PMI | U.S. PRESIDENT'S MALARIA INITIATIVE

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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

GHANA

Malaria Operational Plan FY 2020

Suggested Citation: U.S. President's Malaria Initiative Ghana Malaria Operational Plan FY 2020. Retrieved from (www.pmi.gov)

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ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AGAMal	AngloGold Ashanti Malaria Control Programme
AL	Artemether-lumefantrine
ANC	Antenatal care
AS/AQ	Artesunate-amodiaquine
BMGF	Bill and Melinda Gates Foundation
CDC	Centers for Disease Control and Prevention
CHN	Community Health Nurse
CHO	Community Health Officer
CHV	Community Health Volunteer
CHPS	Community-based Health Planning and Services
CLU	Clinical Laboratory Unit
CWC	Child welfare clinic
CY	Calendar year
DFID	Department for International Development
DHS	Demographic and Health Survey
DHIMS2	District Health Management Information System
DHMT	District Health Management Team
EDS	Electronic Data System
EUV	End User Verification
FY	Fiscal year
G2G	Government to Government
Ghana FDA	Ghana Food and Drug Administration
GHI	Global Health Initiative
GhiLMIS	Ghana Integrated Logistics Management System
GHS	Ghana Health Service
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GOG	Government of Ghana
HNQIS	Health Network for Quality Information System
HPD	Health Promotion Division
HPNO	Health Promotion and Nutrition Office
IPC	Interpersonal communication
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
JICA	Japan International Cooperation Agency
KOICA	Korean International Cooperation Agency
LMD	Last Mile Delivery
LMIS	Logistics Management Information System

MAVCOC	Malaria Vector Control Oversight Committee
MICC	Malaria Interagency Coordination Committee
MICS	Multiple Indicator Cluster Survey
MIP	Malaria in pregnancy
MIS	Malaria indicator survey
MoH	Ministry of Health
MOP	Malaria Operational Plan
MOS	Months of Stock
NAMRU	Naval Medical Research Unit
NHIA	National Health Insurance Authority
NHIS	National Health Insurance Scheme
NIRMOP	National Insecticide Resistance Monitoring Partnership
NMCP	National Malaria Control Program
NMIMR	Noguchi Memorial Institute for Medical Research
NSP	National Strategic Plan
OPD	Outpatient Department
OTSS	Outreach Training and Supportive Supervision
PBO	Piperonyl butoxide
PCR	Polymerase Chain Reaction
PMI	U.S. President's Malaria Initiative
RAS	Rectal artesunate suppositories
RDT	Rapid Diagnostic Test
RHA	Regional Health Administration
RHMT	Regional Health Management Team
RMS	Regional Medical Store
RSSH	Resilient and Sustainable Systems for Health
SBC	Social and behavior change
SDP	Service Delivery Point
SM&E	Surveillance, monitoring, and evaluation
SMC	Seasonal Malaria Chemoprevention
SP	Sulfadoxine-pyrimethamine
SPAQ	Sulfadoxine-pyrimethamine + amodiaquine
UCC	Universal coverage campaign
USAID	United States Agency for International Development
VSLA	Village Savings and Loan Association
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 Ghana to end malaria. PMI has been a proud partner of Ghana since 2007, helping to decrease child death rates by 46 percent and through investments totaling $305 million.

The proposed PMI fiscal year (FY) 2020 budget for Ghana is $28 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Ghana for FY 2020. Developed in consultation with the National Malaria Control Program (NMCP) 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 of Ghana as well as other donors and partners.

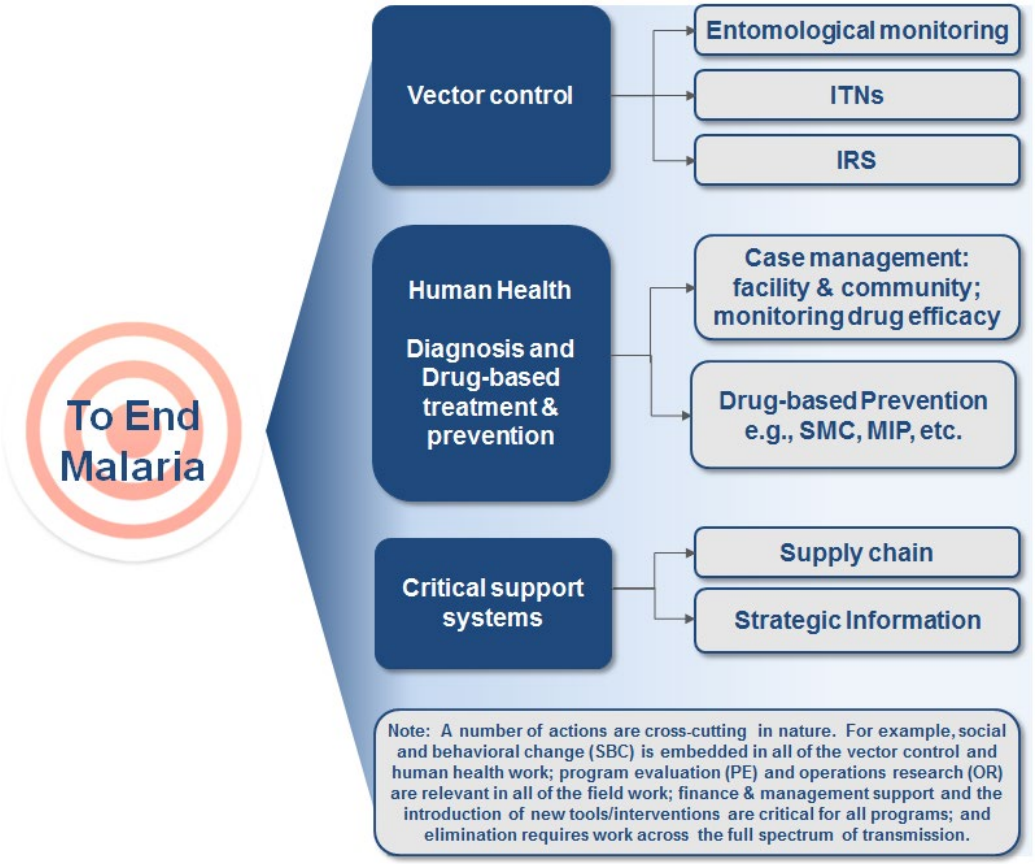
Ghana at a glance

- **Geography:** Ghana is centrally located on the West African coast. It has a total land area of 238,537 square kilometers, and it is bordered by three French-speaking countries: Togo on the east, Burkina Faso on the north and northwest, and Côte d'Ivoire on the west. The Gulf of Guinea lies to the south and stretches across the 560-kilometer coastline. Ghana is a lowland country except for a range of highlands on the eastern border. The highest elevation is Mt. Afadjato, 884 meters above sea level, found in the Akuapem-Togo ranges, west of the Volta River. Ghana can be divided into three ecological zones: the low, sandy coastal plains, with several rivers and streams; the middle and western parts of the country, characterized by a heavy canopy of semi-deciduous rainforests, with many streams and rivers; and a northern savannah, which is drained by the Black and White Volta Rivers. The Volta Lake, created by the hydroelectric dam in the East, is one of the largest artificial lakes in the world. *(DHS-2014)*
- **Climate:** Ghana has a tropical climate with temperatures and rainfall patterns that vary according to distance from the coast and elevation. The eastern coastal area is comparatively dry, the southwestern corner is hot and humid, and the north of the country is hot and dry. The average annual temperature is about 26ºC (79ºF). There are two distinct rainy seasons in the southern and middle parts of the country, from April to June and September to November. The North, however, is characterized by one rainfall season that begins in May, peaks in August, and lasts until September. Annual rainfall ranges from about 1,015 millimeters (40 inches) in the North to about 2,030 millimeters (80 inches) in the Southwest. The harmattan, a dry dusty desert wind, blows from the northeast and covers much of the country between December and March, lowering the humidity and visibility, and also creating very warm days and cool nights in the North. In the South, the effects of the harmattan are felt mainly in January.

