement was not undertaken, and SP stock-outs have been widespread in recent months. Steps are being taken to ensure that stock-outs do not continue and ANC visits remain high.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

- The strategy to increase IPTp coverage in Zambia focuses on the continued training and supervision of provincial, district, and health facility level health workers on the implementation NMEP IPTp guidelines in the four provinces in which PMI focuses its investments (Eastern, Luapula, Muchinga, and Northern). Support will be split across two partners as this is a transition year between projects. In addition, support for routine distribution of ITNs through ANC/EPI will continue.
- To improve patient knowledge and demand for prevention and treatment of malaria in pregnancy, PMI will continue to support national- and community-level SBC activities, with an emphasis on local SBC activities such as SMAGs in rural areas.

2.B.i MALARIA PREVENTION IN PREGNANCY (MIP)

PMI Goal
Support the national strategy for MIP, which includes provision of ITNs at first antenatal care (ANC) visit, IPTp to all pregnant women in malaria endemic areas starting at 13 weeks gestational age, for a minimum of three doses, and effective case management of malaria, in accordance with WHO recommendations.

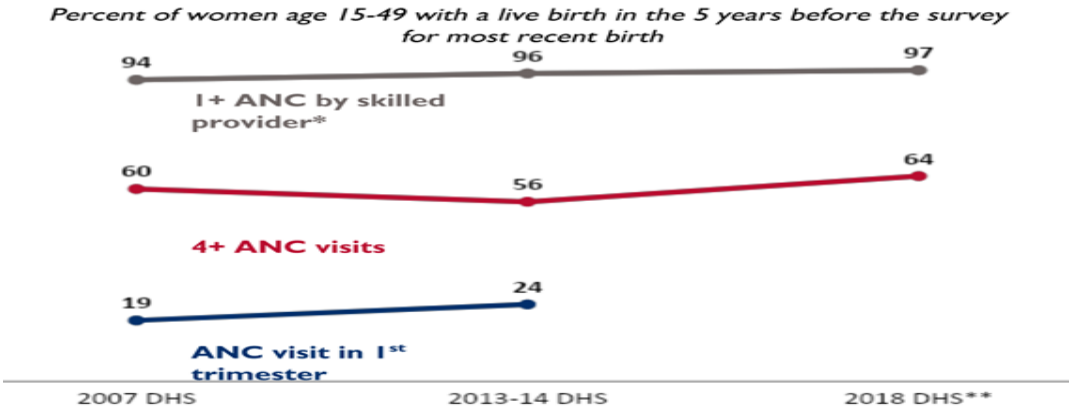
Do you propose to increase, decrease, or maintain funding allocation levels for this activity? Why, and what data did you use to arrive at that conclusion?
Given the Global Fund procured commodities early in the current allocation cycle, and the Government of Zambia is experiencing budget constraints, PMI will procure about half of the country's SP needs in FY 2020. This is a short term solution to ensure sufficient SP coverage at ANC visits and to maintain high ANC consultation rates. PMI will continue to support increased IPTp coverage in Zambia which focuses on the training and supervision of provincial, district, and health facility workers on IPTp implementation guidelines. In addition, support for routine distribution of ITNs through ANC/EPI will be provided. To improve patient knowledge and demand for prevention and treatment of malaria in pregnancy, PMI will continue to support national and community level SBC activities. Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

What proportion of pregnant women are receiving ANC early and frequently during their pregnancy?

Supporting Data

Figure A37. Trends in ANC coverage



*Skilled provider includes doctor, nurse, or midwife

** Preliminary data

Conclusion

The percentage of women who received ANC by a skilled provider has increased slightly from 94 percent in 2007 to 97 percent in 2018. Both women attending 4+ ANC visits and women receiving at least one ANC visit during their first trimester of pregnancy have also seen modest gains. Zambia continues to place significant emphasis on ANC attendance and expects to see continued gains in the area of ANC attendance.

In 2014, the NMEP aligned the national policy on IPTp with the updated WHO policy on IPTp, including updating the HMIS/DHIS2 to capture three doses of IPTp. The current national policy calls for pregnant women to receive IPTp at every ANC visit at least one month apart up until the time of delivery, with the first dose starting as early as possible in the second trimester of pregnancy--between 13 and 16 weeks. Initially, national policy did not align with the recommendation for low dose folic acid. PMI Zambia worked with the Safe Motherhood Technical Working Group to advocate for a policy change in order to include low-dose folic acid. In early 2017, a final decision was made to update the FANC guidelines to include low-dose folic acid, which is now being provided at ANC visits.

Key Question 2

What proportion of pregnant women are receiving the recommended doses of IPTp?

Supporting Data

Figure A38. Trends in IPTp

Percent of women age 15-49 with a live birth in the two years before the survey who received the specified number of doses of SP/Fansidar during their last pregnancy, at least one of which was administered during an ANC visit

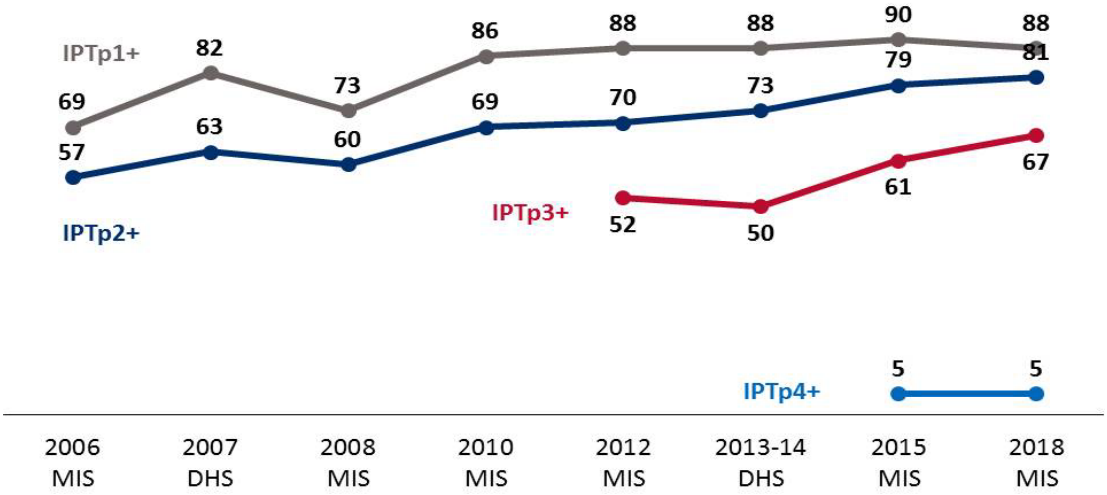
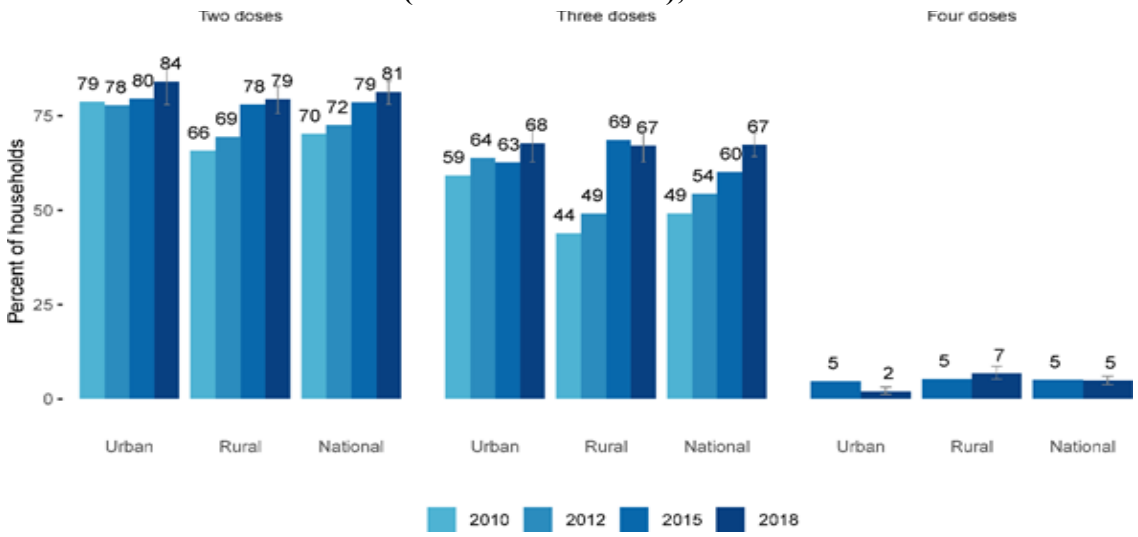


Figure A39. Women with Recent Births Reporting Coverage of at Least Two, Three, and Four Doses of Intermittent Preventive Treatment During Pregnancy, By Urban and Rural Areas (Zambia 2010-2018), MIS 2018



Conclusion

An increasing percentage of women reported taking two and three doses of IPTp in 2018 with 81 percent of pregnant women reporting at least two doses. The percentage of women reporting taking a fourth dose stayed the same at 5 percent between 2015 and 2018. Data on the fourth dose are presented only for the 2015 and 2018 MIS. PMI will continue to support IPTp coverage through health care worker trainings, SBC, and the procurement of SP in order to fill country wide gaps.

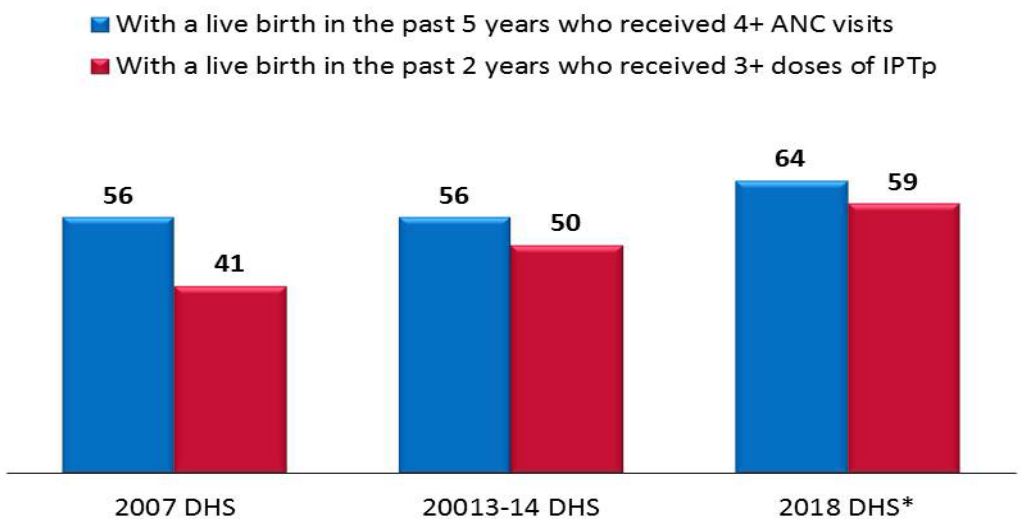
Key Question 3

What is the gap between ANC attendance and IPTp uptake? What barriers and facilitators exist, especially among providers?

Supporting Data

Figure A40. Trends in Missed Opportunities for IPTp

Percent of women age 15-49



*Preliminary data. Please note that the source for IPTp3+for 2018 differs from the graphic on trends in IPTp for purposes of direct comparison with ANC4+ and identifying gaps.

Figure A41. Facilitators and Barriers to IPTp Uptake among Pregnant Women

Facilitator	Type of Factor	Data Source	Evidence
Relatively High Frequency of 3+ ANC Visits	Social	MIS - 2018	See figure above showing stable relatively high frequency of 3+ ANC visit.
Knowledge about Malaria Prevention Services for Pregnant Women	Internal	SBC Formative Research Report - 2019	Ninety one percent of those surveyed knew pregnant women should seek malaria prevention during regularly scheduled ANC visits.
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Lack of Knowledge about IPTp Guidelines	Internal	SBC Formative Research Report - 2019	Over a third (35%) of the households surveyed were of the view that pregnant women should start IPTp at the beginning of their pregnancy, 24% thought that IPTp should start at the first antenatal care visit, and 21% thought IPTp should begin at the start of the second trimester.

Conclusion

Women attend ANC visits with relatively high frequency and are aware that malaria prevention is a service offered during ANC visits. However, there is a lack of accurate knowledge about IPTp guidelines and at what point during pregnancy women should initiate IPTp treatment. Even healthcare providers have varied levels of knowledge about which month pregnant women should initiate SP. SBC activities should focus on promoting correct IPTp administration guidelines among pregnant women, women of childbearing age, and their families.

Key Question 5

What is the estimated need for IPTp commodities over the next three years and what proportion of this need will PMI support?

Supporting Data

Figure A42. Gap Analysis of IPTp Commodities Needs, 2019 - 2021

Calendar Year	2019	2020	2021
SP Needs			
Total country population [1]	**17,381,168**	**17,885,422**	**18,400,556**
Methodology Type	Service	Demographic	Demographic
Expected Pregnancies in the population - 5.4% [2]	938,583	965,813	993,630
77% of pregnant women will come for the 1st ANC		743,676	765,095
62% of 1st ANC attendance will return for 2nd ANC		461,079	474,359
52% of 1st ANC attendance will return for 3rd ANC		386,711	397,849
23.3% of 1st ANC attendance will return for 4th ANC		173,276	178,267
10.8% of 1st ANC attendance will return for 5th ANC		80,317	82,630
Total expected ANC attendances		1,845,060	1,898,201
Adjustment for 30% missed IPT [3]		2,398,578	2,467,661
Expected ANC attendances [4]	2,084,716		
Reporting rate completion (95%)	2,194,438		
Transposing error (5%)	104,236		
Total ANC attendances	2,298,674		
Total SP needs - Annual patient need only [5]	**13,792,042**	**7,195,733**	**7,402,984**
Partner Contributions			
SP carried over from previous years	0	0	4,624,967
SP from Government	**16,667**	0	0
SP from Global Fund	0	7,196,000	0
SP from CHAI [6]	79,000	0	0

Calendar Year	2019	2020	2021
SP planned with PMI funding	0	4,624,700	2,700,000
Total SP available	**95,667**	**11,820,700**	**7,324,967**
Total SP surplus/gap	**-13,696,375**	**4,624,967**	**-78,017**

Footnotes:

[1.] Annual population estimates reflect the 2010 Census of Population and Housing projections by the Zambian Central Statistical Office (CSO).

[2.] The total number of pregnant women is estimated at 5.4% of the total CSO population.

[3.] This is a positive adjustment to account for the potential impact of the prolonged stockout of SP and other essential medicine stockouts on ANC attendance. It was noted that SP has been stocked out at central level since 2017 (or earlier) and facility-level stockouts averaged about 30% over the year.

[4.] This was calculated as a quarterly linear progression from 2015 data.

[5.] The 2019 forecast assumed that each pregnant woman would receive 6 IPTp treatment doses as recommended in the current NMEC policy. The visits per pregnancy per year for 2019 was guided by the revised MOH 2018 ANC policy. During the quantification review, it was determined that the assumption on the number of visits was unrealistic as of the time of the review, as the data showed pregnant women receiving a maximum of 3 IPTp treatment doses. This led to the change in the quantification methodology for 2020 and 2021.

[6.] This was procured outside the supply pipeline for Northern Province, supported by CHAI. MOH, however, redistributed 38,333 treatments to other provinces.

Conclusion

The SP gap table is based on technical expert input following the 2019 quantification exercise and is pending consensus from NMEC stakeholders. At a high level, the table shows that a funding gap is anticipated. The revised gap analysis will feed into the next Global Fund grant for procurement of commodities beginning in 2021.

Key Question 6

What are the in-country considerations that impact your funding allocation in this category

Supporting Data

Please see section above.

Conclusion

Please see section above.

3. CROSS-CUTTING AND OTHER INFRASTRUCTURE

3.A. SUPPLY CHAIN

NMEP objective
The National Malaria Elimination Strategic Plan 2017 to 2020 does not currently explicitly state a supply chain objective. Please see below for the NMEP supply chain approach.