- **Population in 2019:** 30,795,491 (2010 general census population with 2.4% annual increase)
- **Population at risk of malaria:** 100% (Ghana National Malaria Strategic Plan 2014-2020)
- **Principal malaria parasites:** *Plasmodium falciparum*
- **Principal malaria vectors:** *An. gambiae s.l.*
- **Malaria incidence per 1000 population: 271** (World Bank Open Data 2017)
- **Under-five mortality rate:** 52/1,000 live births (2017 Maternal Health Survey)
- **World Bank Income Classification & GDP:** GNI per capita $2,130 (World Development Indicators 2018)
- **Political system:** Presidential Republic
- **Trafficking in Persons designations, 2016-2018:** Tier 2 (DS, 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)
    - The World Health Organization (WHO)
    - Against Malaria Foundation (AMF)
    - Noguchi Memorial Institute for Medical Research (NMIMR)
    - Anglo-Gold Ashanti Malaria Control Programme (AGAMal)
    - Naval Medical Research Unit three (NAMRU-3)
- **PMI Support of National Malaria Control Strategy:** Since the launching of its activities in Ghana in 2007, PMI supports the implementation of the national malaria control strategic plan which aims at reducing malaria morbidity and mortality by 75% of the 2012 basis by 2020 across all regions of the country. PMI supports NMCP's implementation of malaria preventive, curative, and systems strengthening interventions, except larval source management.
- **PMI Investments:** Ghana began implementation as a PMI focus country in FY 2007. The proposed FY 2020 PMI budget for Ghana is $28 million, which brings the total PMI investment to nearly $333 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 and is aligned with the USAID Ghana new Country Development Cooperation Strategy (CDCS) [2020 - 2025] targeting behaviors for sustainable results. The new CDCS uses a behavioral approach that focuses on behavior change to achieve development outcomes and makes citizens and development actors accountable for projected results. This approach is directly in line with malaria-related objectives. For example, we know that ownership of a bednet might not always entail its use; hence behavior change is critical to the adoption of healthy behaviors and achieving health outcomes. In line with PMI's emphasis on evidence-based programming, the development of the new CDCS objectives prioritized the use of data to understand development challenges, identify key challenges and enabling factors to achieve outcomes, and identify the key actors and expected intermediate results. Building and strengthening the capacity of Ghana's people and institutions – from the central level to the region and district and ultimately to the 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 contain elements of capacity building and system strengthening. PMI/Ghana will continue to rely on and engage with local partners such as the Ghana Health Service (GHS) and deepen our engagement with the

newly elevated Health Promotion Division (HPD) which engages and empowers communities. The USAID Ghana mission has pioneered and expanded government-to-government (G2G) financing through the Director General's Office of the GHS. To improve accountability and transparency, USAID Ghana will transition G2G to "on-budget" with funding flowing down through the Ministry of Finance with a target date of CY 2022. PMI/Ghana supports seasonal malaria chemoprevention (SMC), supportive supervision (both clinical and lab), and hopes to expand to social behavior change at the community level through the GHS HPD. G2G support capacitates financial systems, accountability, and reporting and contributes to the national vision for "Ghana beyond Aid". Finally, PMI/Ghana will continue to rely on private sector partnerships such as the AngloGold Ashanti Malaria Programme (AGAMal).

To accelerate the Journey to Self-Reliance, PMI developed a programmatic inventory to assess the strengths and persistent challenges of Ghana'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 Ghana is capable of fully financing its development priorities, PMI will work with other partners (e.g., the Global Fund) to jointly track Ghana's funding commitments across the malaria portfolio.

II. MALARIA SITUATION AND MALARIA CONTROL PROGRESS IN GHANA

Malaria is endemic and perennial in Ghana, with pronounced seasonal variations in the northern part of the country. The length of malaria transmission varies by geographic region in Ghana, depending on the length of the dry season (December-March), during which there is little transmission. In Ghana, there are two major transmission patterns. There is a six to seven month transmission season in a larger part of the north of the country and a shorter three to four month transmission in the upper part of the north, with the highest number of cases occurring between July and November. In the southern part of Ghana, the transmission season is nine months or more, with a small peak from May to June and a larger peak from October to November. Although Ghana's entire population is at risk of malaria infection, children under five years of age and pregnant women are at higher risk of severe illness due to lowered immunity.

Ghana has shown steady progress in malaria prevention and control over the years and is poised to start stratifying malaria risk at lower levels (i.e. district and sub-district) and target malaria interventions based on epidemiological and entomological data. Nationwide malaria parasite prevalence in children 6-59 months (based on RDT) declined from 48 percent in 2011 to 28 percent in 2016 (Figure 2). However, large variations and significant decreases in prevalence within and between regions are noted (Figure 3). The three northern regions (Upper East, Upper West, and Northern Regions) have shown significant declines in under five parasite prevalence from 44 percent to 14.5 percent , 51 percent to 22 percent , and 48 percent to 24.6 percent. During the same period, low hemoglobin prevalence (<8.0g/dl) in children 6-59 months of age

has however remained unchanged (Figure 4), yet Ghana has challenges with malnutrition, wasting, and stunting. It should be noted that following a referendum in December 2018, six new regions were created, resulting in the following changes: Northern Region was divided into Northern, North East, and Savannah Regions; Brong Ahafo Region was divided into Ahafo, Bono, and Bono East Regions; Volta Region was split into Volta and Oti Regions; and Western Region was divided into Western and Western North Regions.

Figure 2. Trends in Malaria Prevalence, *Percent of Children Age 6-59 Months Who Tested Positive for Malaria by Microscopy and RDT*

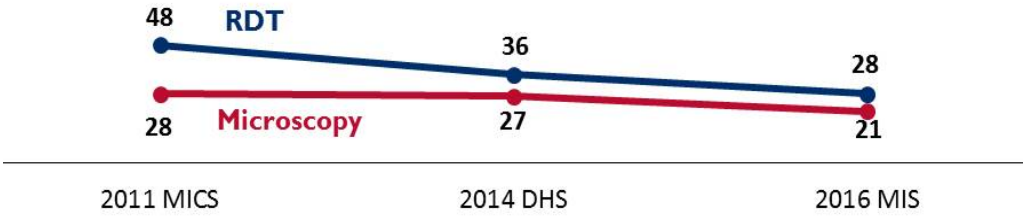


Figure 3. Malaria Parasite Prevalence among Children Under Five Years of Age by Geographic Area

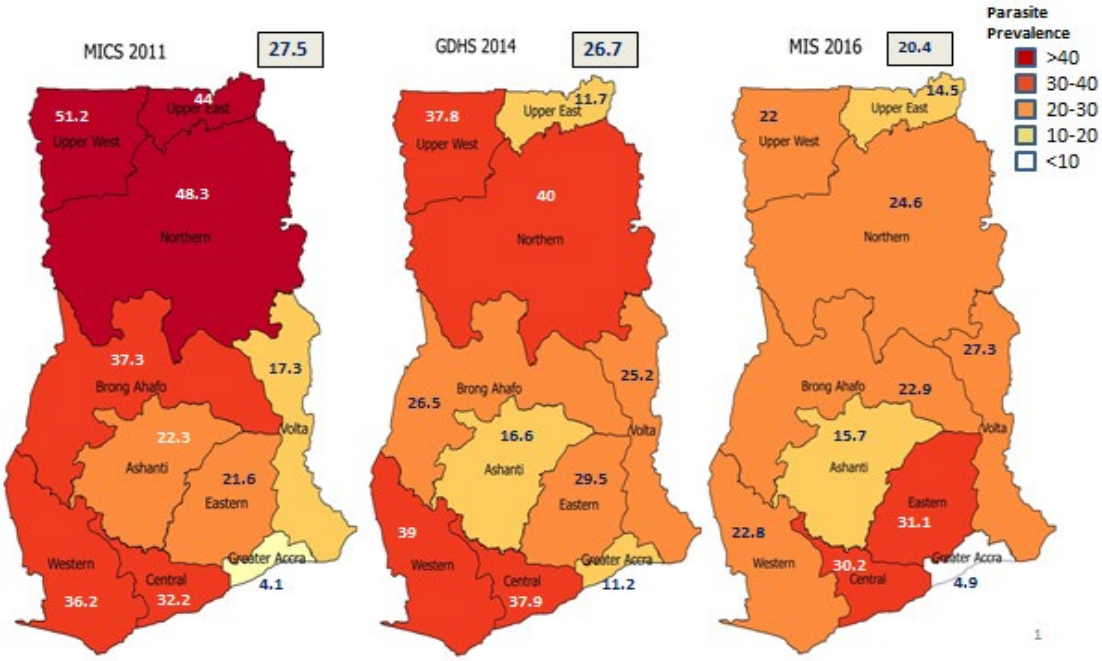
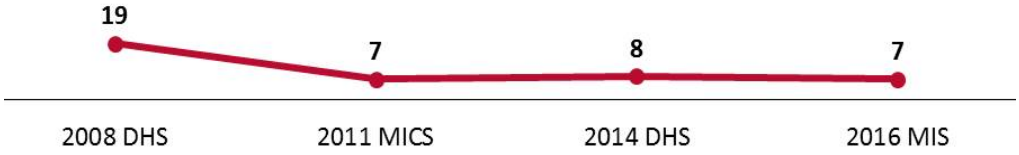


Figure 4. Trends in Prevalence of Low Hemoglobin, *Percent of Children Age 6-59 Months with Moderate-to-Severe Anemia (hemoglobin < 8.0 g/dl)*



Nationwide household insecticide-treated mosquito net (ITN) ownership increased from 19 percent in 2006 to 73 percent in 2016. ITN use among children under-five years and pregnant women has steadily improved since 2006, however ITN use among these two groups was only 52 percent in children under five and 50 percent in pregnant women in 2016 (Figure 5). Children under-five years of age receiving an artemisinin-based combination therapy (ACT) for a recent febrile illness (within the last two weeks) increased from three percent in 2006 to 61 percent in 2016. Febrile children of the same age group who had a finger or heel stick, a proxy measure of malaria diagnostic testing, increased from 16 percent in 2011 to 30 percent in 2016. Women who received three or more doses of intermittent preventive treatment for pregnant women (IPTp) increased from 28 percent in 2008 to 60 percent in 2016.

Figure 5. Key Indicators for Malaria Prevention and Treatment Coverage and Impact Indicators

Indicator	2006 MICS	2008 DHS	2011 MICS	2014 DHS	2016 MIS
% Households with at least one ITN	19	42	49	68	73
% Households with at least one ITN for every two people	n/a	17	26	45	51
% Population with access to an ITN	n/a	30	38	59	66
% Population that slept under an ITN the previous night	n/a	21	29	36	42
% Children under five years of age who slept under an ITN the previous night	22	28	39	47	52
% Pregnant women who slept under an ITN the previous night	n/a	20	33	43	50
% Children under five years of age with fever in the last two weeks for whom advice or treatment was sought[1]	n/a	n/a	50	56	72
% Children under five with fever in the last two weeks who had a finger or heel stick	n/a	n/a	16	34	30
% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs	3	12	18	37	61
% Women who received two or more doses of IPTp during their last pregnancy in the last two years[2]	28	44	65	68	78

Indicator	2006 MICS	2008 DHS	2011 MICS	2014 DHS	2016 MIS
% Women who received three or more doses of IPTp during their last pregnancy in the last two years[2]	n/a	28	n/a	39	60
Under-five mortality rate per 1,000 live births	111	80	82	60	n/a
% Children under five years of age with parasitemia (by **microscopy,** if done)	n/a	n/a	28	27	21
% Children under five years of age with parasitemia (by **RDT**, if done)	n/a	n/a	48	36	28
% Children under five years of age with severe anemia (Hb<8gm/dl)	n/a	19	7	8	7

Sources: Demographic Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), and Malaria Indicator Surveys (MIS) from 2006 - 2016

[1]Note that this indicator has been recalculated according to the newest definition, at the specified number of doses of SP/Fansidar from any source, wherever possible

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

From 2014 to 2018, according to Ghana's District Health Information Management System II (DHIMS2), reported suspect malaria cases seen in health facility outpatient departments (OPDs) increased from 8 million cases in 2014 to approximately 11 million cases in 2018 (Figure 6). Ghana has significantly increased mandatory malaria testing of suspect cases from 54 percent in 2014 to 85 percent in 2018. In 2019, NMCP reports testing rates above 90 percent Therefore, with increased laboratory testing, confirmed malaria cases have increased from around 3.6 million in 2014 to 5.5 million in 2018; however, with improved adherence to test, treat, and track guidelines, treatment of presumed malaria cases dropped 69 percent from 2014 to 2018 (Figure 6). Nationwide, the test positivity rate (TPR) has decreased marginally with expanded testing. DHIMS2 data completeness has also improved from 93 percent in 2014 to 98 percent in 2018. Malaria cases in children under five have decreased from 34 percent in 2014 to 30 percent in 2018 with increased access and better testing (Figure 6). Most importantly, Ghana has shown significant reductions in severe malaria cases, which decreased by 77 percent from 416,317 in 2014 to 94,346 in 2018, and malaria deaths, which fell by 81 percent from 2,275 to 417 over the same period of time (Figure 6).

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

Indicator	2014	2015	2016	2017	2018
# Suspect malaria cases[1]	8,448,394	10,186,510	10,447,524	10,211,971	11,171,484
# Patients receiving diagnostic test for malaria[2]	5,591,550	6,661,351	7,562,480	8,169,836	9,356,189
Total # malaria cases[3] (confirmed and presumed)	6,727,592	7,004,263	6,903,612	6,194,440	6,523,043
# Confirmed cases[4]	3,597,086	4,319,919	4,535,271	4,893,959	5,571,458
# Presumed cases[5]	3,130,512	2,684,344	2,217,211	1,300,481	951,585

Indicator	2014	2015	2016	2017	2018
% Malaria cases confirmed[6]	53.5%	61.7%	65.7%	79%	85.4%
Test positivity rate (TPR)[7]	64.3%	64.9%	60.0%	59.9%	59.5%
Total # <5 malaria cases[8]	2,315,483	2,266,393	2,217,211	1,987,393	1,960,715
% Cases under 5[9]	34.4%	32.4%	32.1%	32.1%	30.1%
Total # severe cases[10]	416,317	175,789	116,150	90,244	94,346
Total # malaria deaths[11]	2,275	2,137	1,264	599	417
# Facilities reporting[12]	3486	3815	4218	5034	5181
Data form completeness (%)[13]	93.4%	95.7%	92.5%	100%	98.4%