NMEP approach

The MOH developed Zambia's first Health Sector Supply Chain Strategy (HSSCS) in 2013 and implemented the strategy from 2015 to 2017. In 2018, PMI provided technical assistance to the MOH and stakeholders (such as the Procurement and Supply Management Technical Working Group) to develop and finalize a revised Health Sector Supply Chain Strategy (HSSCS) 2019-2021. The goal of the HSSCS is to ensure equitable access to medicines, vaccines and medical supplies for all Zambian citizens. Paraphrasing from the HSSCS, the strategy aims to achieve this goal by focusing on interventions under four functional groups: *Forecasting, Procurement, and Rational Use; Storage and Distribution; Strategic Data; Finance and Resources.*

The HSSCS has been adopted by the Government of the Republic of Zambia (GRZ) and will provide guidance to teams in order to achieve the following:

- Ensure the availability of quality public health commodities and medical supplies through effective and efficient forecasting, procurement, and rational use
- Establish sufficient pharma-grade storage facilities and a sustainable and efficient distribution system
- Aim to have 80 percent of trained personnel using an integrated supply chain management system to enhance data integrity by 2021
- Improve efficiency, equity, and resource mobilization to ensure financial sustainability in the health sector supply chain

PMI objective, in support of NMEP

There are seven high-level focus areas for PMI contributions:

1. Forecasting and supply planning technical assistance to the MOH
2. Logistics management information systems capacity building
3. Data visibility for assessing and monitoring stock status
4. MSL warehousing and distribution capabilities
5. Malaria pre-elimination activities
6. Procurement, distribution, and monitoring of ITNs
7. Procurement of antimalarials, RDTs, and diagnostic commodities

Overall, these focus areas align at a high level with the national supply chain strategy functional areas of forecasting, procurement, and rational use; storage and distribution; strategic data; and finance and resources. However, one key area of divergence with GRZ in terms of supply chain can be found within the National Malaria Elimination Strategic Plan (NMESP) 2017-2021. Under the NMESP, the National Malaria Elimination Programme (NMEP) proposes the use of Mass Drug

Administration (MDA) using DHAP (Dihydroartemisinin + Piperaquine). PMI does not support this initiative and therefore does not procure DHAp.

PMI-supported recent progress (past ~12-18 months)

In the table below, the progress is presented through the outcomes and the impact. Most of the activities listed in this table will continue until the end of FY 2019, after which, activities will commence in line with partner work planning for FY 2020.

Figure A43. PMI-Supported Recent Progress (past ~ 12-18months)

Result Area	Outcomes	Impact
Strengthened logistics information systems to avail critical data for informed supply chain decision-making.	To date in FY 2019, PMI, through partners, has conducted desk reviews and remote support for 480 facilities and conducted supervision visits at 129 sites to improve the quality of data in logistics reports.	This field-level reach enables engagement at SDPs to monitor stock availability and resolve challenges. This technical assistance has contributed to sustained high levels of reporting rates for malaria commodities (averaging 91% to date in FY 2019) and stock availability for malaria products (averaging 78% across FY 2019).
	Technical assistance provided for seven provincial and district integrated meetings and conducted 129 supervision visits to improve the quality monitoring and use of logistics data for supervision.	This technical assistance builds the capacity of supervisors to access and analyze eLMIS data to make management decisions, such as redistributing malaria commodities to mitigate stock imbalances in the health facilities. This technical assistance has contributed to sustained high levels of reporting rates for malaria commodities (averaging 91% in FY 2019) and stock availability for malaria products (averaging 78% across FY 2019).
	Built MOH staff capacity in logistics systems operation and commodity management through integrated pre-service and in-service training for 539 MOH staff as of the end of FY 2019.	The trainings help ensure proper reporting and ordering of malaria commodities through eLMIS, thus promoting commodity security and mitigating instances of stock out or understocks. This technical assistance has contributed to sustained high levels of reporting rates for malaria (averaging 91% in FY 2019) and stock availability for malaria products (averaging 78% across FY 2018).

	Quarterly End Use Verification (EUV) surveys for malaria as a way of monitoring and providing recommendations on (1) malaria commodity availability data, (2) adherence to SOPs for malaria case management, and (3) prescribing practices for malaria commodities (rational drug use).	This exercise increases commodity security by providing MOH and partners with information for decision-making and identifying training needs in malaria case management.
	Support pre-elimination activities in targeted districts of Sinda, Katete, and Chadiza in Eastern Province by strengthening pharmaceutical and supply chain management systems to support the scale-up of integrated community case management (iCCM) supplies to community workers.	Pre-elimination districts will serve as pathfinder sites aiming to achieve pre-elimination status with enhanced investments from PMI and GRZ. The project will provide supplemental stock of malaria commodities and strengthen pharmaceutical and supply chain management systems in the three districts to support the investments.
Increased ownership by GRZ to lead quantification and procurement planning processes and provision of cost-effective, reliable procurement services.	Supported annual forecasting and quantification events and quarterly supply plan updates for malaria commodities.	Achieved 100% of expected quarterly supply plan updates for malaria commodities across the life of the project. For beneficiaries to have sustained access to health commodities, proper forecasting and procurement planning at the central level is vital.
	To date in FY 2019, delivery of malaria commodities worth approximately $1.8 million and ITNs worth approximately $1.2 million completed.	In terms of malaria impact, this is enough to treat 350,040 patients with anti-malarial commodities and provides ITNs for 779,000 bed spaces.
Improved effectiveness and efficiency in warehousing and distribution.	Provided a set of diagnostics tools for measurement for performance monitoring and continual improvement, such as distribution schedule adherence tools and third party logistics monitoring tools.	These tools are vital for improved performance from MSL to meet its mandate of delivering commodities to beneficiaries in need. These tools measure the extent of MSL planning and oversight and provide assurance that planned routes have been followed and therefore commodities are dispatched to facilities in a timely manner for use by beneficiaries.

	In FY 2019, PMI, through partners, delivered ITNs to district-level for onward distribution to health centers. Coordinated with NMEP to determine ITN quantities, the project assisted with net distribution directly to designated districts upon clearance and arrival in country, thus bypassing central level storage and creating efficiencies in the supply chain. The project delivered 694,000 ITNs for continuous distribution, 55,000 for mass campaign coverage, and 30,000 for school distribution in pre-elimination districts. This distribution occurred in five provinces (Eastern, Luapula, Muchinga, Northern and Central).	Support for the distribution of ITNs is critical in supporting PMI and NMEP malaria prevention strategies, thus contributing to reductions in malaria prevalence.
Increased innovation for strategic management and planning for improved commodity security.	Provided technical leadership to establish a working draft of the national supply chain strategy (2017-2021).	A key component of the vision is to institutionalize strategic planning approaches so that supply chain needs can be anticipated and addressed early. Ensuring that the National Health Strategic Plan for 2017–2021 is a technically sound and useful document to guide MOH planning will promote the success of and adherence to strategic planning approaches.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

- Strengthened logistics information systems to avail critical data for informed supply chain decision-making.
    - Monitoring and evaluation (M&E) (to include data visibility and analytics initiatives).
- Increased ownership by GRZ to lead quantification and procurement planning processes
- Cost-effective, reliable procurement services provided to GRZ
- Improved effectiveness and efficiency in warehousing and distribution
    - Transportation and Distribution
    - Warehousing and Inventory Management
    - Governance and Financing
    - In-country Storage and Distribution
- Increased innovation for strategic management and planning for improved commodity security.

PMI Goal
Ensure continual availability of quality products needed for malaria control and elimination (ACTs, RDTs, SP, Art. Inj., and ITNs) at health facilities and community level.

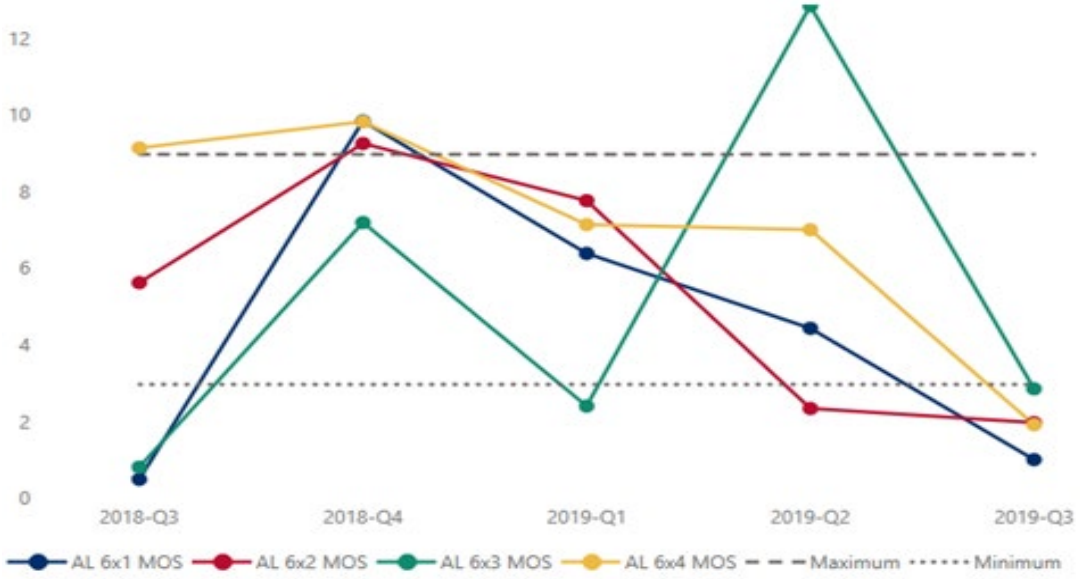
Do you propose to increase, decrease, or maintain funding allocation levels for this activity? Why, and what data did you use to arrive at that conclusion?
As of MOP writing, the country is projecting a $32 million gap in malaria commodities in FY 2020. This figure includes all projected malaria commodity needs, except for ITNs, including six months of buffer stock. Although additional quantification calculations and assumptions may be needed to refine this number, PMI will invest significant resources for the procurement of malaria commodities in FY 2020. Zambia will be eligible for a new Global Fund grant starting January 2021 which will hopefully provide significant additional resources for malaria commodities in early 2021. Given current Government of Zambia budget constraints it is uncertain as to whether the Government will procure significant quantities of malaria commodities in FY 2020. Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

Has the central level, (or sub-central level if appropriate) been stocked according to plan for ACTs, RDTs, SP and Art. Inj over the last year? If not stocked according to plan, have they been under, over or stocked out?

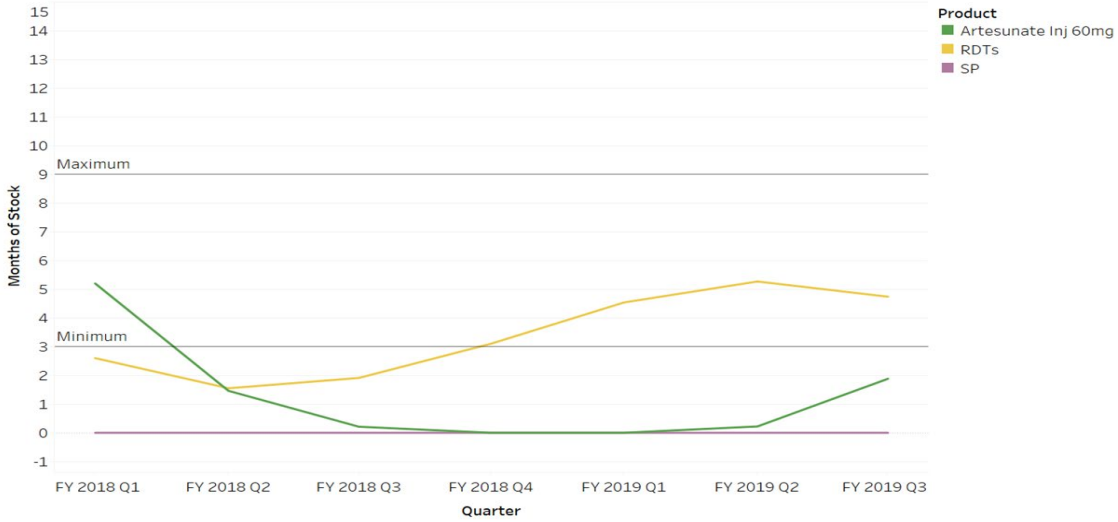
Supporting Data

Figure A44. Months of AL in Stock at Central Level



At the central level, the majority of AL presentations were – on average – stocked according to plan in FY 2019 Q1 and Q2. However, the presentations dipped below minimum in FY 2019 Q3.

Figure A45. Central Stock Levels for RDTs, SP and Injectable Artesunate, 60 mg



The country was consistently stocked out of SP centrally, as there were funding gaps and the product is not funded by PMI. The MOH has committed to procuring 500,000 bottles of 1,000 tablets in FY 2019 to alleviate stockouts. To date, the MOH has delivered only 50 bottles of 1,000 tablets. To help address challenges of stock shortages, PMI partners generated and shared a supply plan for SP with MOH, including recommendations for managing the pipeline to maintain a steady flow of the commodity.

As indicated in Figure A45, RDTs were stocked according to plan in the period under review.

The country was consistently understocked or stocked out of artesunate injection centrally during the period under review, as there were funding gaps and the product is not funded by PMI. PMI partners will continue to monitor central-level stock status to advocate for funding commitments from GRZ and other stakeholders.

Conclusion

The SP funding gaps causing central level stock out has impacted service delivery at facilities nationally. The coordination with GRZ to fill the gap will provide a foundation for addressing the stock shortages, however the short-term recommendation is emergency procurement of SP with a medium- and long-term plan to ensure SP is prioritized among donors and GRZ to avoid future stock-outs. SP funding and procurement will be reviewed during monthly supply chain meetings to monitor emergency procurements and progress towards medium- and long-term funding commitments and supply planning. Depending on GRZ resources and coordination among donors, it may be determined that PMI be the primary supplier of SP for the medium- and long-term in order to ensure commodity security and avoid losing gains made with Zambia's MIP program.

Key Question 2

What are the trends in facility- and community health worker-level stock out rates for ACTs (including AL ability to treat), RDTs, and SP over the last year (if tracked)? Is there a seasonal or geographic difference in stock out rates?