Data sources and comments:
N/A = not available
Definitions:
1 Number of patients presenting with signs or symptoms considered to be possibly due to malaria (e.g., this could be the number of patients presenting with fever or history of fever in the previous 24 or 48 hours)
2 Number of patients receiving a diagnostic test for malaria (RDT or microscopy). All ages, outpatient, inpatient
3 Total # cases: Total number of reported malaria cases. All ages, outpatient, inpatient, confirmed and unconfirmed cases.
4 # confirmed cases: Total diagnostically confirmed cases. All ages, outpatient, inpatient.
5 # presumed cases: Total clinical/presumed/unconfirmed cases. All ages, outpatient, inpatient.
6 % Malaria Cases confirmed: # confirmed cases (#4 above) / Total # cases (#3 above)
7 Test Positivity Rate (TPR): Number of confirmed cases (#4 above)/Number of patients receiving a diagnostic test for malaria (RDT or microscopy) (#2 above)
8 Total #<5 cases: Total number of <5 cases. Outpatient, inpatient, confirmed, and unconfirmed.
9 Total # <5 cases (#8 above) / Total # of cases (# 3 above)
10 As there may not be a standard definition across countries, please specify if there is such a variable available and the definition that is used; if "severe malaria" is not used or collected but "hospitalized for malaria" is a standard in the country, please insert that label and the relevant data by year.
11 Total # Malaria Deaths Reported: All ages, outpatient, inpatient, confirmed, and unconfirmed.
12 Total # of health facilities reporting data into the HMIS/DHIS2 system for that year.
13 Data completeness: Number of monthly reports received from health facilities/Number of health facility reports expected (i.e., number of facilities expected to report multiplied by the number of months considered).

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

Ghana's Malaria National Control Strategic Plan (NSP) covers 2014 through 2020. The goal is to reduce malaria morbidity and mortality by 75 percent of the 2012 basis by 2020 across all the regions of the country. The scope of the strategic plan is to consolidate the recent gains and accelerate malaria control in the high transmission areas to further reduce malaria burden, and move towards establishing lower-transmission areas in Ghana by the end of 2020. The NMCP surpassed their malaria mortality goal with an 85 percent reduction from 2012 (2,275 deaths) to 2018 (417 deaths), however malaria morbidity remains high nationally with geographic variability, especially in the Northern regions. The 2014 - 2020 NSP specific objectives are outlined below:

- *To protect at least 80* percent *of the population at risk with effective malaria prevention interventions by 2020.* Prevention interventions include universal coverage with ITNs

through mass campaigns and continuous distribution, indoor residual spraying (IRS) in areas of high parasite prevalence, larval source management, SMC in areas of seasonal transmission, and IPTp.

- *To provide correct diagnosis to all suspected malaria cases and prompt and effective treatment to 100* percent *of confirmed malaria cases in accordance with treatment guidelines by 2020.* Ghana's policy recommends that all suspected malaria cases are confirmed in accordance with the "Test, Treat, and Track" Initiative, utilizing microscopy and rapid diagnostic tests (RDTs) for rational use of ACTs.
- *To strengthen and maintain the capacity for program management, partnership, and coordination to achieve malaria programmatic objectives at all levels of the health care system by 2020.*
- *To strengthen the systems for surveillance and M&E in order to ensure timely availability of quality, consistent, and relevant malaria data at all levels by 2020.*
- *To increase awareness and knowledge of the entire population on malaria prevention and control so as to improve uptake and correct use of all interventions by 2020.*

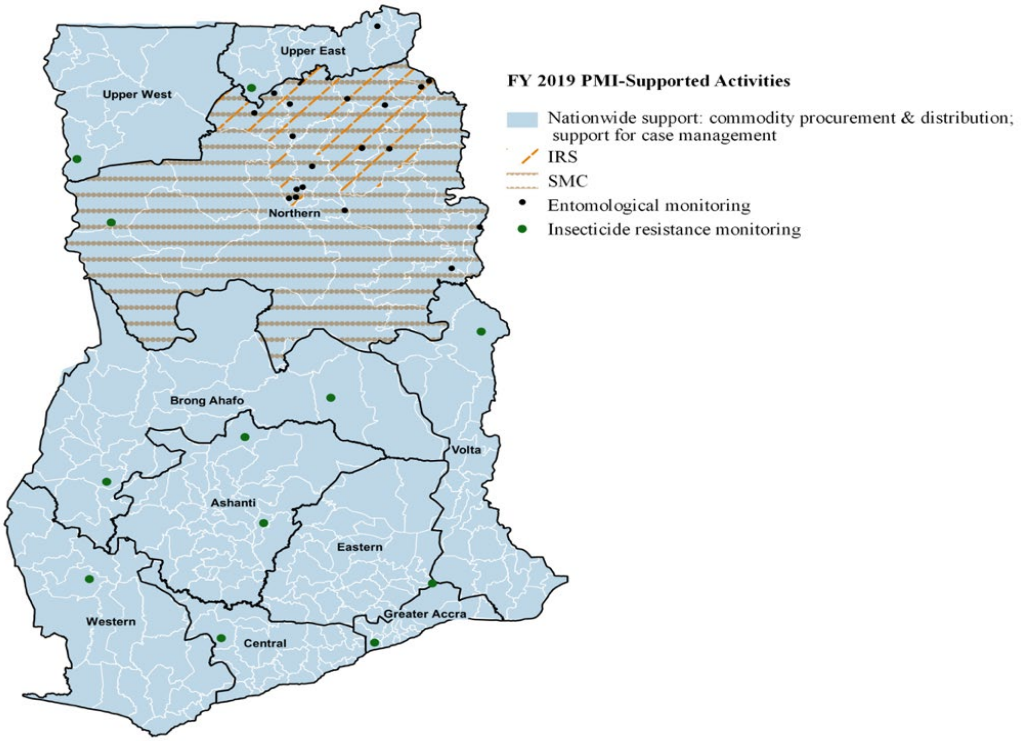
Currently, the NMCP is working with all malaria stakeholders to develop the next NSP from 2021 through 2025, which will focus on targeted interventions based on stratification. The process includes a malaria program review (MPR), field visits, and comprehensive stakeholder discussions.

Nationally, PMI and Global Fund provide joint and coordinated support to vector control, case management, malaria in pregnancy, social and behavior change (SBC), and surveillance, monitoring, and evaluation (SM&E) (Figure 7). PMI and Global Fund support the procurement and distribution of malaria commodities, including drugs for the treatment of severe malaria, RDTs, insecticides for IRS, and insecticide-treated mosquito nets (ITNs), for both mass campaigns and continuous distribution through schools, antenatal care (ANC), and child welfare clinics (CWCs). More specifically, PMI supports malaria case management and laboratory training and supportive supervision, both malaria-specific and integrated, in all 16 regions. PMI supports malaria in pregnancy (MIP) through revised and updated guidelines, training, and supportive supervision. PMI uses SBCC to target ITN use and IPTp uptake by mass media and interpersonal communication at the community level. Historically, PMI and the USAID Ghana mission have focused SBC support activities on "above the line" mass media activities, with concomitant community or "below the line" support. PMI is currently shifting SBC support to emphasize "below the line" community-based activities, which will also be highlighted and emphasized in the new malaria NSP. Additionally, PMI will support the recently elevated Health Promotion Division of the GHS, which will coordinate nationwide implementation of a community engagement program to promote early preventive strategies and healthy behaviors, including for malaria, that will be based on the development and implementation of malaria community action plans by communities. PMI also supports strengthening DHIMS2 with data

validation, data use with wall charts, and data review meetings and implementation and expansion of the Electronic Tracker (E-tracker), a web-based tablet tracking of OPD and ANC. PMI also supports periodic national demographic and malaria household surveys, routine surveillance, and monitoring and evaluation. As mentioned above, a component of PMI support is routed through G2G financing to capacitate and build sustainability in support of Ghana's Journey to Self-Reliance.

In addition to these nationwide activities, PMI supports targeted preventive interventions in the Northern, North East, and Savannah regions. PMI has supported IRS in the Northern and North East Regions (formerly comprising the Northern Region) since 2008, and is currently implementing IRS in nine districts. AGAMal implements IRS in all nine districts in Upper West Region, three districts in the Upper East Region, and one district in Ashanti Region with support from the Global Fund. With support from the Department for International Development (DFID) (now discontinued) and the Global Fund, the NMCP began implementing SMC in the Upper West and Upper East regions in 2015, and with additional support from PMI began implementing SMC in the Northern, North East, and Savannah regions in 2019.

Figure 7. PMI Intervention Support Map



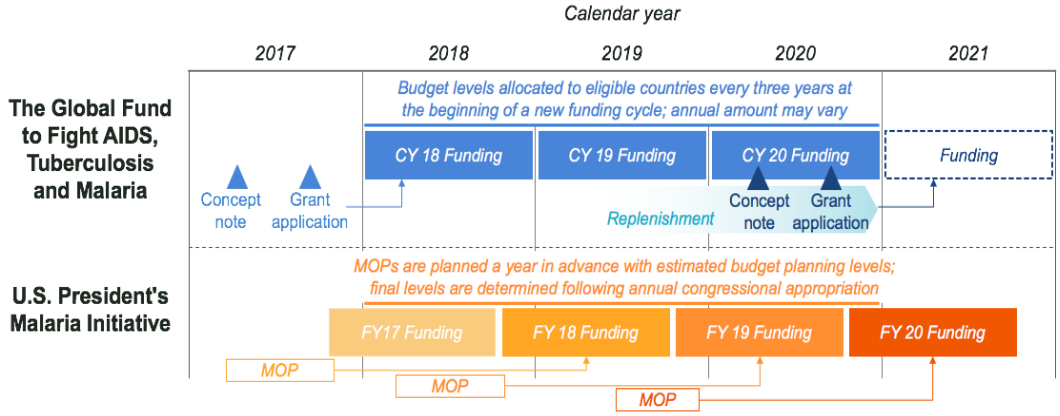
Note: Following a referendum in December 2018, six new regions were created: Northern Region was divided into Northern, North East, and Savannah Regions; Brong Ahafo Region was divided into Ahafo, Bono, and Bono East Regions; Volta Region was split into Volta and Oti Regions; and Western Region was divided into Western and Western North Regions.

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 the Bill and Melinda Gates Foundation (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 8 visualizes the annual cycle of PMI funding and the MOP implementation year. As the figure illustrates, any given FY of the MOP funds activities that take place during the next FY. For example, the FY 18 MOP funds implementation during FY 19. Global Fund funding is based on a three-year grant cycle on a calendar year (CY) timeframe during which activities were implemented. The Government of Ghana funding is based on the calendar year. 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 8. 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.

The tables below summarize contributions by external partners and host country government in calendar years 2018-20, with the goal of highlighting total country investments. For Ghana, data is available for PMI (FY 18) 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 20 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.

Figure 9. 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	$13.1M	$7.4M	$1.2M	$1.9M	$0.8M	$3.6M	**$28.0M**
	Global Fund	$30.3M	$6.3M	$2.3M	$7.6M	$2.8M	$5.3M	**$54.5M**
	Total	**$43.4M**	**$13.7M**	**$3.5M**	**$9.5M**	**$3.6M**	**$8.9M**	**$82.5M**
FY18/CY19	PMI	$12.7M	$8.0M	$1.1M	$1.2M	$1.9M	$3.1M	**$28.0M**
	Global Fund	$11.6M	$9.7M	$4.0M	$2.0M	$1.5M	$4.6M	**$33.3M**
	Total	**$24.3M**	**$17.7M**	**$5.1M**	**$3.2M**	**$3.3M**	**$7.7M**	**$61.3M**
FY19/CY20	PMI	$11.0M	$4.6M	$1.8M	$1.9M	$1.8M	$4.9M	**$26.0M**
	Global Fund	$7.1M	$8.0M	$3.2M	$.6M	$.6M	$2.6M	**$22.2M**
	Total	**$18.1M**	**$12.7M**	**$5.0M**	**$2.4M**	**$2.4M**	**$7.5M**	**$48.2M**

Footnotes:

1. Each year's figures represent the FY for PMI and CY for GFATM that most closely align. Global Fund budget data accurate as of July 1, 2019. PMI budget data accurate as of Sept 1, 2019.
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"

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.

Figure 10. Annual Budget by Level 3 Category, Detailed Breakdown for PMI and Global Fund

Level 1 Category	Level 3 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	$1.4M	$1.5M	$3.8M	$4.8M	$3.6M	$4.9M
	Distribute ITNs via Continuous Distribution	-	$0.1M	$1.3M	$0.2M	$1.3M	$0.2M
	Procure ITNs for Mass Campaigns	$4.6M	$7.0M	-	-	-	-
	Distribute ITNs via Mass Campaigns	-	$13.8M	-	-	-	-

Level 1 Category	Level 3 Category	FY17/CY18[1]		FY18/CY19[1]		FY19/CY20[1]	
		PMI	Global Fund	PMI	Global Fund	PMI	Global Fund
	Other ITN Implementation*	$1.8M	-	$1.6M	-	-	-
	IRS Implementation[4]	$4.8M	$2.5M	$5.6M	$2.5M	$5.6M	$0.5M
	Procure IRS Insecticide[4]	-	$2.4M	-	$2.5M	-	$0.4M
	Other IRS*	-	-	$0.0M	-	$0.0M	-
	Entomological Monitoring	$0.6M	$0.3M	$0.4M	$0.3M	$0.4M	$0.1M
	SBC for Vector Control[5]	-	$0.4M	-	$0.3M	-	$0.2M
	Other vector control measures	-	-	-	-	-	-
	Removing human rights- and gender-related barriers to vector control programs**	-	-	-	-	-	-
Case Management	Active Case Detection**	-	-	-	-	-	-
	Community-based case management	-	-	-	-	-	-
	Facility-based case management	-	$0.9M	-	$2.0M	-	$0.4M
	Private-sector case management	-	$0.1M	-	-	-	-
	Procure ACTs	$2.0M	$2.5M	$1.0M	$1.5M	-	$1.3M
	Procure Drugs for Severe Malaria	$0.4M	$1.9M	$0.4M	$3.2M	$0.4M	$3.3M
	Procure Other Diagnosis-Related Commodities	$0.2M	-	-	-	$0.05M	-
	Procure Other Treatment-Related Commodities	-	-	-	-	-	-
	Procure RDTs	$2.1M	-	$4.7M	$1.4M	$2.1M	$1.5M
	Therapeutic Efficacy	-	-	-	-	-	-
	SBC for Case Management[5]	-	$0.4M	-	$0.4M	-	$0.2M
	Other Case Management	$2.7M	-	$1.9M	-	$2.0M	-
Drug-Based Prevention[2]	Procure SMC-Related Commodities	$0.7M	$0.0M	-	$0.4M	$0.7M	$0.4M
	SMC Implementation	-	$1.6M	$0.6M	$1.6M	$0.7M	$1.6M
	Prevention of Malaria in Pregnancy Implementation	$0.6M	$0.4M	$0.6M	$1.3M	$0.4M	$0.4M
	Procure IPTp-Related Commodities	-	-	-	$0.4M	-	$0.5M