Supporting Data

Figure A46. Percent of Facilities Stocked Out of AL

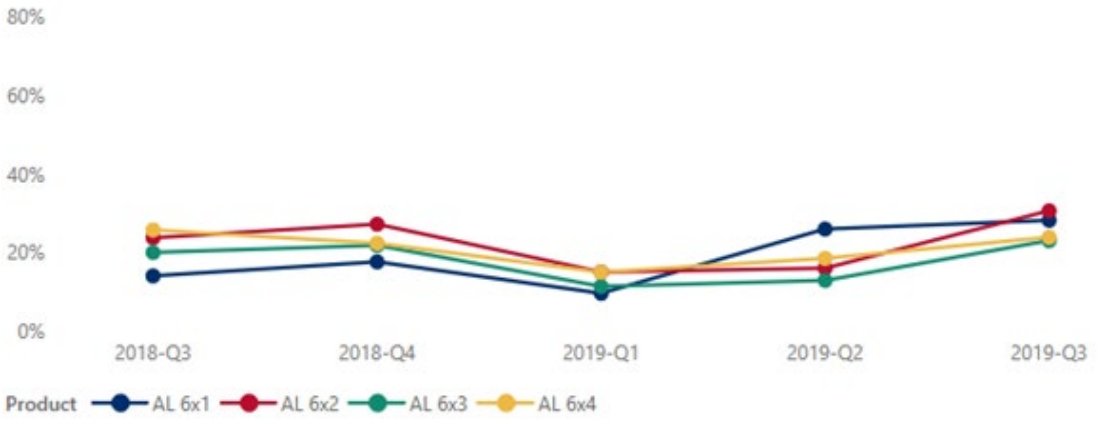
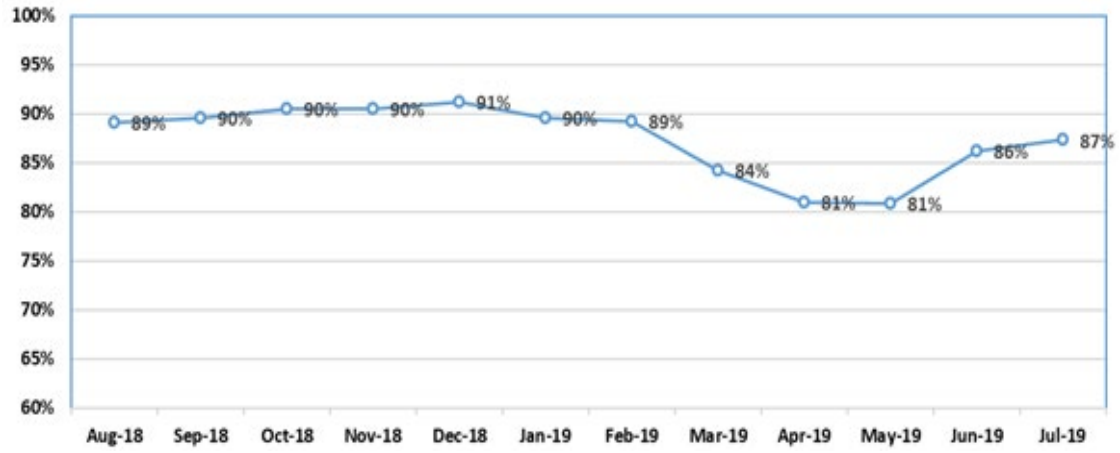


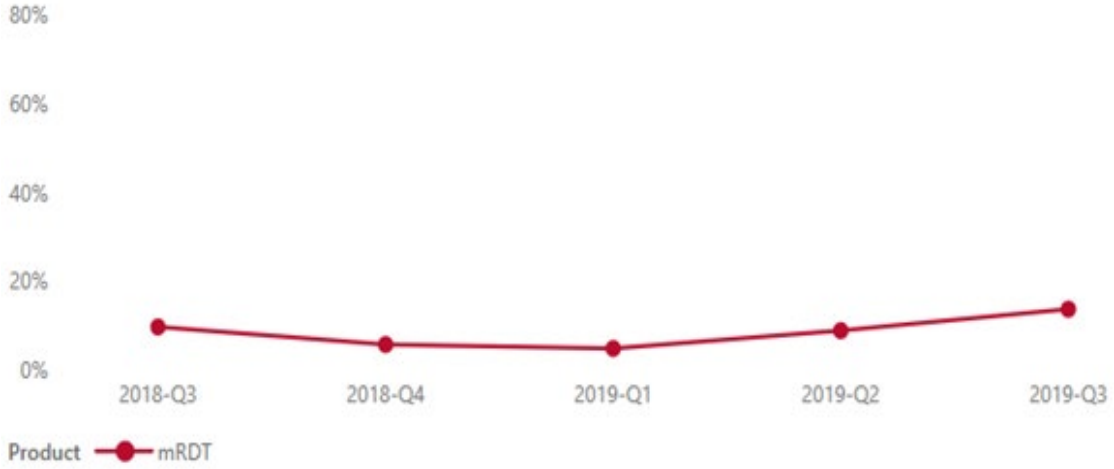
Figure A47. Malaria Ability to Treat, August 2018 - July 2019



The ability to treat rates above are calculated as the number of facilities ever stocked with at least one presentation of ACTs—during any one month in the period under review—as a percentage of the total number of SDPs that reported the presentations.

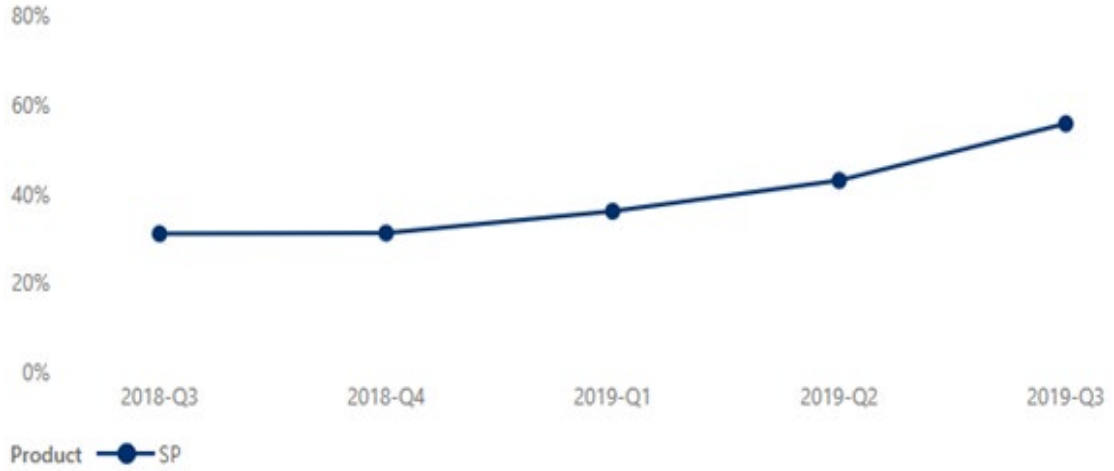
The data shows that ability to treat ranged between 81 percent and 91 percent during the period under review. The rates were generally high, with a slight dip between March and June, which could be attributed to increased number of patients and intermittent distribution by Medical Stores Limited (MSL).

Figure A48. Percent of Facilities Stocked Out of mRDTs



RDT stockouts at the facility-level averaged 9.4 percent and remained relatively low. FY 2019 Q3 saw a modest increase in facility level stockouts to 14 percent.

Figure A49. Percent of Facilities Stocked Out of SP



Facility-level stockouts of SP were observed in all quarters due to funding gaps from GRZ (PMI has not traditionally procured SP for Zambia). There is currently limited availability of SP supplied to health centers through health center kits.

Conclusion

To mitigate impact on treatment and service delivery for ACT, it is critical to monitor stock and distribution schedules closely in the lead up to the peak malaria season in FY 2020.

To mitigate the shortage of SP stock at facilities, a supply plan for SP has been generated and shared with MOH and includes recommendations for managing the pipeline to maintain a steady flow of the commodity.

The impact of late reporting by facilities and subsequent non-processing of the orders by MSL during the resupply cycle has caused increases in RDT stock shortages and stockouts at facilities. Direct technical assistance to MSL and facilities should be prioritized to track delivery schedule adherence, support order processing, increase picking and packing efficiencies, and improve facility level data accuracy and order submission rates.

In FY 2020, though GHSC-PSM, USAID will roll-out a small scale CHW logistics system which will standardize CHW reporting and increase the accountability and accessibility of commodities. The logistics system is under review by MOH and NMEP. Upon approval by GRZ, the activity will begin by conducting a training of trainers (TOT) for facility staff to build capacity of CHWs. This work will be initiated in the pre-elimination districts and integrated with the activity to support visibility of commodities managed by CHWs for integrated Community Case Management (iCCM).

Key Question 3

What is the difference between quantities for ACTs consumed and malaria cases, and RDTs consumed and numbers tested? What is driving any differences seen?

Supporting Data

- In Q1 2019, PMI and MOH launched pre-elimination program activities in target districts of Eastern province. In order to inform investment decisions, the pre-elimination baseline assessment report triangulated a wide range of epidemiological, entomological, and logistics data. The data analysis and conclusions from this assessment show concerning discrepancies between HMIS and eLMIS data. These conclusions are representative of the national picture of consumption and case management data.
- In all 5 districts from the baseline assessment, eLMIS reports of ACT courses consumed were 4-10 times the HMIS reports of cases treated. RDTs in eLMIS reports ranged from 0.54 percent to 1.92 percent of HMIS reports of cases tested.
- Poor data quality is common in both systems. HMIS facility reporting rate is often 100 percent but 3 percent for timeliness and 49 percent data element accuracy. Only half of facilities listed in HMIS were also found in eLMIS, likely due to facility code matching errors and no master data which both systems use.
- In Chipata, RDT counts were distorted by outliers--one health facility reported a 10-fold spike in RDTs between months. Similarly, ACT count was also distorted by outliers--Central Hospital reported a 50-fold spike in AL 4x6 use between November and December, while a rural health center had a 30-fold spike between two months.

Conclusion

- Nationally, the data accuracy and discrepancies between HMIS and eLMIS data presents challenges to use for quality case management at the facility level and creates risk for use in forecasting and procurement planning and preventing stock outs centrally and at

facilities. While there are strong data systems established in Zambia which provide timely and consistent data reporting, data accuracy is poor and has led to challenges in data use for decision making. Incompleteness and discrepancies in HMIS and eLMIS data limit the usefulness of these systems which have been rolled-out and adopted nationally.

- The expansion of data quality audits for HMIS and eLMIS will improve routine malaria data quality along with support to health care workers needing training and supervision in data reporting, auditing, and quality checks. There is a need for routine, national integration of HMIS and eLMIS, reviewed by central level stakeholders making decisions about re-supply, forecast adjustments, and pre-elimination planning. Additionally, there is a push for product standardization and training at facilities and the development of a product master list to resolve pack size miscalculation errors.

Key Question 4

What are the trends in LMIS reporting rates?

Supporting Data

Figure A50. Essential Medicine Reporting Rates

The reporting rates are calculated as the number of facilities that reported under the EMLIP program area (which includes malaria commodities) as a percentage of the total number of facilities expected to report during each reporting period. The percentage of facilities reporting has been consistently high, with reporting rates consistently above 91 percent in FY 2019.

Conclusion

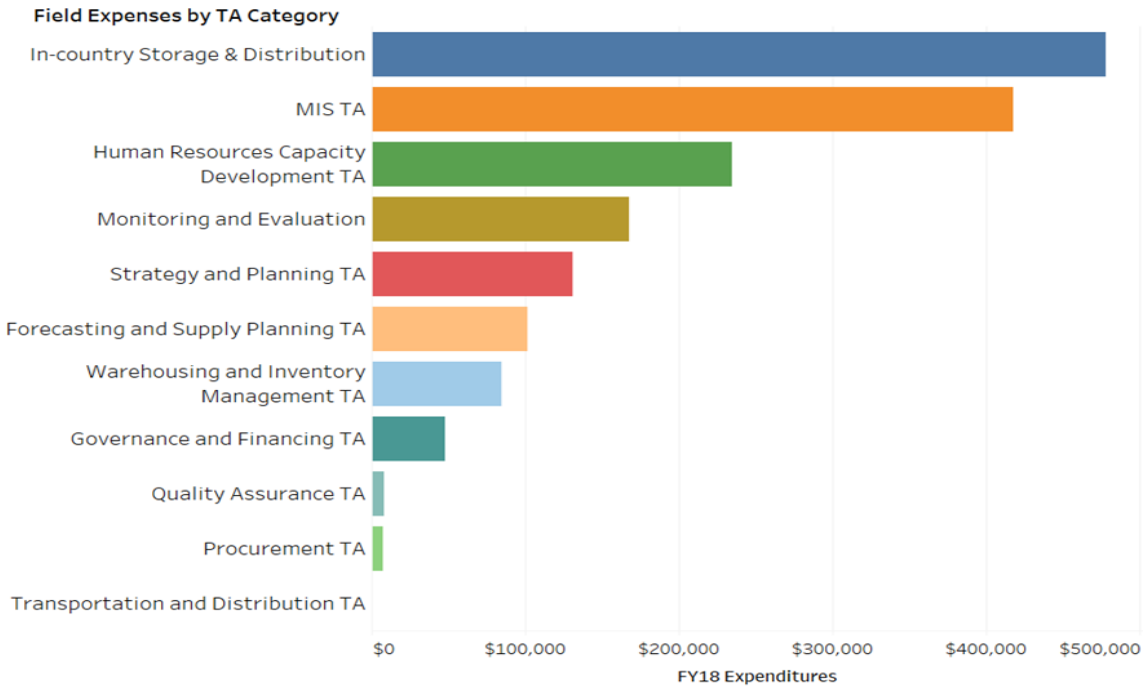
As evidenced by the data, Zambia has achieved consistently high levels of reporting rates against targets across quarters, a result of USG and partner investments in logistics system capacity building, and eLMIS deployment and training in system use.

Key Question 5

What are the main supply chain functions supported by PMI? For areas that are not as strong is there additional investment that PMI should? In areas performing well, is it dependent on PMI/donor funding and so should be maintained?

Supporting Data

Figure A51. PMI Supply Chain Investments in FY 2018



Conclusion

The investments in logistics management information systems capacity building have provided ongoing training and support to MOH staff in the use of eLMIS to enhance malaria commodity security. The MIS TA also includes data visibility support for assessing and monitoring stock status.

Data from forecasting and supply planning, warehouse management systems, eLMIS, and data analytics tools is shared with MOH and MSL in forums such as the Supply Chain Management TWG, provincial meetings, and district meetings are used in monitoring and decision-making for improved stock availability and service delivery.

In-country storage and distribution is a critical function which provides technical assistance in inventory management procedures, inventory management policies, product security procedures, warehouse management system use, workplace organization processes, and distribution and fleet management. This investment is also comprised of direct delivery costs to deliver ITNs to districts and strategic locations for campaigns.

Key Question 6

What are the in-country considerations that impact your funding allocation in this category?

Supporting Data

- Related to well-publicized economic pressures and fiscal challenges in 2018-19, the Zambian health sector has come under increasing financial constraint, with implications for health commodity security. Power shortages, disappointing copper prices, drought, and unsustainable domestic and international borrowing have contributed to the situation.
- It is widely understood that by mid-2019 90 percent of the government budget was devoted to debt financing and salaries, making it difficult to resolve mounting arrears to drug vendors. Important vendors have begun to decline selling to the GRZ on credit. It has become difficult for the MOH to maintain past levels of spending on antimalarials, RDTs, SP for IPTp, essential medications, and antiretrovirals, among others, not to mention pesticides for IRS.
- Compounding the situation in both malaria and HIV is the front-loading of commodity procurements in the 3-year Global Fund grant 2018-2020, leaving little Global Fund monies for medications and test kits in 2020. Unless additional funding becomes available, the Global Fund will not procure malaria commodities in FY 2020.
- At the time of MOP writing, concerns exist about the current malaria forecasting and quantification tables with regards to possible discrepancies and data gaps that prohibit full knowledge of the country's commodity status. PMI is currently working with the NMEC to address these issues. Although lack of precision regarding malaria commodity needs is of high concern, PMI is confident that procuring malaria commodities in FY 2020 is critical to maintaining successful malaria program implementation in Zambia.
- While reduced dependency on international partners remains an important long-term goal, in the near-term cooperating partners see the need to increase their investment in health commodities to prevent stock outs and protect vulnerable populations.

Conclusion

- As compared with recent MOPs, PMI Zambia will shift available FY 2019 and FY 2020 funds into essential malaria commodities, especially SP, ACTs and RDTs.
- PMI will devote additional human and financial resources to ensure accurate malaria commodity forecasting and quantification numbers are available in Zambia.

3.B. SURVEILLANCE, MONITORING & EVALUATION (SM&E)

NMEP objective

According to the National SM&E Plan for malaria, which was developed to complement the *NMESP 2017–2021,* SM&E objectives are:

- To strengthen and enhance SM&E systems so that key indicators are reliable, can be accurately tracked and the data is used strategically to inform malaria programming at the national, provincial, district, facility and community levels.
- To assess the impact of the *NMESP 2017-2021* and measure successes in reducing malaria burden.

NMEP approach

The *NMESP 2017–2021* emphasizes the importance of a robust SM&E system to ensure timely availability of quality, consistent, and relevant data on malaria control performance. Surveillance is a key program component for malaria control in Zambia, as it enables the MoH/NMEP and partners to process, present, interpret, and disseminate malaria data from service delivery points to use for timely decision-making. Malaria surveillance data can be used to identify areas in need of interventions, measure the impact of interventions, and guide policy and decision-making.

The key strategies from the National Malaria SM&E Plan are as follows:

- Strengthen capacities at community, facility, district, provincial, and national level for malaria surveillance and monitoring to provide feedback to the NMEP, Roll Back Malaria (RBM) partners, and other relevant authorities in order to improve malaria program planning, management, and accountability.
- Strengthen and enhance malaria data management systems at community, facility, district, provincial, and national levels and their ability to collect, process, analyze, manage, and use quality malaria-related and key indicator data for programming.
- Strengthen coordination in SME across the NMEP by working with each program area to enhance their capacity to manage and use data for programming.