Level 1 Category	Level 3 Category	FY17/CY18[1]		FY18/CY19[1]		FY19/CY20[1]	
		PMI	Global Fund	PMI	Global Fund	PMI	Global Fund
	IPTi**	-	-	-	-	-	-
	SBC for Drug-Based Prevention[5]	-	$0.2M	-	$0.1M	-	$0.1M
	Other Prevention**	-	-	-	-	-	-
Supply Chain[3]	In-Country Supply Chain[3]	-	-	$0.2M	-	$0.4M	-
	Supply Chain Infrastructure	-	$7.4M	-	$1.8M	-	$0.3M
	Ensuring Quality	-	$0.2M	-	$0.3M	-	$0.3M
	Pharmaceutical Management Systems Strengthening	$1.9M	-	$1.0M	-	$1.5M	-
	Supply Chain System Strengthening	-	-	-	-	-	-
Monitoring, Evaluation & Research	Reporting, Monitoring, and Evaluation	$0.7M	$1.5M	$0.5M	$0.3M	$1.7M	$0.3M
	Program and data quality, analysis, and operations research	-	$0.6M	-	$0.1M	-	$0.0M
	Surveys	$0.0M	$0.8M	$1.2M	$1.0M	-	$0.3M
	Other Data Sources**	-	-	-	-	-	-
	Support for FETP*	$0.1M	-	$0.1M	-	$0.1M	-
Other Cross-Cutting and Health Systems Strengthening	Integrated service delivery, quality improvement, and national health strategies**	-	-	-	-	-	-
	Financial management systems**	-	$1.3M	-	$1.3M	-	-
	Community responses and systems**	-	-	-	-	-	-
	Support for PCV and SPAs*	-	-	$0.05M	-	$0.03M	-
	Cross-Cutting Human Resources for Health**	-	-	-	-	-	-
	Central and Regional Program management[6]	$0.6M	$0.9M	$0.3M	$1.0M	$0.9M	$0.8M
	In-Country Staffing and Administration*	$1.6M	-	$1.6M	-	$1.9M	-
	Other Program Management**	-	$3.2M	-	$2.4M	-	$1.8M
	SBC Unspecified[5]	$1.4M	-	$1.1M	-	$2.0M	-
Total		**$28.0M**	**$54.5M**	**$28.0M**	**$33.3M**	**$26.0M**	**$22.2M**

Footnotes:

[1.] Each year's figures represent the FY for PMI and CY for Global Fund that most closely align. Global Fund budget data accurate as of July 1, 2019. PMI budget data accurate as of Sept 1, 2019;

[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 11. 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]	$1.4M	$4.6M	-	$2.0M	$2.1M	$0.4M	$0.7M	-	**$11.1M**
	Global Fund[3]	$1.5M	$7.0M	$2.4M	$2.5M	-	$1.9M	$0.02M	-	**$15.3M**
	Total	**$2.9M**	**$11.5M**	**$2.4M**	**$4.5M**	**$2.1M**	**$2.3M**	**$0.7M**	**-**	**$26.4M**
FY18/CY19	PMI[2]	$3.8M	-	-	$1.0M	$4.7M	$0.4M	-	-	**$9.9M**
	Global Fund[3]	$4.8M	-	$2.5M	$1.5M	$1.4M	$3.2M	$0.4M	$0.4M	**$13.8M**
	Total	**$8.6M**	**-**	**$2.5M**	**$2.5M**	**$6.0M**	**$3.7M**	**$0.4M**		**$23.8M**
FY19/CY20	PMI[2]	$3.6M	-	-	-	$2.1M	$0.4M	$0.7M	-	**$6.9M**
	Global Fund[3]	$4.9M	-	$0.4M	$1.3M	$1.5M	$3.3M	$0.4M	$0.5M	**$11.9M**
	Total	**$8.6M**	**-**	**$0.4M**	**$1.3M**	**$3.6M**	**$3.8M**	**$1.1M**	**-**	**$18.8M**

Footnotes:

1. Each year's figures represent the FY for PMI and CY for Global Fund that most closely align. Global Fund budget data accurate as of July 1, 2019. PMI budget data accurate as of Sept 1, 2019 ;
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 $7.4 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 the 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 Ghana 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

NMCP objective
Ghana aims to protect at least 80 percent of the population at risk with effective malaria prevention interventions by 2020. To achieve this goal, Ghana will implement an integrated vector management (IVM) strategy that includes: • Universal ITN coverage through mass distribution campaigns and continuous channels • IRS in areas with high parasite prevalence • Larval source management in combination with other vector control interventions
NMCP approach
Ghana's strategic plan for deployment of IVM interventions includes: • Sustained universal coverage with ITNs through mass distribution campaigns every three years in non-IRS districts, with a target of one ITN per two people. • Continuous distribution of ITNs through ANC clinics targeting pregnant women, CWCs targeting children under five years receiving measles vaccine, and through primary schools targeting pupils in grades two and six as well as boarding high schools. • Implementation of IRS in areas with high parasitemia prevalence, targeting mainly districts in the northern part of the country with the highest malaria burden, with the objective to achieve 90 percent coverage of sleeping structures in a geographic location. • Larval source management to include larviciding in areas where breeding sites are few, fixed, and findable, as well as environmental management, targeting mainly urban areas. • Conduct entomological surveys to provide data on vector transmission dynamics, insecticide resistance profiles and mechanisms, and quality and effectiveness of ITNs and IRS.
PMI objective, in support of NMCP
PMI support for vector control interventions in Ghana aligns with the current national strategic plan, except for larval source management. In collaboration with other partners, PMI supports universal coverage with ITNs through mass campaigns and continuous distribution channels, IRS in high prevalence areas (northern Ghana), as well as entomological monitoring.
PMI-supported recent progress (past ~12-18 months)
Over the past 12-18 months, PMI supported the following vector control activities:

- Procurement of 4.3 million ITNs for the universal coverage campaign (UCC) conducted in CY2018, about 15.7 million ITNs were distributed to all non-IRS districts in nine out of ten regions. PMI also supported:
    - Procurement of 1,000 tablet computers to support digitized mass campaign distribution of ITNs
    - Technical assistance to monitor ITN distributions and ensure commodity security across the supply chain during campaign implementation process
- Collection of ITN durability monitoring data at baseline and 12-months following the 2018 UCC
- Continuous distribution of ITNs through:
    - Provision of temporary warehousing for staging ITN distributions to districts
    - Procurement of 1.5 million pyrethroid + Piperonyl butoxide (PBO) ITNs for school-based distribution, of which ~1.3 million were distributed to 22,739 schools across 9 regions in May 2019
    - The initiation of procurement of 1.3 million pyrethroid + PBO ITNs for school-based distribution in May 2020
- Implementation of an insecticide rotation strategy for IRS annually in eight districts in the Northern and North East regions, consistently achieving spray coverage targets and insecticide residual efficacy of 7-8 months
- Conduct entomological monitoring, including:
    - Insecticide resistance monitoring at 10 of 20 sites through the National Insecticide Resistance Monitoring Partnership (NIRMOP), supported jointly with the Global Fund
    - Monthly vector bionomics monitoring in the Northern and North East Regions (20 sites in CY 2018, 16 sites in CY 2019) as part of both routine surveillance and an operational research project to evaluate the effect of IRS on *Anopheles* vector behaviors and their impact on malaria transmission
    - Molecular analyses of mosquito samples collected at vector bionomics monitoring sites conducted by NMIMR

Challenges to implementation of these activities included:

- Security concerns over local conflict prevented the planned expansion of IRS to a ninth district, Cheroponi district, in the Northern region in CY 2019.
- ANC and CWC service delivery points have challenges requisitioning and stocking appropriate quantities of ITNs needed for clients. PMI is supporting the integration of ITNs

for continuous distribution into the last mile delivery requisitioning process and into the Ghana Integrated Logistics Management System (GhiLMIS) to ensure uninterrupted availability of nets at health facilities through the collection and visibility of ITN data for continuous distribution.

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

Over the next 12-18 months, PMI will support the following vector control activities:

- Procurement of 3.9 million pyrethroid + PBO ITNs for the UCC to be conducted in CY 2021, during which 16,038,826 ITNs will be distributed to all non-IRS districts in 15 out of 16 regions.
- School-based distribution of 1.3 million pyrethroid + PBO ITNs in May 2020
- Collection of ITN durability monitoring data at 24-months following the 2018 UCC
- Improving the stock management of ITNs at health facilities
- Implementation of IRS in nine districts in the Northern and North East regions
- Expand entomological monitoring to include:
    - Insecticide resistance monitoring by NMIMR at 30 sites through the NIRMOP, supported jointly with the Global Fund
    - Continue monthly vector bionomics monitoring in 8 of 16 sites in Northern and North East Regions, and expand to four new sites in other regions to address gaps in geographic coverage.
    - Molecular analyses of mosquito samples collected at vector bionomics monitoring sites, conducted by the AGAMal laboratory

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 expanding, contracting, or changing any entomological monitoring activities? If so, why, and what data did you use to arrive at that conclusion?

In FY 2020, PMI will increase support from $100,000 to $150,000 for insecticide resistance monitoring at 10 additional sites (for a total of 30 sites) through the NIRMOP, which is supported jointly with the Global Fund. In addition, PMI will increase funding for monthly vector bionomics

monitoring from $185,500 to $450,000 to support additional sites to address gaps in geographic coverage. The total number of sites have yet to be determined, but will be selected in consultation with the NMCP to capture entomological indicators across ecological zones and different vector control interventions (e.g., IRS, pyrethroid ITNs, pyrethroid + PBO ITNs). This activity will leverage existing (NMIMR) and new partnerships with local research institutions as well as the NMCP. Funding will support capacity building at each institution as well as at the national level. 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

PMI and the Global Fund jointly fund the National Insecticide Resistance Monitoring Partnership (NIRMOP), through which NMIMR conducts insecticide resistance monitoring in 20 sites throughout Ghana (Figures A1 and A2). PMI also supports comprehensive entomological monitoring, including insecticide resistance, vector bionomics, and insecticide residual efficacy monitoring, in the Northern and North East Regions where IRS is implemented (Figures A1 and A3).

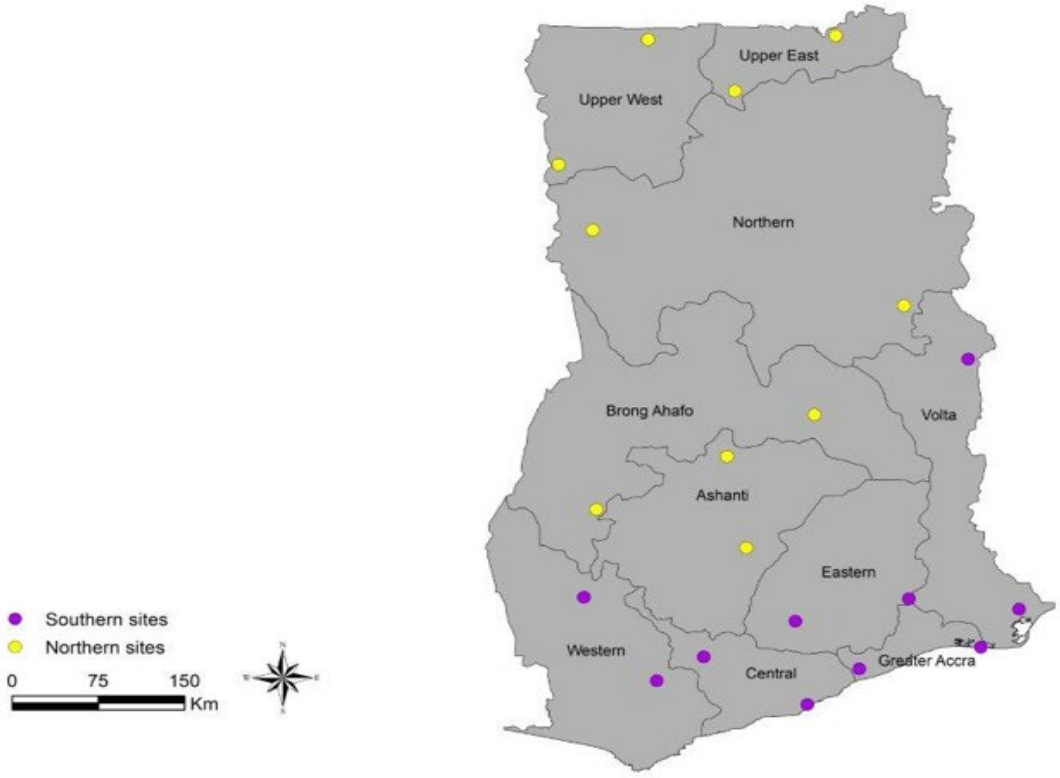
Figure A1. Entomological Monitoring Activities in Ghana, 2019.

Region	Total sentinel sites	Activities*	Supported by
Ahafo	1; Kenyasi	Insecticide resistance monitoring	PMI, GF
Ashanti	2; Ejura, Konongo	Insecticide resistance monitoring	PMI, GF
Bono East	1; Kwame Danso	Insecticide resistance monitoring	PMI, GF
Central	2; Gomoa Obuasi, Twifo Praso	Insecticide resistance monitoring	PMI, GF
Eastern	2; Akuse, Kade	Insecticide resistance monitoring	PMI, GF
Greater Accra	2; Ada-Foah, Weija	Insecticide resistance monitoring	PMI, GF
Northern	8; Bandaya, Gbullung, Gupanarigu, Kumbungu, Dimabi, Woribugu, Kulaa, Tugu	Insecticide resistance monitoring	PMI
	1; Wulensi	Insecticide resistance monitoring	PMI, GF
	8; Bandaya, Gbullung, Gupanarigu, Tum Tu-Zie, Dimabi, Woribugu, Kulaa, Tugu	Vector bionomics monitoring	PMI
	4; Bandaya, Gbullung, Gupanarigu, Tum Tu-Zie,	Insecticide residual efficacy monitoring	PMI

Region	Total sentinel sites	Activities*	Supported by
North East	5; Bunbuna, Kata-Banawa, Wundua, Yagaba, Zaratinga	Insecticide resistance monitoring	PMI
	8; Bunbuna, Kata-Banawa, Kpemale, Kunkwa, Nakpaya, Wundua, Yagaba, Zaratinga	Vector bionomics monitoring	PMI
	8; Bunbuna, Kata-Banawa, Kpemale, Kunkwa, Nakpaya, Wundua, Yagaba, Zaratinga	Insecticide residual efficacy monitoring	PMI
Oti	1; Nkwanta	Insecticide resistance monitoring	PMI, GF
Savannah	1; Sawla	Insecticide resistance monitoring	PMI, GF
Upper East	2; Fumbisi, Zebilla	Insecticide resistance monitoring	PMI, GF
Upper West	2; Wencheau, Tumu	Insecticide resistance monitoring	PMI, GF
Volta	1; Afife	Insecticide resistance monitoring	PMI, GF
Western	1; Prestea	Insecticide resistance monitoring	PMI, GF
Western North	1; Sefwi-Waiso	Insecticide resistance monitoring	PMI, GF

Insecticide resistance monitoring* is conducted annually and includes insecticide susceptibility testing, synergist, and resistance intensity assays, as well as mosquito species identification. ***Vector bionomics monitoring* is conducted monthly (March - December) to determine species composition and distribution, and measure mosquito indoor/outdoor biting rates and resting densities, parity rates, blood meal source, *P. falciparum* sporozoite rates, and entomological inoculation rates (EIRs). ***Insecticide residual efficacy monitoring*** is conducted monthly in IRS districts until mosquito mortality drops below 80 percent for two consecutive months.