<u>Routine health information systems in Zambia:</u>

- In Zambia, HMIS and IDSR are used by the MoH to report on diseases. In 2014, the HMIS was upgraded to the DHIS2 platform nationwide. All public and mission health facilities (representing 87 percent of all facilities), and some private facilities, report malaria data monthly to the HMIS group within the MoH. Zambia's National Malaria Elimination Program (NMEP) accesses malaria data from the HMIS and maintains its own data management system on the DHIS2 platform. At the community level, Zambia has deployed a cadre of community health assistants (CHAs) and community health workers (CHW) to help track cases of malaria via a mobile reporting system.

- NMEP supports monthly district malaria data review meetings and quarterly malaria supervisory visits to districts; provinces and their respective districts to conduct routine data quality audits; monitoring and mentoring visits; improving collection and reporting of routine malaria indicators at the community level; and strengthening malaria data analysis and use for planning and decision making. Since 2017, central-level NMEC personnel were to conduct and follow up on data quality audits (DQAs) in all districts and provincial offices.
- There is no current monthly malaria bulletin or newsletter (last was in 2011). However, HMIS and other surveillance data is reviewed at monthly review meetings at national and provincial level, using a work planning tool and dashboard. Since 2017, monthly dashboards (from Tableau) are sent to stakeholders capturing community surveillance data.

Evaluation:

- The major tools for evaluating outcomes and impact of malaria prevention and control activities in Zambia are the periodic nationally representative surveys, namely the DHS and the MIS. Nationwide MISs were carried out at the end of the rainy seasons in 2006, 2008, 2010, 2012, 2015, and 2018 to provide information on the coverage of the four major malaria interventions, malaria parasite prevalence, and the prevalence of severe anemia.
- The most recent Zambia DHSs were conducted in 2007, 2014, and 2018. Although the DHS does not include malaria biomarkers and in Zambia has not been timed for malaria peak season (unlike MIS), its crucial contribution is determination of all-cause mortality in children under five years of age.

PMI objective, in support of NMEP

PMI's support of SM&E in Zambia aligns with the NMESP as well as the National Malaria SM&E Plan. PMI coordinates and collaborates with the NMEP and several partners, including MACEPA, the Global Fund, UNICEF, and WHO, in providing technical assistance and resources for SM&E activities.

- PMI provides logistical and technical assistance to the SMEO (SM&E and Operations Research) technical working group, which meets quarterly to provide national-level coordination and leadership in this area.
- PMI provides support to strengthen routine malaria data collection at the community, health facility, district, provincial, and national levels through the HMIS.
- PMI will continue to support DQAs as a proven tool for improving system performance. In Zambia, community-level case management through scale-up of iCCM is continuing to improve, and as local malaria burden decreases, active case follow up and community surveillance reporting (aka RCD or 'Step D') will become an important foundation for elimination activities.

- Zambia exhibits a stronger culture of data tracking and disease mapping at all levels than many comparable, high-burden malaria countries, and PMI aims to further that tendency.

PMI-supported recent progress (past ~12-18 months)

Highlights of PMI support in the past 12-18 months include:

- Supported districts to hold biannual malaria data reviews and clinical meetings
- Supported roll out of MRR (malaria rapid reporting) in selected districts
- Baseline assessment in pre-elimination districts
- SBC formative research to inform the national malaria communication strategy
- Supported the 2018 MIS (data collection, field supervision, report writing and printing)
- Participated in the mid-term strategic plan review

Details of selected activities were as follows:

PMI provided technical and material support to conduct two HMIS DQAs in 180 health facilities with data quality challenges. This support will be given through respective PHOs with technical oversight by central-level NMEP and PAMO. The project support activities aimed at enhancing HMIS data quality in order to improve timeliness, accuracy, and completeness of malaria data. The malaria DQAs involved assessing data quality and providing immediate technical support for improvement on the inadequacies found. On-site technical support during DQAs involved guiding staff on how to complete health facility registers and health information aggregation forms. With technical guidance from respective PHO staff and PAMO surveillance officers, the audit teams facilitated comprehensive support on the negative audit findings.

PMI provided technical assistance to enhance standardization and reporting of national-, facility-, and community-level data (including community surveillance data). In the context of programming to improve control and accelerate to malaria pre-elimination, this technical assistance aimed to ensure that the data collected is analyzed and used for decision-making at the various levels where decisions are made. PMI supported malaria data review meetings and development of electronic work planning tools linked to performance monitoring dashboards, which have been taken up for regular use at provincial and national levels.

PMI supported 25 percent of the districts in all four focus provinces to hold bi-annual malaria data review meetings in order to enhance data analysis and use. Poor performing districts will be selected and supported to hold these meetings and DQA findings and OTSS data will be used to select the districts. PMI worked with provinces to produce quarterly malaria reports containing key malaria data elements for each of the four provinces. PMI also introduced a data visualization tool (Tableau Reader) in one district in each of the four provinces with the aim of enhancing HMIS malaria data analysis and use.

In addition to Nchelenge District, which started entering community level data via mobile phones into DHIS2 in 2018, PMI supported three more districts (Mbala, Mpika, and Mambwe) to have 40 of their CHWs equipped with mobile phones to submit data monthly. Going forward, one district each from Northern, Muchinga, and Eastern provinces will be picked and PAMO-supported trainings of 200 CHWs in iCCM and two data review meetings will be held.

In the pre-elimination districts, as malaria cases decline, data quality becomes increasingly important for making the right decisions that help accelerate the reduction of malaria cases. Confirming every suspected case becomes a top priority, therefore timely acquisition of data, efficient logistics management information system and improved staff skills in managing data becomes critical. In order to implement these data-related functions effectively, PMI supported intensified activities focused on data quality improvement, capacity-building through trainings in surveillance and DHIS2 reporting for HF staff and CHWs, and provision of tools for data capturing, analysis, reporting, and utilization for decision-making, including capacity-building in HMIS/DHIS2-related issues including MRR and RCD reporting.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

PMI will continue to support the range of activities just described. In addition, with additional new FY 2018 resources, PMI will support the following activities:

- In Nchelenge, PMI will support a joint site visit and data review, for all the partners (ICEMR, Tropical Disease Research Centre (TDRC), NMEC, and PMI) working in the district. The partners will review the progress of the collaboration and review data on an annual basis. The site visit will occur during the dry season before the commencement of the malaria transmission season. PMI will provide financial assistance to NMEC and PHO staff to join the site visit. Furthermore, PMI will share implementation data on a quarterly basis with ICEMR, TDRC, and the NMEC. The data will include the status of ITN distribution and CHW deployment (who, when, where) to allow the partners to link with their longitudinal malaria outcome data and gauge impact.
- PMI will work with the MOH and other partners to design and implement a pilot ANC-based surveillance program in Eastern Province under this work plan. The purpose of this pilot will be to create a process to collect surveillance data from pregnant women attending antenatal care. These women will be screened for malaria to understand their infection status and in relation to possible symptoms. Information obtained from routine ANC visits will be compared with household survey data based on an agreed method, to establish the utility of and efficiency gained in ANC-based surveillance.
- PMI will conduct a household parasitemia survey in Chadiza District with the objective of:
    - validating ANC surveillance,
    - serving as a baseline for the ProACT study (described in the OR section), and

- enriching the mapping and modeling activities so as to better characterize the current and potential future malaria situation. The household survey is expected to take place in April/May 2020.

PMI Goal

To support the NMEP to build their capacity to conduct surveillance as a core malaria intervention using high quality data from both surveys and routine health information systems.

Are you proposing to increase, decrease, or maintain funding allocation levels for this activity? Why? What data did you use to arrive at that conclusion?

Funding allocations for SM&E activities in FY 2020 will remain comparable to previous years.

The improving trends in such measures as data completeness and timeliness; case confirmation rates; and the routine use of data for planning and advocacy at all levels would suggest that past PMI and Global Fund investments have had an impact.

PMI will ensure the SM&E activities at the national level and in the four PMI-supported provinces are complementary.

PMI support at the national level will continue. The SME technical working group meets quarterly and has been among the more effective TWGs, Through this TWG, PMI will support the NMEP and its partners in ensuring that existing policies and guidelines are in line with current technical standards, collecting and reviewing evidence to inform program implementation, and ensuring that program activities are well-coordinated and implemented. In calendar year 2021, it is anticipated that Zambia will conduct an end-term review of the strategic plan.

The next national MIS is planned for 2020. Given the time-sensitivity of MIS preparation and implementation, one half of PMI-support for this activity was included in the FY 2019 MOP. In light of looming commodity constraints, support will be sought from other partners to cover the remaining portion of the funds that PMI had originally intended for the MIS; these funds are therefore omitted from the FY 2020 MOP.

Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

Which sources of data are available to inform estimates of intervention coverage, service availability and readiness, and morbidity and mortality?

Supporting Data

Figure A52. Data sources available by year

Data Source	Data Collection Activities	Year								
		2015	2016	2017	2018	2019	2020	2021	2022	2023
Household Surveys	Demographic Health Survey (DHS)				*				(X)	
	Malaria Indicator Survey (MIS)				X			(X)		
Health Facility Surveys	Service Provision Assessment (SPA)	(*)								
	Other Health Facility Survey			(*)						
Other Surveys	EUV	X	X	X	X	X	(X)	(X)	(X)	(X)
	Other (Knowledge, Attitudes and Practices Survey, Malaria Behavior Survey)					X				
	Other (Malaria Impact Evaluation)							X		
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System (Malaria Rapid Reporting)			X	X	X	(X)	(X)		
	Support to HMIS	X	X	X	X	X	(X)	(X)	(X)	(X)
	Support to Integrated Disease Surveillance and Response (IDSR)	*	*	*	*	*	(*)	(*)	(*)	(*)
	Other (Electronic Logistics Management Information System (eLMIS)	X	X	X	X	X	(X)	(X)	(X)	(X)

*Asterisk denotes non-PMI funded activities; x denotes completed activities and (x) denotes planned activities.

Conclusion

Zambia has been relatively well endowed in terms of data sources for malaria surveillance. For example, an MIS has been conducted every two to three years since 2006. Malaria partners including PMI have provided consistent support to improve HMIS and eLMIS quality measures, including completeness, timelines, and accuracy, while at the same time supporting the MRR

system which improves upon the HMIS in terms of timeliness and consistency of inclusion of CHW data. With the planned-for standing up of a Community HMIS system, the parallel MRR may become redundant over time. Zambia is also relatively well endowed in terms of malaria research programs. Collaboration with the NIH-funded International Center of Excellence in Malaria Research station in Nchelenge, for example, holds the potential for program evaluation of a scaled-up package of malaria interventions in that high-burden setting.

Key Question 2

What HMIS activities have been supported in your country? What current priorities will be supported with this MOP funding?

Supporting Data

Figure A53. HMIS activities

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this (MACEPA)? (X)
	FY 18	FY 19	FY 20		
Central Level					
Register, tools (e.g. checklists, indicator glossary), job aids (design, indicators, definition of data elements, data dictionary, system support)	X	X	X		X
Data quality assessments (separate from supervision – funding for travel to lower levels)	X	X	X	X	X
Program monitoring and technical assistance (funding for travel to lower levels)	X	X	X	X	X
Training (funding for central level to conduct training at lower levels, capacity building, i.e. on the job training for central level staff)	X	X	X	X	X
Human Resources (secondment of person in NMEP for SM&E, office/team for SM&E)					X
Data Use (analysis, interpretation, visualization (dashboards, bulletins, dissemination/feedback to lower levels, decision-making)	X	X	X		X
Policy guidelines and coordination (updating policies, guidelines, supporting sub-committee meetings, supporting participation in sub-committee meetings)	X	X	X		X

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this (MACEPA)? (X)
	FY 18	FY 19	FY 20		
External relations/Communications/Outreach (support travel to international meetings and publications)	X	X	X		X
Support to annual operational plans for national malaria program	X	X	X		X
Desk review to catch "logic errors system" (provide TA to catch logic errors)					
Admin 1 Level (Province). PMI supports activities in 4 provinces while Global Fund supports activities in all provinces					
Registers (warehousing, printing, distribution)	X	X	X	X	X
Data quality assessments (separate from supervision – funding for travel to lower levels)	X	X	X	X	X
Program monitoring and technical assistance (funding for travel to lower levels)	X	X	X	X	X
Training (funding for district staff to conduct training at lower levels, capacity building (i.e. on the job training for district level staff)	X	X	X	X	X
Human Resources (secondment of person for malaria SM&E, office/team for SM&E)					
Data Use (analysis, interpretation, visualization (dashboards, bulletins), dissemination/feedback to lower levels, decision-making)	X	X	X		X
Adaptation of national policy guidelines and coordination (adapting policies, guidelines, supporting sub-committee meetings, supporting participation in sub-committee meetings)					
Adaptation of checklists and job-aides					
Participation in national meetings (support for travel costs)	X	X	X	X	X
Support to Annual Operational Plans for provinces	X	X	X	X	X

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this (MACEPA)? (X)
	FY 18	FY 19	FY 20		
Admin 2 Level (District)					
Data entry, summary, and transmission (training, re-training, computers, internet, tools)	X	X	X	X	X
Supervision (training, traveling, supervision tools/checklists, create/design system for organized/methodical supervision)	X	X	X	X	X
Data validation (data validation activities before monthly data submission - organize health facilities)					
Monthly/Quarterly data quality review meetings (venue, meeting support)	X	X	X	X	X
Data Use (analysis, interpretation, visualization (i.e. dashboards), dissemination/feedback to facilities, decision-making)	X	X	X		X
Human Resources (secondment of person for malaria SM&E, office/team for SM&E)					
Annual planning with provinces (support travel)	X	X	X	X	X
Facility Level					
Data collection/entry, summary, and transmission (training, re-training, computers, internet, tools)	X	X	X	X	X
Supervision of CHWs (training, traveling, administering supervision tools/checklists of community health workers)	X	X	X	X	X
Data use (analysis, interpretation, visualization (dashboards), dissemination/feedback to CHWs, decision-making)	X	X	X		X
Monthly/Quarterly data quality review meetings(support for travel)	X	X	X	X	X

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this (MACEPA)? (X)
	FY 18	FY 19	FY 20		
Community Level					
Data collection/entry and transmission (training, re-training, tools	X	X	X	X	X
Data use (analysis, interpretation, decision-making)	X	X	X		X
Monthly/quarterly data quality review meetings (support for travel)	X	X	X	X	X

Conclusion

As shown in the above table, Zambia receives support from PMI, the Global Fund and MACEPA for data-related system strengthening at all levels. Duplication is minimized at the national level through close coordination among partners, and at the provincial and lower levels through coordinated work planning and especially through a geographic partitioning of the country, whereby MACEPA focuses its support on Southern Province; PMI focuses on Luapula, Northern, Muchinga and Eastern, with enhanced data quality support in the 5 (formerly 3) pre-elimination districts in Eastern; and Global Fund through the MOH and CHAZ caters to needs in the other provinces.

NMEP staff are committed to malaria elimination activities; however, they rely on partner support to thoroughly supervise provincial, district, and community-level activities and effectively coordinate partners. NMEP oversees monthly district malaria data review meetings and quarterly malaria supervisory visits to districts; provinces and their respective districts to conduct routine data quality audits; monitoring and mentoring visits; improving collection and reporting of routine malaria indicators at the community level; and strengthening malaria data analysis and use for planning and decision making.

PMI supports national-level HMIS strengthening through capacity building for central level M&E staff for DHIS2, national-level coordination with partners such as MACEPA and CHAI on their M&E activities, support for M&E technical working group meetings, and technical assistance to enhance standardization and reporting of data in HMIS, including standardization of platforms for collection of community-level and active case detection data across provinces and other partner projects.

Key Question 3

What are the outcomes of HMIS strengthening efforts?

Supporting Data

Findings from data quality audits demonstrate improvement over time. Figure A54 illustrates the situation in the four PMI focus provinces from 2017-2019. During these years each province with technical and logistical support from PMI, conducted data quality audits, covering over 180 randomly selected health facilities and representing all districts. The audits were coordinated by the Public Health Offices through their respective Senior Health Information Officers (SHIOs). PMI also supported malaria data review meetings and health facility supervisory visits by DHOs. This was based on the understanding that the improvement of data quality and related practices cannot be attained without adequate supervisory follow-ups on findings and action plans decided.

The DQA tool promoted by PMI has been used extensively by the NMEP in Southern Province and has proved to be very effective in supporting malaria data quality improvement. It focuses on eight data elements:

1. total OPD attendance,
2. total clinical malaria cases,
3. total clinical malaria cases in pregnancy,
4. total confirmed malaria cases,
5. total confirmed malaria cases in pregnancy,
6. total malaria cases provided with an antimalarial,
7. total tested cases (RDT), and
8. total tested cases (microscopy).

There was either improvement or sustained maximal performance on four of the five DQA indicators, with reporting rates remaining at 100 percent, monthly accuracy improving from 26 percent in 2017 to 54 percent in 2019, and accuracy by data element improving from 48 percent in 2017 to 63 percent in 2019. Reporting rates, completeness and timeliness were generally high across the three years.

Figure A54. Summary of DQA Results, 2017-2019, in PMI Focus Provinces

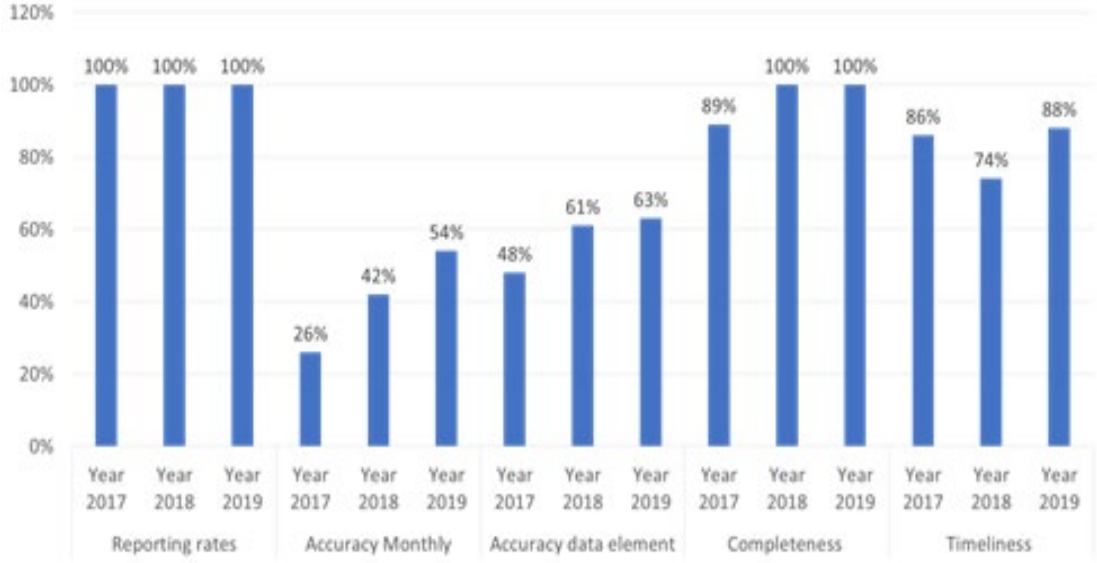


Figure A55. Timeliness, Completeness, and Accuracy of DQA Reporting

		2017	2018
Timeliness	% of reports received on time	86%	74%
Completeness	"Confirmed malaria cases for children under 5 years of age" was reported in X% of facility-months	89%	100%
Accuracy	Populate with most recent DQA data	48%	61%

Conclusion

Impact of the participatory data review process arises from

a) providing immediate technical support in weak areas;

b) developing action plans with clear timelines on when such issues would be resolved;

c) creating awareness by staff of being audited and creating the expectation is to record better results in the subsequent visit; and

d) increasing understanding by supervisors of malaria case management and data quality issues.

The monitoring and evaluation of malaria prevention and control activities will rely on a combination of routine malaria data through the HMIS and surveys. Although the DHIS platform has been in Zambia for quite some time, not all health posts and health facilities are using DHIS2 correctly and the accuracy of data is lower than expected, although completeness and timeliness have improved. Sustained effort and leadership is needed to ensure that all facilities generate accurate data, incorporate the DHIS community component, and that the GRZ provides leadership and strategic vision for utilizing the data at all levels. PMI will continue to support

activities aimed at enhancing data quality in order to improve timeliness, and especially accuracy. Going forward, the objective is to achieve 100 percent on-time reporting and accuracy of malaria cases by districts and 90 percent by health facilities in PMI-targeted provinces.

Key Question 4

What are the in-country considerations that impact your funding allocation in this category?

Supporting Data

N/A

Conclusion

N/A

3.C. SOCIAL AND BEHAVIORAL CHANGE (SBC)

NMEP Objective
The NMEP's objectives for the new National Communication Strategy 2017 to 2021 are to increase knowledge of malaria from the 2015 baseline to 100 percent by 2019; to improve uptake of and correct use of key malaria interventions from baseline to 90 percent by 2019; to arm influencers, health workers, and communities with the communication tools required to achieve elimination; to promote the recognition and celebration of communities that attain malaria-free status; and to provide guidance to communities on the messages and materials needed to maintain malaria-free status and remain vigilant about imported infections and the potential for resurgence.
NMEP Approach
The NMEP launched the new National Communication Strategy for Malaria Elimination on World Malaria Day on April 25, 2018. This strategy is in support and alignment with the NMESP 2017 to 2021 and the National Health Strategic Plan. The strategy envisions a malaria-free Zambia and will begin focusing not only on increased awareness and knowledge of malaria, but also on the additional step of examining what it will take to eliminate malaria from the country. A national malaria SBC coordinating committee was just reinstated after two years of being inactive and the first TWG was recently held at the NMEC. The MOH has a Directorate of Health Promotions which coordinates general health SBC efforts, clears all health promotion materials, endorses SBC materials on behalf of the MOH, leverages resources to increase coverage and reach of SBC activities, and provides guidance to monitor and evaluate SBC activities. All malaria partners in Zambia align program activities with the National Communication Strategy for Malaria Elimination. The largest donors include PMI, the Global Fund, and BMGF. The Global Fund

supports the implementation of community level SBC activities through CHAZ. This includes implementation of champion communities and engagement with traditional and religious leaders.

The National Communication Strategy for Malaria Elimination 2017-2021 has increased the MOHs capacity to more effectively plan and oversee all SBC activities in country. Currently, all institutions working in malaria - public and private organizations, NGOs, the Global Fund, and PMI - are required to follow the national strategy.

Figure A56. Communication Behavioral Objectives of the National Malaria SBC Strategy

Vector Control: IRS/ITNs
Behavioral Objectives
● All pregnant women have LLINs and use them every night, all year-round. ● All household members, including adolescents have access to LLINs and use them appropriately/allow their households to be sprayed/clear stagnant water in surrounding areas. ● Migrant populations carry LLINs wherever they go/have a responsibility to allow their homes to be sprayed.
Communication Objectives
● To increase knowledge of malaria/the mosquito. ● To increase understanding of LLINs/IRS/LSM activities and increase the awareness of the benefits of vector control. ● To communicate the community benefit of vector control.
Case Management
Behavioral Objectives - Community Members
● To increase the number of women taking at least four doses of IPTp during pregnancy. ● To increase the number of men/husbands supporting their spouses during ANC. ● To increase the number of symptomatic people who seek care within 24 hours. ● To improve the quality of care and prevent misdiagnosis.
Communication Objectives - Community Members
● To increase the number of pregnant women and women of child-bearing age with knowledge of the importance of IPTp and early ANC. ● To increase the number of men/husbands who understand the importance of ANC. ● To increase the number of people with knowledge of the common symptoms of malaria. ● To increase the number of people that know how to seek malaria testing and treatment. ● To stress the importance of conducting a malaria diagnostic test before prescribing medication.

Behavioral Objectives - Providers
● Record every case into the register, aim for zero clinical diagnosis. ● Submit case management and community details into the reporting system on time each week. ● Based on data, order enough supplies to provide quality health care. ● Insist on blood test before receiving and malaria treatment. ● If you test positive, adhere to the complete treatment course.
Communication Objectives - Providers
● To increase the number of districts adopting Component B strategies. ● To increase trust in health service delivery by clinicians. ● To increase understanding of the importance and use of data. ● To increase understanding of malaria services available. ● Increase understanding on malaria treatment.
Community Clearance of Malaria Parasites
Behavioral Objectives
● To increase the percentage of people participating in MDA, in particular those who move for fishing and farming (seasonal migration) and adolescents. ● To increase the percentage of people-adhering to the three-day regimen. ● To increase the number of religious leaders actively promoting MDA from their pulpits. ● To increase the number of community leaders publicly testifying on the benefits of MDA.
Communication Objectives
● To increase the understanding of symptomatic vs. asymptomatic malaria. ● To increase the understanding of MDA drugs (currently Dihydroartemisinin-piperaquine (DHAP). ● To increase awareness of the community benefits of MDA participation, and demonstrate safety by having CHWs and leaders take their first dose during a village meeting. ● To inspire community leaders to become “malaria champions.”
Detect and Investigate Individual Cases
Behavioral Objectives
● Increase the number of community members seeking medical services from their resident CHW. ● Increase the number of household members who accept malaria testing, even when they do not feel sick.

- Increase the number of communities providing incentives to their CHWs.
- Timely and accurate data reported by CHWs.
- Quality care being administered by CHWs.
- Follow-up on all index cases.

Communication Objectives

- Increase trust in CHWs.
- Increase understanding of asymptomatic malaria and the disease transmission.
- Increase appreciation for the community-wide impact of a single malaria case.
- To be armed with durable and appropriate materials for engaging homes.
- To communicate how CHW work is part of a larger effort to end malaria.

Eliminating Malaria

Behavioral Objectives

- Strengthen malaria surveillance systems.
- Expand training to the delivery of other healthcare services (while continuing to test and treat every suspected case of malaria).
- Increase / maintain treatment seeking behavior.
- Increase number of community advocates for malaria elimination.
- Increase the number of businesses supporting malaria elimination.
- Sponsor, celebrate and recognize the attainment of malaria-free status.
- Increase the number of malaria-free zones.

Communication Objectives

- Increase the understanding of malaria elimination – both the requirements and benefits.
- Recognize community effort to achieve malaria-free status.
- Increase awareness of malaria elimination campaigns in local areas.

PMI Objective in Support of NMCP

PMI supports many areas of the National Communication Strategy for Malaria Elimination 2017-2021 with the exception of larvae source management. PMI support at the national level has included work on the national communication strategy, training materials, and tools which are being used across the country by both the NMEC and implementing partners. National level support has also included donor coordination and standardization of SBC materials. Communication activities in PMI's four target provinces--Luapula, Northern, Muchinga and Eastern--has focused on increasing use and reducing misuse of ITNs; increasing ANC attendance with higher IPTp uptake;

strengthening health-care seeking behaviors; and acceptance of IRS. PMI also supports the implementation of integrated community-based communications focusing on the promotion of malaria prevention, diagnosis, and appropriate treatment for pregnant women and children under five years of age.

PMI-Supported Recent Progress *(Past 12-18 Months)*

- PMI funded the NMEP to conduct a formative research study to help refine the National Communication Strategy for Malaria Elimination 2017 to 2021.
- PMI supported district health offices in focus districts to hold 40 community dialogues on ITNs, malaria in pregnancy, and community case management.
- PMI supported district health offices to engage 900 traditional leaders from pre-elimination districts and orient them on the national malaria elimination strategy and role of traditional leaders in the elimination agenda.
- In pre-elimination districts in 2019, PMI trained 15 media personnel from six media houses on key malaria interventions in order to improve malaria reporting and increase community impact. Following the development of media action plans, media houses aired free malaria radio spots and radio discussion programs.
- PMI provided subgrants to 19 civil society organizations to support district health offices and health facility staff to implement SBC activities including community dialogues, health talks, quiz competitions, and school debates.
- PMI supported the NMEP and the provincial health office to orient civil society organizations and district health offices on the champion community initiative which encourages local communities to take ownership and helps communities set malaria targets and work towards achieving those targets, in focus districts.
- PMI provided support for malaria messaging during World Malaria Day and the South African Development Malaria Day.
- PMI printed and distributed almost 17,000 branded SBC materials in target provinces including flip charts, t-shirts, fact sheets, and t-shirts.

PMI-Supported Planned Activities *(Next 12-18 Months Supported by Currently Available Funds)*

- PMI will support the use of community radio to increase the reach of malaria messaging in Luapula, Northern, Muchinga, and Eastern province. This will leverage the existing US Government supported platform of a popular health educational drama series on community radio, incorporating malaria messaging, for the first time.

- PMI will provide technical assistance to the NMEC to standardize and strengthen malaria messaging at the national level.
- PMI will continue to support implementation of the champion community initiative and the training of community change agents in four focus districts.
- PMI will continue to support subgrants to 19 civil society organizations to support district health offices and health facility staff to implement SBC activities including community dialogues, health talks, quiz competitions, and school debates.
- PMI will provide support at the national level for the implementation of SBC activities prior to the 2020 mass distribution campaign.
- PMI will scale-up implementation of community dialogues to cover all health facilities in the focus districts in order to increase awareness and promote utilization of malaria services.
- PMI will support malaria messaging during World Malaria Day and the South African Development Malaria Day.
- PMI will provide support to the NMEC and provincial and district health offices to supervise and monitor community level implementation of SBC.

PMI Goal

Through the use of SBC interventions and in alignment with a country's national malaria control communication strategy, PMI supports the uptake and correct and consistent use of malaria interventions, thereby improving the overall quality of malaria control efforts that will contribute to reductions in malaria morbidity and mortality.

Are you proposing to increase, decrease, or maintain funding allocation levels for this activity? Why? What data did you use to arrive at that conclusion?

In FY 2020, PMI will increase the funding allocation for SBC in order to return to similar FY 2018 levels of SBC support. Funding will support communication activities in target provinces as well as nationwide support for SBC capacity building and campaign messaging. Activities will include community mobilization and community dialogues that focus on key intervention areas as well as messaging to pregnant mothers during ANC and EPI. PMI will support SBC strategic implementation at the national level.

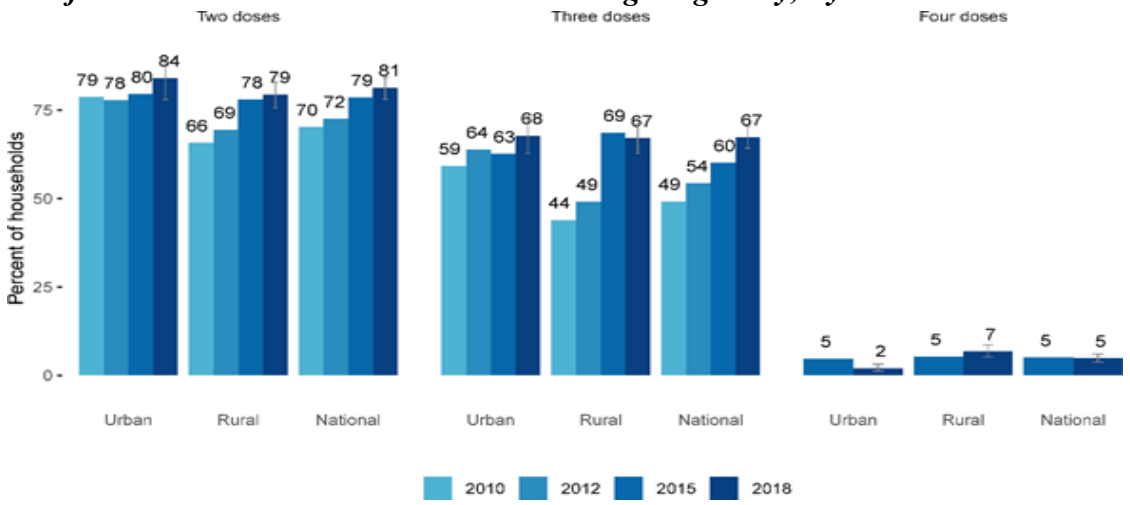
Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

What behaviors is PMI proposing to prioritize through its SBC programming? Will support be geographically targeted or at national scale? What data support this prioritization?

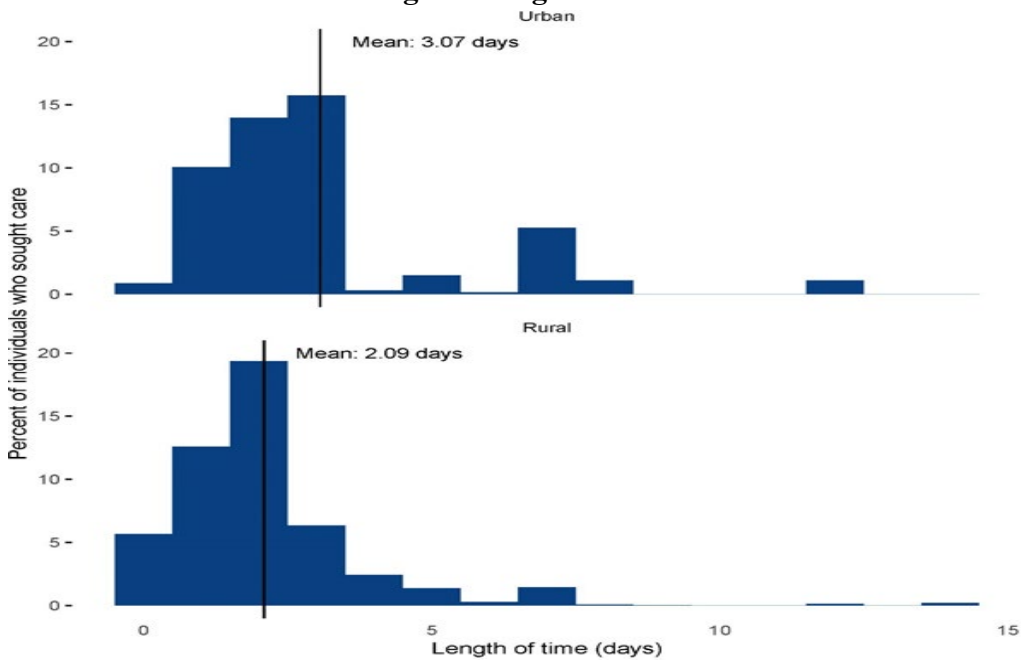
Supporting Data

Figure A57. Data Supporting Focus on Intermittent Preventive Treatment During Pregnancy; *Women with Recent Births Reporting Coverage of at Least Two, Three, and Four Doses of Intermittent Preventive Treatment During Pregnancy, By Urban and Rural Areas*



Source: MIS, Zambia 2010– 2018

Figure A58. Data Supporting Focus on Prompt Care-Seeking; Average Length of Time Reported Before Treatment was Sought among Febrile Children Under Five Years of Age



Source: Zambia MIS, 2018

Conclusion

After reviewing the available data, PMI-supported SBC efforts will be focused on two behaviors:

Figure A59: PMI-supported SBC efforts

Behavior	Target Population	Geographic Focus	Justification
Early ANC Attendance	Pregnant Women	All-PMI Supported Provinces	In 2018, only about 5% of pregnant women received four doses of IPTp. Seven percent of rural women compared to 2% of urban women received four doses of IPTp. From 2015 to 2018, the percentage of women reporting taking a fourth dose of IPTp stayed the same at 5%.
Prompt Care Seeking for Children Under Five	Caretakers of Children Under Five	All PMI-Supported Provinces	Prompt care-seeking for children with fever was low, as only 19.7% sought treatment from a health facility/provider on the same day or next day. Promptness of treatment seeking was moderately higher in urban (24.1%) than in rural areas (16.4%).

Key Question 2

Given the priority behaviors identified, what data are available to better understand the factors influencing low uptake? What are the behavioral determinants of the prioritized behaviors? Are there gaps in understanding the barriers to uptake?

Supporting Data

Figure A60. Behavioral Determinants Associated with Early ANC

Facilitator	Type of Factor	Data Source	Evidence
Men Knowledgeable About ANC Visits	Social	Formative SBC Study, 2019	A recent study found that both male youths and male adults were able to share some informed level of detail about when pregnant women should generally start ANC visits.
Knowledge of IPTp administration during ANC clinic	Internal	Formative SBC Study, 2019	Quote from community member, “Then when a woman is pregnant, they go to antenatal clinic, they are given medicine, however, it does not mean they already have malaria, no! It is for prevention. Since Fansidar is an anti-malaria drug, they are given this medicine.
Norm for women to seek preventive services during ANC	Social	Formative SBC Study, 2019	About nine in ten households were of the view that pregnant women should seek preventive services during regularly scheduled ANC visits.

Barrier	Type of Factor	Data Source	Evidence
Cultural beliefs	Social	Formative SBC Study, 2019	Hesitance to begin ANC visit due to women's perceived risk of losing the fetus and the unborn child and thus not wanting to acknowledge pregnancy early on.
Limited Messaging for ANC and IPTp	Environmental	Formative SBC Study, 2018	Forty eight percent of people surveyed had heard that "pregnant women should go for antenatal care," and only twenty percent of people surveyed had heard that "pregnant women can obtain medicine for preventing malaria during antenatal care visit."
Limited Knowledge of When IPTp Should be Started	Internal	Formative SBC Study, 2018	A recent cross-sectional household survey found that only 21% of respondents knew correctly when IPTp should start. Limited understanding of when IPTp should be started may influence early ANC attendance.

Figure A61. Behavioral Determinants Associated with Prompt Care-Seeking for Children Under Five Years of Age

Facilitator	Type of Factor	Data Source	Evidence
Recognition of fever as a symptom of malaria	Internal	Zambia MIS - 2018	Seventy one percent of women ages 15–49 years recognize fever as a symptom of malaria.
Strong messaging to women through ANC and under-five clinics	Environmental	Formative SBC Study - 2018	In rural areas, 60.5 % of women have heard about malaria during ANC visits, and 58% had heard about malaria through under-five clinics.
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Finger/heel stick for malaria testing	Internal	Zambia MIS - 2018	Fifty five percent of children ages 0-59 months with fever reporting a finger/heel stick.
Prompt care seeking for fever	Internal	Zambia MIS - 2018	Twenty percent of children with fever who sought treatment from a facility or provider the day of fever onset or the next day.
Limited messaging about prompt care seeking messaging	Environmental	Formative SBC Study - 2019	Twenty two percent of the population surveyed had heard "Children with fever should be taken to the health facility without delay".

Conclusion

In Zambia, there is a fairly high level of ANC awareness; however, additional SBC is needed to promote early ANC attendance which in turn will help ensure full coverage of IPTp. Women's malaria knowledge has not translated into action with regard to early care-seeking behavior. Both IPTp uptake and early care seeking behavior should be approached through an integrated SBC approach with reproductive, maternal and child health programs given that ANC visits have been identified as a successful medium for malaria messaging. Messaging at ANC visits will be conducted through service communication and will focus on behavioral determinants in pregnant women. Based on SBC formative research results in Zambia effective messaging should also target community health meetings, under-five clinics, radio and in some cases, television. Billboards, posters, information leaflets, newspapers and magazines have been widely used in communicating health messages, although they appear to be the least effective channels for reaching communities with health-related information, including on malaria.

Key Question 3

What activities are needed to bolster the country's capacity for SBC? Are these activities needed at the national or sub-national level?

Supporting Data

The National Communication Strategy for Malaria Elimination 2017-2021 has increased the MOHs capacity to more effectively plan and oversee all SBC activities in country. Currently, all institutions working in malaria - public and private organizations, NGOs, the Global Fund, and PMI - are required to follow the national strategy. The strategy emphasizes behavioral and communication objectives at both the national-level and community-level as a way to target specific audiences with effective SBC content. While the NCSME is an important step forward in ensuring effective SBC outreach, the strategy is currently lacking in specific SBC indicators ascribed to each objective. SBC data from a recently finalized PMI funded SBC formative study will be used to support the development of baseline and target indicators and will help strengthen the NCSME's ability to track SBC progress and impact. The SBC formative study will also serve as a base from which to develop specific evidence-based strategies to address behavioral factors for the country's changing malaria epidemiology. In turn the country will need support to develop and deploy strong and effective messaging targeting specific behavior barriers both at the national and the community level. Capacity building of health facility staff is needed to empower effective SBC planning and implementation of SBC activities at both the health facility and community level. Support to the NMEC could help strengthen SBC strategic implementation at the national level.

Conclusion

PMI will support the NMEP to further develop the NCSME through the creation and monitoring of objective baseline and target indicators and will continue to support the country to develop strategic strategies to address behavioral factors. PMI will work at both the national and sub-

national level to develop and deploy targeted malaria messaging through ANC and under five child clinics, radio, and in-person contact from CHWs.

Key Question 4

What are the in-country considerations that impact your funding allocation in this category

Supporting Data

Please see section above.

Conclusion

Please see section above.

3.D. PROGRAM EVALUATION AND OPERATIONAL RESEARCH

NMEP objective
The NMESP highlights "harnessing innovation through focused research" as a key aspect of health system strengthening. It states that ongoing research on the following topics is needed to ensure that existing tools and approaches are implemented efficiently: ● Therapeutic efficacy of antimalarial treatments; ● Insecticide resistance in vector populations; ● Uptake of malaria interventions. An objective is to add to the base set of malaria control interventions and novel interventions, in addition to existing tools used in novel ways, in order to facilitate the process of reaching the elimination goals. The NMESP calls for research in the following areas: ● Information systems ● Drugs and strategies for drug use ● Vector control ● Other interventions, such as vaccines that interrupt malaria transmission.
NMEP approach
The NMEP conducts an annual consultative exercise at which research priorities are updated. The list of priorities generated is extensive. The NMEP SMEO unit and the SMEO technical working group vets research proposals; guides research implementation; and provide fora for dissemination of findings. Thematic areas include vector control, case management, malaria in pregnancy, health systems/program management, social and behavior change communication, monitoring and evaluation, elimination and epidemic response.

PMI objective, in support of NMEP

In 2017, PMI supported the NMEP to develop a list of priority malaria research topics by thematic area for the 2017-2021 timeframe. Each year, PMI supports the review and updating of the research agenda. PMI coordinates with other major sponsors of malaria research, including BMGF/MACEPA and the NIH to identify areas that would benefit from PMI support. Examples are covered in the following sections.

PMI-supported recent progress (past ~12-18 months)

Comparison of different indoor residual spraying strategies to maximize finite resources in Zambia: A comparison-control trial, Eastern Province, Zambia

This core-funded study examined the effect of different district-level IRS targeting strategies on measures of malaria transmission by comparing three IRS scenarios in groups of two districts for each scenario: 1) geographic targeting of IRS, 2) HMIS data-targeted IRS, and 3) ecologically targeted IRS. Groups were chosen to mimic the choices presented to malaria control programs when faced with finite resources and the question of which districts should conduct IRS operations and at what coverage intensity. The primary outcome was parasite prevalence by PCR and secondary outcomes included parasite prevalence by RDT, anopheline mosquito density per household, insecticide resistance profiles, and cost-effectiveness.

In 2017, IRS spray operations targeted 2,083 communities across the six districts. Adherence to the prescribed targeting methods was high across all districts. Regression analysis showed that the ecologically targeted arm of the trial saw the largest decrease in confirmed malaria incidence, 13 percent better than using geographical concentration, and 63 percent better than targeting using health facility incidence data. Study results were presented to PMI in September 2018 and a manuscript is in preparation. In 2019, a similar ecological-targeted approach was used in an attempt to inform IRS micro-planning in peri-urban areas of the Copperbelt, but the model yielded counter-intuitive results and appears to require modification before it can be applied in densely populated settings.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

ProACT study in Chadiza district

Improving access to and use of health services for prompt and effective case management of malaria has been a persistent challenge. Only about half of febrile children under five years of age are taken to a trained medical provider. As a result, many cases of malaria are undiagnosed and untreated, contributing to ongoing transmission and increased morbidity. iCCM, in which CHWs are trained to offer a menu of basic services focused on maternal and child health, has been introduced in some countries, but is often poorly resourced and under-utilized. In order to improve access to and use of case management services, and to realize the theoretical benefit in terms of transmission reduction that prompt and effective case management offers, a more proactive approach is needed.

The hypothesis is that proactive case detection and treatment by CHWs will lead to a greater reduction in parasite prevalence and case incidence compared to passive community case management delivered by CHWs.

The study has two primary objectives:

1. Assess whether weekly proactive iCCM, year round, compared to passive iCCM, with malaria case management for all ages, reduces the prevalence of patent (by RDT) and sub-patent (by polymerase chain reaction) parasitemia detected at household level in cross-sectional household surveys.
2. Determine whether the confirmed malaria case incidence (detected by CHWs either proactively or passively and at health facilities) decreases over time in communities with weekly proactive iCCM compared to routine iCCM by comparing the difference in slope of confirmed malaria incidence in proactive versus routine arms using an interrupted time series analysis.

This study will be a two arm, cluster-randomized controlled trial to determine whether year-round weekly household visits by CHWs to detect and test people of all ages with fever or history of fever with RDTs (and offer treatment of diarrhea and pneumonia for children under five years) and offer treatment with an ACT for those who test positive compared to standard iCCM by CHWs (which includes malaria case management for all ages in Zambia) is associated with a greater reduction in confirmed malaria cases and parasite prevalence over a two-year follow-up period. Randomization will occur at the level of the CHW catchment areas.

Protocol finalization is underway, and baseline data will be collected in early 2020.

PMI Goal

Over time, PMI will conduct OR/PE that helps: to evaluate coverage of population at-risk, quality of intervention(s), and efficiency in intervention delivery, or study reducing remaining malaria transmission and disease burden, test effectiveness of new or evolved priority interventions and strategies, or explore new metrics and mechanisms to assess the impact of interventions.

There are no OR activities proposed with FY 2020 funding.

Are you proposing to increase, decrease, or maintain funding allocation levels for this activity? Why? What data did you use to arrive at that conclusion?

The ProACT study is core-funded; therefore, MOP funds are not being proposed for this activity.

Key Question 1

Have technical challenges or operational bottlenecks that require operations research or program evaluation been identified in consultation with the NMEP? How have they been prioritized?

Supporting Data

Current research areas of mutual interest to the NMEP and PMI include misuse and repurposing of ITNs; piloting malaria surveillance using the ANC platform; and impact of scaled-up intervention coverage in high burden setting (Nchelenge); among others.

Figure A62. PE/OR Currently Conducted in Country with USG, Global Fund, Multilaterals or Other Major Donors. (Selected):

Source of Funding	Implementing institution	Research Question/Topic	Current status/ timeline
BMGF through IVCC	PATH, Macha Research Trust	Attractive target sugar baits, entomologic validation	Implementation ongoing in Luampa and Kaoma Districts, Western Province, Planned completion in 2022.
BMGF	MACEPA	Long term impact of MDA	Follow up survey in 2019 of the 2016-17 RCT.
BMGF	MACEPA	Comparison of reactive cased detection vs reactive drug administration in malaria elimination areas"	"CORE study." Data collected in 2017-18, data analysis ongoing, publication pending.
WHO	MOH	Assess feasibility and impact of window screening vs ITNs alone on malaria prevalence	Nyimba district, Eastern Province Baseline survey done 8/2019 Implementation begun 10/2019.
NIH	ICEMR	Longitudinal impact monitoring of malaria control measures in Choma and Nchelenge districts, and related studies	Ongoing, monthly sampling of household parasitological and entomologic indices complemented by HF caseloads. Correlate with measure of malaria control intervention implementation.
BMGF, MMV	MAMaZ	Feasibility and impact of community management of severe malaria	Pilot study in Serenje district completed. Publication pending.

Conclusion

Zambia is a relatively rich setting for malaria operations research, with significant ongoing contributions from BMGF/MACEPA and NIH/ICEMR, among others.

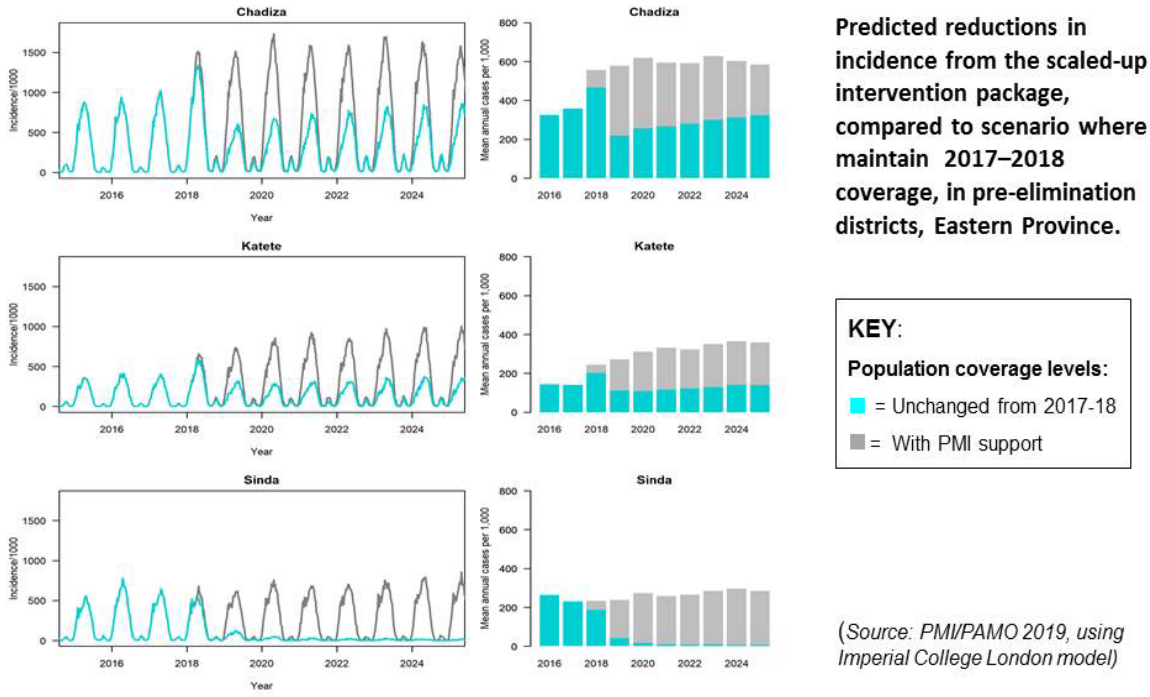
Key Question 2

In the technical areas covered above, are there specific issues in any of the intervention areas that merit further exploration, in anticipation of establishing intervention strategies that are or could become available in the future that could be applied?

Supporting Data Zambia

The PMI-supported pre-elimination program in Eastern Province will soon complete its first phase, during which investment focused on scale-up and optimization of the standard package of interventions (IRS, ITNs, CM including iCCM, SBC). Modelling at baseline suggested that some areas within the supported area may not reach pre-elimination status within the hoped-for time frame of 2-3 years (Figure A63).

Figure A63: Modelling of Current Package Impact in Chadiza, Katete and Sinda



During the planned second phase of the program, innovative would be needed to further accelerate toward elimination. Intervention areas that seem most promising for further exploration may include:

1. deployment of CHWs on a pro-active basis (i.e. the ProACT study);
2. strengthening of malaria surveillance through use of ANC attendees as sentinel population (i.e. the ANC surveillance pilot);
3. possible addition of mass drug administration on an operations research basis (potentially to be funded by other donors);
4. introduction of PBO or next-generation ITNs, which modelling suggest will have an impact; and
5. enhanced vector control, such as incorporation of ATSBs and focal IRS.

Conclusion

The appropriate mix of innovation will be reviewed in CY2020, following two full years of pre-elimination program implementation. The MOH counterparts have expressed interest in such a "dry season review," in which case incidence, vector densities and other impact data will be compared across the peak seasons of 2018-2020.

Key Question 3

What are the in-country considerations that impact your funding allocation in this category

Supporting Data Zambia

Given the extensive research activities supported by BMGF and NIH, the FY 2020 MOP priorities support for critical commodity procurements in the near term. PMI core funding would be a potential source of operations research, such as the ProACT study.

Conclusion

NA

3.E. OTHER HEALTH SYSTEMS STRENGTHENING

NMEP objective

- Zambia's National Malaria Elimination Strategic Plan 2017 - 2021 calls for:
    - Strengthening of national, provincial, and district-level capacity to plan, manage, and implement malaria activities;
    - Addressing human resource needs;
    - Ensuring that there is an established planning and forecasting framework for projecting funding needs and tracking health expenditures;
    - Developing capacity at all levels of the health system to manage the storage and distribution of malaria commodities; and
    - Reinforcing coordination among partners.
- Mobilize an additional $100 million, in addition to projected donations by long-standing malaria partners, to close the country's identified funding gap in order to meet its goal of eliminating malaria by 2021. The country estimated its malaria resource requirements at just over $694 million for the five year period from 2017 to 2021.

NMEP approach

- In March 2019 Zambia launched its first End Malaria Council (EMC). The EMC is designed to increase resource mobilization to achieve and sustain malaria elimination. Zambia's EMC convenes senior-level, multi-sectoral stakeholders (government, business, and community leaders) to complement Zambia's National Malaria Elimination Programme. The EMC is

country-led and country-owned, and is focused on three priority areas: 1) ensure the national strategic plan is implemented by driving action and holding stakeholders accountable; 2) pursuing traditional and innovative financing to mobilize domestic resources to close the existing funding gap; 3) and advocating for malaria elimination to remain high on public and private sector agendas.

- In June 2019 the EMC established the End Malaria Fund (EMF). The EMF is a public-private partnership to spearhead efforts towards mobilizing the country's estimated $100 million funding gap necessary to fill in order to end malaria by 2021. The EMF's Board will operate as a subcommittee of the EMC and support the Council in meeting its key strategic priorities.
- To achieve operational capacity, the NMEP is targeting health facility catchment areas and aiming to support them with specific intervention packages. As part of this decentralization, the GRZ implements a community health assistant program to bridge the gap between the community and formal health services.

PMI objective, in support of NMEP Infrastructure

PMI aims to support capacity strengthening and malaria health system improvements at the provincial, district, facility, and community levels, including data driven decision-making at the national and sub-national level.

PMI-supported recent progress (past ~12-18 months)

PMI has provided support for the Field Epidemiology Training Program (FETP) and the Peace Corps Stomp Out Malaria Initiative as well as provided support to strengthen the NMEP staff capacity through professional development activities.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

- PMI will continue to provide support for one Zambian national to participate in FETP, either at the intermediate or advanced level.
- PMI will continue to support Peace Corps activities in malaria control, including through small project assistance grants. PMI will also support a third year Peace Corps Volunteer position to assist community health workers to improve the quality of services and surveillance data for the PMI-supported pre-elimination program.
- PMI will continue to provide support to strengthen NMEP staff capacity through development activities such as training workshops and regional/global meetings.
- In support of the EMC's goal to mobilize domestic resources to close the funding gap for malaria, PMI will seek non-PMI resources for a nation-wide partner landscaping assessment

(with a particular focus on local private sector and faith-based partners) through a USAID Local Works grant or another external mechanism.

PMI Goal

In support of PMI's objectives to achieve and sustain scale of proven interventions; improve countries' capacity to collect and use information; mitigate risk against current malaria control gains; and build capacity and health systems toward full country ownership, PMI/Zambia aims to support the NMEP to ensure accurate, timely, and complete distribution of life-saving commodities across the country.

Key Question 2

What are the in-country considerations that impact your funding allocation in this category?

Supporting Data Zambia

Addressed in previous sections.

Conclusion

N/A.

ANNEX B: COUNTRY PROGRAM INVENTORY

The MOP seeks to facilitate a consultative, collaborative process between PMI, the NMCP, and other partners, where relevant. This section outlines a high-level program inventory along key intervention areas, and is intended to structure discussions around the relative strengths and challenges facing a program, as well as prioritization and opportunities to drive catalytic impact with specific investments.

Key:

Example score

Figure B1. Category: Vector Control

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
Entomological Monitoring	Insecticide Resistance monitoring	No insecticide resistance monitoring conducted	Limited insecticide resistance monitoring conducted on an ad-hoc basis	Insecticide Resistance monitoring conducted on an annual basis in a limited number of sites, not covering all administrative units. Occasional monitoring of molecular mechanisms	Insecticide resistance monitoring conducted in a greater number of sites on an annual basis with some collaboration with other partners, routine monitoring of some resistance mechanisms	Regular high quality insecticide resistance monitoring done in multiple sites per administrative division, consideration of molecular mechanisms and bioassay data, collaboration with other partners and NMCP
	Insectary	No functioning insectaries in country	Insectary present, but frequent ruptures in rearing and contamination of strains, frequent challenges in meeting needs	Insectary present, full-time staff present, some capacity for strain verification, sometimes challenges to get enough mosquitoes, occasional contamination	One or more insectary present, regular verification, rare challenges in getting sufficient mosquitoes, some capacity for strain verification	Highly functioning insectaries with verification of strains, capacity for rearing wild strains, quality controls in place
	Data-based vector control decision making	No consideration of entomological data when making decisions	Limited review of data, reliance on outdated data, uncoordinated analysis of data with limited collaboration with partners	Irregular and incomplete review of data from multiple partners, sometimes in collaboration with research and funding partners	Collaborative but irregular review of entomological data, sometimes providing timely evidence for decisions	Collaborative regular review of entomological data from multiple sources when making decisions about vector control

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Vector bionomics monitoring or research	No research or longitudinal monitoring done in country	Limited longitudinal monitoring and research done in country	Regular vector bionomics monitoring and vector control research done in country, but generally not having an important role in decision making	Regular vector bionomics and vector control research conducted in country but not sufficient to respond to all major needs of the national program	Regular monitoring driven by program priorities conducted alongside research done in country to provide timely data on the best malaria vector control
	Institutionalization of funding	No resources	Only supported by external partners, no host government funding	Some host country government funding	>50% funded by host country government	Fully funded by host country government
ITNs	Consistent distribution channels, in accordance with national strategy	Infrequent campaigns with no continuous distribution	Regular (e.g., every 3 years) campaigns, no continuous distribution	Regular campaigns, inconsistent continuous distribution	Regular campaigns, plus at least 1 well-managed continuous distribution channel	Regular, well-executed campaigns and well- managed continuous distribution channels
	Regular supervision of routine ITN distribution (e.g. HFs)	No HFs regularly supervised in ITN distribution	0-25% of HFs regularly supervised in ITN distribution	25-50% of HFs regularly supervised in ITN distribution	50-75% of HFs regularly supervised in ITN distribution	75-100% of HFs regularly supervised in ITN distribution
	ITN distribution reporting capabilities	Quantities of ITNs distributed not reported at all into LMIS (or other system)	Some quantities of ITNs distributed reported routinely	Some quantities of ITNs distributed reported routinely but cannot be disaggregated by channel	Quantities of ITNs distributed reported routinely and disaggregated by channel	All ITNs distributed captured routinely, disaggregated, and reported electronically
	Capacity to use data to appropriately target and rotate new types of nets	N/A	No capacity	Limited capacity	Some capacity	Good capacity

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
IRS	Host country government's IRS implementation capacity	N/A, no host country government implemented spray campaign	Host country government has very limited capacity to implement minor aspects of spray campaign	Host country government has capacity to implement some aspects of spray campaign	Host country government has capacity to implement most aspects of spray campaign	Host country government implements independent spray campaign
	Institutionalization of funding	N/A, no IRS conducted in country	No host country government funding, only supported by external sources (e.g. PMI, GF, mining companies)	Limited host country government funding in addition to external sources	>50% funded by host country government in addition to external sources	Fully funded by host country government, no external sources
	Coverage of Government-Implemented Spray Campaign	N/A, no government-implemented spray campaign	Spray coverage not reported	85+% coverage in some government-sprayed areas	85+% coverage in most government-sprayed areas	85+% coverage in all government-sprayed areas

Figure B2. Category: Case Management

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
Community-based CM, if in national strategy	Coverage of CHWs trained in and providing CM (geographic or numerical target)	No CHWs conducting CM	0-25% of national target met	25-50% of national target met	50-75% of national target met	75-100% of national target met
	Regular supervision of CHWs in CM (regular defined as per national QA/QC guidelines)	No CHWs regularly supervised in CM	0-25% of CHWs regularly supervised in CM	25-50% of CHWs regularly supervised in CM	50-75% of CHWs regularly supervised in CM	75-100% of CHWs regularly supervised in CM
	CHW reporting capabilities	CHW-managed cases not reported into HMIS	Some CHW-managed cases routinely reported into HMIS	Cases routinely reported into HMIS but cannot be disaggregated from HF-reported cases	Cases routinely reported into HMIS and can be disaggregated from HF-reported cases	All CHW case data routinely captured and reported electronically

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Institutionalization of funding (salaries and/or other support)	No resources	Only supported by external partners, no host government funding	Some host country government funding	>50% funded by host country government	Fully funded by host country government
Facility based CM	Access to HF-based care (within 5km of a health facility or as per national definition)	0-20% of population has access to HF	20-40% of population has access to HF	40-60% of population has access to HF	60-80% of population has access to HF	>80% of population has access to HF
	Regular* supervision of public HFs in CM	No HFs regularly supervised in CM	0-25% of HFs regularly supervised in CM	25-50% of HFs regularly supervised in CM	50-75% of HFs regularly supervised in CM	75-100% of HFs regularly supervised in CM
	Drug resistance monitoring	No TES performed in last 3 years	TES performed in last 3 years but results not available	Recent TES results available (within last 3 years) but no training in molecular testing	Recent TES results available (within last 3 years) and in-country staff trained in molecular testing	Recent TES results available (within last 3 years) and in-country capability for molecular testing

Figure B3. Category: Drug-Based Prevention

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
SMC (where applicable)	Geographic scope	No eligible districts receiving SMC		50% eligible districts receiving SMC		All eligible districts receiving SMC
	Coverage in targeted areas (% of eligible children 3-59 months who received complete SMC courses for all 4 rounds)	<60%	60-69%	70-79%	80-89%	90%+
	Institutionalization of funding	No resources	Only supported by external partners, no host government funding	Some host country government funding	>50% funded by host country government	Fully funded by host country government

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
MIP	National policy exists for malaria prevention in pregnancy	No policy	Policy exists but is not comprehensive (does not cover all aspects of MIP: ITN, IPTp and case management)	Comprehensive policy exists for prevention (ITNs, IPTp) and case management but not all WHO recommendations are included	Policy meets current WHO recommended MIP prevention	Comprehensive, WHO-aligned policy is actively implemented
	Country policy adoption/adaptation of ANC guidelines with at least 4 recommended contacts	No policy	Country has started discussions and consultations for adopting the new ANC guidelines and recommendations	Country has policy specifying ANC contacts but no provision for early delivery of IPTp and is not able to systematically track ANC visits in HMIS	Country policy specifies ANC contacts and has provision for delivery of IPTp at 13-16 weeks but cannot track all ANC visits in HMIS	Country policy specifies the number of contacts be delivered during pregnancy and has a provision for delivery of IPTp at 13-16 weeks and is able to track ANC visits in HMIS.
	National MIP working group established and coordinating effectively	No working group established	Working group formed and meets on an ad hoc basis, TORs are established	Working group engages in regular coordination but does not have mechanisms to ensure programmatic integration across technical areas	Working group coordinates at the national level only with Malaria and Maternal Health and has limited mechanisms for ensuring programmatic integration across technical areas	Working group engages in regular coordination at national and sub-national level with Malaria and Maternal Health and has mechanisms to ensure programmatic integration across technical areas.
	Supportive MIP supervision conducted	No HFs regularly supervised in MIP	0-25% of HFs regularly supervised in MIP	25-50% of HFs regularly supervised in MIP	50-75% of HFs regularly supervised in MIP	75-100% of HFs regularly supervised in MIP
	Routine SP resistance monitoring via biomarkers conducted	No SP resistance monitoring conducted	SP resistance monitoring conducted in the last 6-10 years	SP resistance monitoring conducted in the last year 4-5 years	SP resistance monitoring conducted in the last year 3 years	SP resistance monitoring conducted in the last 3 years and results published or being published.

Figure B4. Category: Supply Chain

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
Supply Chain	Forecasting and Procurement Planning	Ad hoc forecasting based on poor, inadequate, or inaccessible data Insufficient skills for selecting and implementing appropriate forecasting methodologies. Procurement plans are not developed from forecasts No coordination among procurers	Annual forecasting and supply planning done but is based on poor, inadequate, or inaccessible data Locally based skills in quantification are developing Review of procurement plans is irregular. Coordination among procurers is limited	Annual forecasts incorporate service and/or/consumption data Supply plans updated semi-annually and incorporate review/revisions of available funding Coordinated procurement planning done at the national level (and regional level, if the health system is decentralized) and among procurers	Semi-annual forecasts incorporate service and/or/consumption data, account for seasonality Supply plans updated quarterly and incorporate review/revisions of available funding Coordinated procurement planning done at the national level (and regional level, if the health system is decentralized). Identified commodity gaps effectively communicated to stakeholders for purposes of resource mobilization	Near real-time demand/consumption, enhanced with additional programmatic contributions, drives monthly forecasting Forecasting and supply planning-specific software used and outputs visible across networks. Supply plans updated monthly and incorporate review/revisions of available funding Coordinated procurement planning done at the national level (and regional level, if the health system is decentralized). Identified commodity gaps effectively communicated to stakeholders for purposes of resource mobilization. Outputs shared through global platforms
	Warehousing/ Storage	Quality of infrastructure and operations at all stock holding levels (Central, Sub-central/facility) compromises ability to ensure commodities are	Quality of infrastructure and operations in at least one stock holding level (Central, Sub-central/facility) ensures that commodities are	Quality of infrastructure and operations in at least two stock holding levels (Central, Sub-central/SDP) ensures that commodities are adequately protected from damage, deterioration and loss.	Quality of infrastructure and operations at all stock holding levels (Central, Sub-central/SDP) ensures that commodities are adequately protected from damage,	Quality of infrastructure and operations at all stock holding levels (Central, Sub-central/SDP) ensures that commodities are adequately protected from damage, deterioration and loss.

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
		adequately protected from damage, deterioration and loss. Unable to locate stock by batch in central/mid-level stores/warehouses.	adequately protected from damage, deterioration and loss. Paper-based inventory management system. No SOPs.	Warehousing SOPs exist. Able to track inventory level with central level WMS but information is not routinely shared across warehouses. Some maintenance occurring Limited ability to scale storage capacity	deterioration and loss Stock data is digitized in at least two stock holding levels Some routine maintenance occurring Storage capacity scaled through contracting of third party logistics providers (3PLs)	Storage infrastructure and operations adhere to Good Warehousing Practices and/ or meet in-country compliance standards Stock data is digitized at all stock holding levels and near real-time stock visibility available across networks Routine and predictive maintenance budgeted for and institutionalized Storage capacity is logically located and can be effectively scaled with 3PLs
	Routine distribution/ resupply between stock holding levels	No routine requisition and resupply schedule between stock holding levels No resources routinely available and allocated for transportation from higher to lower stock holding levels	Routine requisition and resupply between at least two stock holding levels according to a schedule Resources for transportation from higher to lower stock holding levels provided on ad hoc basis	Routine resupply between all stock holding levels according to a schedule Allocated resources for transportation from higher to lower stock holding levels provided on an irregular basis and resupply often achieved through unplanned means Resupply performance monitored post-activity	Routine resupply between all stock holding levels according to a schedule shared with all levels and informed by accurate demand signals Allocated resources for transportation provided on a regular basis and augmented with 3PLs Resupply performance monitored real-time	Routine resupply between all stock holding levels according to a schedule shared with all levels and informed by accurate, timely, demand signals Robust emergency and inter-facility resupply mechanisms are in place Allocated resources for transportation available internally or outsourced with 3PLs. Resupply transaction data is digitized for all stock transfers

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
						Near real-time visibility into upstream and downstream activities Resupply operations adhere to GDP and or meet in-country compliance standards for maintaining quality during distribution
	Logistics Management Information System	System to aggregate, analyze, validate and display data (from all levels of the logistics system) that can be used to make logistics decisions and manage the supply chain not institutionalized or followed No facility level records or not maintained. Low reporting rates. No visibility into CHW supplies. No visibility by central level on facilities and none by facility level on central level.	Stand-alone, program specific LMIS processes and structures defined but no formal or ongoing monitoring or measurement protocol exists. Some visibility of facility level inventory and consumption, low reporting rates, mostly paper-based	The country has documented LMIS processes and structures. The structures are functional. Metrics for performance monitoring, quality improvement, and evaluation are systematically used. Migration of data collection and reporting from a paper system to an electronic system at the district level and above. A documented mechanism is in place for maintaining data quality throughout the data supply chain.	Government and stakeholders use the national LMIS systems for key performance monitoring and follow standard practices. Facility inventory and consumption data is digital at facility level, upstream data available to facilities, System alerts for low stock/expiry, use of master product list and master facility list Interoperability with other information systems (e.g., warehouse management, medical records, laboratory management, enterprise resource planning systems, and health information management systems)	Near real time visibility into inventory and consumption data at all levels, data from multiple systems feed into common platform/control tower (automated process), predictive analytics. The government and stakeholders routinely review interoperability activities and modify them to adapt to changing conditions. Compliance with standards for data exchange, messaging, and security is regularly reviewed. The regulatory framework is reviewed and updated to reflect best practices for data exchange, messaging, and systems security.

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Regulatory, Policy and Governance	Legal basis to enable a medicines (and related health commodities - e.g., devices, vaccines, etc.) regulatory agency to function is absent or inappropriate Formal organizational structure regarding in-country stakeholders and relevant agencies to whom authority is delegated, is absent or inadequate (e.g., up-to-date organogram of MOH). Human and financial capacity to enable regulatory functionality, weak or absent No approved supply chain strategic plan	Medicines framework exists and is sufficient to support basic regulatory functions including clinical dossier review (licensing) and marketing authorization with registration. Documented domestic financial support to enable regulatory activities - including human resources Approved supply chain strategic plan but not updated recently. Poorly implemented strategic plan	All SDP levels have in place policies that address STG, quality assurance and HR. Management policies for the supply chain system are in place at the MOH level. Policy and strategic leadership is not always translated into robust implementation plans, and supportive supervision, capacity building and guidance to managers within the system. No consistent approach to pharmacovigilance or a standard reporting structure for pharmacovigilance events Overall quality management system in place to support interface of product licensing, registration, manufacturing, post-marketing surveillance. Approved (and up to date) supply chain strategic plan. Partially implemented	Strong policy and strategic leadership by government, with firm grasp of budgets and financial sustainability Robust implementation plans, and supportive supervision, capacity building and guidance to managers within the system. Regulatory and policy bodies in alignment to support quality product availability National and standardized Pharmacovigilance or a standard reporting structure for pharmacovigilance events in place, not fully functional. Approved (and up to date) supply chain strategic plan (contains clear roles and responsibilities, stakeholder mapping, costs).	The MOH leads strategic functions such as, policy formulation, quality assurance and overseeing the funds required for policy implementation. Ability to ensure product quality, automated drug registration process, clear/transparent importation process, robust post-market surveillance system and, track and trace regulations developed and/or in the process of implementation. Approved (and up to date) supply chain strategic plan (contains clear roles and responsibilities, stakeholder mapping, costs). Includes risk mitigation plan.

Figure B5. Category: Support Systems

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
SBC	National Malaria SBCC Strategy used to guide design and implementation of malaria SBC activities	No strategy exists.	Strategy exists but there is no evidence that it has been used to guide design or implementation.	Strategy exists and is used from time-to-time to guide design and implementation, but is of poor quality and does not include any of the key elements identified in the RBM SBCC Working Group National Malaria SBCC Strategy Template.	Strategy is used from time-to-time to guide design and implementation, but lacks alignment with the broader National Malaria Strategy and only incorporates a couple of the key elements identified in the RBM SBCC Working Group National Malaria SBCC Strategy Template.	Strategy is well aligned with the broader National Malaria Strategy, includes the key elements identified in the RBM SBCC Working Group National Malaria SBCC Strategy Template, and is used to guide design and implementation.
	SBC Technical Working Group coordinates effectively	No technical working group exists.	The SBC Technical Working Group exists on paper, but has not been operationalized.	The SBC Technical Working Group has significant resource and staffing gaps and does not have clear pathways for coordination.	The SBC Technical Working Group lacks some needed resources/staff and generally only coordinates at the national level only.	The SBC Technical Working Group is well resourced and staffed and engages in regular coordination at both the national and sub-national level.
	High-quality formative assessments used to inform intervention design	No high-quality, formative assessment conducted in the last five years.	Formative assessment conducted, but significant quality issues in the design and no evidence that data was used to inform intervention design.	High-quality, formative assessment conducted, but no evidence that data was used to inform intervention design.	Data from prior projects used exclusively to guide intervention design; no new data collected.	High-quality, formative assessment conducted and data used to inform intervention design.

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
Elim (relevant only for countries actively pursuing elimination	Elimination planning to implementation	No elimination or pre-elimination targets in the national strategic plan	Risk stratification conducted using latest incidence data and interventions targeted	Readiness assessment/ capacity inventory conducted	Capacity built and systems in place to initiate elimination activities	Elimination activities implemented fully in targeted areas
	Surveillance system readiness to track all cases	Monthly, aggregate data from public sector only	At least monthly, aggregate data from public, private, and community levels	Case-based reporting initiated	Real-time, case-based surveillance inclusive of all sectors and levels in targeted areas	Real-time, case-based reporting and response activities implemented
General Infrastructure	Staffing	No staff	Manager and a few technical staff; not all intervention areas are covered	Manager and technical staff for each intervention area; many staff have limited training and experience ; limited program support staff	Full staffing of program areas and support systems but some staff need further training to optimize their effectiveness; limited plans and opportunities for such training	Fully staffed with personnel with relevant training and experience; complete plan for professional development
	Office space, transport	No office space or transport	Office space exists but is insufficient for staff; Transport available at intervals but limited for program needs	Office space adequate for current staff but no growth possible; office not well positioned for access to MOH leadership. Transport available but not covering all needs and not well managed/maintained	Office space adequate for current staff and some technical areas (e.g., lab) but not fully adequate for growth and all technical services. Transport covers most needs.	Office space is fully adequate for current staff and technical needs (lab, insectary, meeting space, etc.) and some growth and well positioned in the MOH; Transport is fully available for needed purposes -- trucks and 4-wheel drive vehicles where needed - all maintained and managed.

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Internet connectivity	No Internet connectivity	Intermittent connectivity; poor bandwidth; challenging maintenance; very little budget	Mostly connected with some outages; ok but not ideal bandwidth; irregular maintenance; modest budget	Generally stable connections, adequate bandwidth for most work, fair to good maintenance and sufficient budget	Fully connected, maintained, good bandwidth for all needs, and sufficient budget including all needed hardware and software
	NMCP placement within Ministry of Health	NMCP exists but is barely visible in the MOH structure	NMCP is visible in the MOH structure but NMCP manager reports to supervisor who is still low in the MOH system	NMCP is visible and manager reports to high level leader in MOH (e.g., Director of Public Health or Permanent Secretary for Health)	NMCP (or NMEP) is highly visible and reports at a high level in MOH and has some access to other ministry leadership (e.g., education, agriculture, community development)	NMCP (or NMEP) is highly visible within MOH and with all other relevant ministries and has ready access to country leadership (e.g., the president/prime minister; and parliament)

Figure B6. Category: Strategic Information

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
Data, Surveillance, Monitoring & Evaluation	Overall HMIS reporting rate (CY 2018)	<60%	60-69%	70-79%	80-89%	90%+
	Element specific reporting rate: "Confirmed malaria cases among children under 5" (CY 2018)	<60%	60-69%	70-79%	80-89%	90%+
	HMIS data quality assurance and quality control	Few standards exist for data collection, assembly, & analysis. Data	Standards used for data collection, assembly & analysis in limited settings. Some electronic	Standards defined and implemented for data collection, assembly, analysis, and used nationally. Data quality	Data reviews and audits are integrated in strategic plans, conducted on a regular schedule.	Continuous review and auditing through automated and manual processes, to ensure defined levels of data

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
		quality reviews and audits are ad hoc for specific data needs. No data-quality assurance plan and national coordinating body exist.	tools used for data quality review and audit. Data-quality assurance plan is available.	reviews and audits scheduled and include a remediation process to address identified issues. SM&E staff are seconded to NMCP	Regular meetings held by national data-quality governing body; issues identified are addressed through an established remediation process.	quality. Data quality metrics are used for continuous improvement. The data-quality assurance plan is reviewed periodically by a national coordinating body and appropriate stakeholders.
	Reporting Systems	Data collection tools are not standard and procedures are not consistently followed; data are collected and stored in an unstructured format. NMCP does not have access to malaria data from HMIS.	Data systems support longitudinal health data (clinical, surveillance, M&E) in limited settings. The data are available for centrally mandated reporting. A parallel malaria reporting system may exist.	Most data platforms/applications ensure data availability at all levels for decision support and M&E for authorized users. No parallel malaria reporting system exists. NMCP has access to malaria data from HMIS.	The data systems in use ensure reliable and appropriate access to data at all levels for authorized users. Changes in reporting requirements are accommodated with minimal disruption to data availability. Data systems support secondary use of data and NMCP has access.	Data availability is monitored for continuous improvements and to meet emerging health sector needs. Reporting is available from private facilities and community-level providers and can be disaggregated.
	Data collection	Data collection is not done at the most peripheral level (CHWs) and is irregular and inaccurate at rural and more central health facilities. System is entirely paper based, but registers may be absent	Data collection is well managed at HF level, but incomplete at community level (CHWs); most collection is paper based and aggregation is paper based; registers generally available; timeliness and completeness remain challenges	Data collection is well managed at HF level and at community level (CHWs); most collection is paper based, aggregation is electronic; registers available; timeliness and completeness >80%, feedback to collectors limited	Data collection at all levels); collection is electronic and sometimes paper based, aggregation is electronic; registers include all program-critical data; timeliness and completeness >80%, feedback to collectors is standardized	Data collection occurs at all levels, is transmitted in real time with timely feedback to those collecting and those using the data; data checks exist at point of collection; electronic transmission is the norm, including to data collectors

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Data use	Activities (analysis, interpretation, visualization) to ensure data use are rarely implemented	Limited data use activities are implemented (bulletin has been developed but analysis and interpretation for decision- making needs to be strengthened)	Country conducts regular data use activities (review meetings, bulletin at least quarterly, at least at the central level).	Country conducts regular data use activities at all levels (review meetings, bulletins, dashboard at least quarterly).	Country has developed their own high- quality dashboard to facilitate data use, and data-informed decision making is evident at all levels, on a frequent basis.
OR/PE	PMI in-country OR experience	No previous PMI OR experience in country	PMI team has prepared concept notes (CNs) but has not completed protocols or conducted OR	PMI team has completed protocols and received approval for OR; studies in planning, underway, or recently completed	PMI team and/or other country partners have completed a OR study and prepared and shared reports	Multiple OR studies completed in country that address malaria program implementation bottlenecks with publication and sharing of results, with involvement from MOH co-investigators
	Country mechanisms for OR/PE review	No in-country process for research review, determination or IRB processes	Limited in-country processes for research review, determination and IRB oversight	Processes in place for research and IRB review with federal-wide assurance approval; no previous PMI in-country OR experience	Processes in place for research and IRB review with federal-wide assurance approval; previous PMI in-country OR experience	Full complement of research review, approval, oversight processes including data safety and monitoring boards and systems for results sharing
	In-country partnerships for OR	No in-country partners (academic, NGO, or other) with OR experience	1-2 in-country partners with OR experience, but no malaria specific experience	3+ in-country partners with OR experience; 1+ with some malaria expertise; no current PMI-linked OR work	3+ in-country partners with OR experience; 1+ with malaria expertise; current or recent work with PMI OR	Multiple in-country partners with specific malaria experience in PMI OR, including completed past work and reporting on malaria OR

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Conceptualization of problems needing scientific evaluation	No experience	Some but limited experience in identifying programmatic problems and prioritization	Experience with identifying program problems and prioritizing PE and OR	Experience with identifying problems needing PE or OR and developing study approaches with partners	Extensive experience with problem identification, prioritization, proposal development and conducting PE or OR