Figure A2. NIRMOP Insecticide Resistance Monitoring Sites.



The major malaria vectors throughout Ghana are members of the *Anopheles gambiae* species complex. *Anopheles funestus* is a minor vector in some parts of the country. These species are most abundant in the rural and peri-urban areas and generally bite late in the night. In the Northern and North East Regions, peak vector abundance is typically in August and September. *An. gambiae* s.l. tends to bite both indoors and outdoors, with humans being the preferred host, but the data suggest that preferred resting locations are outdoors (Figure A4). Entomological inoculation rates (EIRs) vary, ranging from 0 to 26.2 infectious bites per person per year in the northern parts of the country.

Figure A3. PMI-Supported Entomological Monitoring Sites in the Northern and North East Regions, 2018.

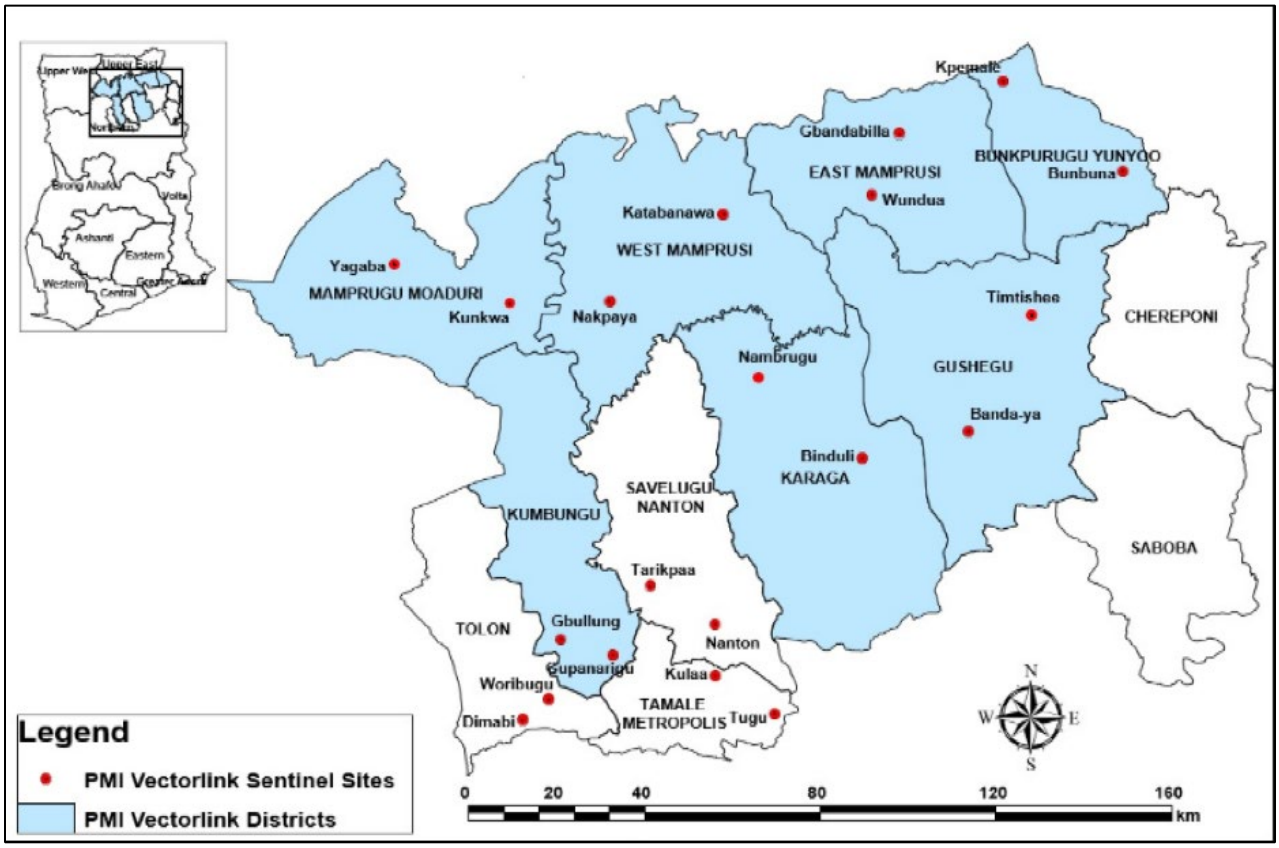


Figure A4. Summary of Vector Bionomics in PMI-Supported Entomological Monitoring Sites in Northern and North East Regions of Ghana, March - December 2018.

District	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Resting Location**	Preferred Host****	Peak Sporozoite Rate	EIR (Mar-Dec)
Bunkpurugu-Yunyoo*	*An. gambiae* s.l.	*An. funestus*	August-September	Outdoors/Indoors	N/A	N/A	0%	0
East Mamprusi	*An. gambiae* s.l.	N/A	August-September	Outdoors/Indoors	N/A	N/A	0.84%	12.2
Gushegu	*An. gambiae* s.l.	*An. funestus*	August-September	Outdoors/Indoors	N/A	N/A	0.38%	16.2
Karaga	*An. gambiae* s.l.	N/A	August-September	Outdoors/Indoors	N/A	N/A	0.35%	18.4

District	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Resting Location**	Preferred Host****	Peak Sporozoite Rate	EIR (Mar-Dec)
Kumbungu***	*An. gambiae* s.l.	*An. funestus*	August-September	Outdoors/Indoors	Outdoors	Human	0.27%	6.6
Mamprugu Moadori	*An. gambiae* s.l.	N/A	August-September	Outdoors/Indoors	N/A	N/A	0.39%	23.2
West Mamprusi	*An. gambiae* s.l.	*An. funestus*	August-September	Indoors/Outdoors	N/A	N/A	0.86%	26.2
Tolon	*An. gambiae* s.l.	*An. funestus*	August-September	Outdoors/Indoors	N/A	N/A	0.44%	13.1
Tamale Metropolitan***	*An. gambiae* s.l.	N/A	August-September	Indoors/Outdoors	Outdoors	Human	0.47%	20.1

*Now divided into two districts, Bunkpurugu-Nyakpanduri and Yunyoo-Nasuan;
**Outdoor resting only monitored in Kumbungu and Tamale; in other districts, indoor resting collections yielded very low numbers and preferred resting location could not be determined;
***Operational research sites;
****Complete data set is not yet available.

Conclusion

In FY 2020, PMI will expand support for entomological monitoring to increase the number of NIRMOP insecticide resistance monitoring sites from 20 to 30, and support additional vector bionomics monitoring sites beyond the Northern and North East Regions, including four new sites to be added in FY 2019 (as described above under PMI supported vector control activities in the next 12-18 months), to address gaps in geographic coverage. The total number of sites have yet to be determined, but will be selected in consultation with the NMCP to capture entomological indicators across ecological zones and different vector control interventions (e.g., IRS, pyrethroid ITNs, pyrethroid + PBO ITNs). This activity will leverage existing (NMIMR) and new partnerships with local research institutions as well as the NMCP.

Key Question 2

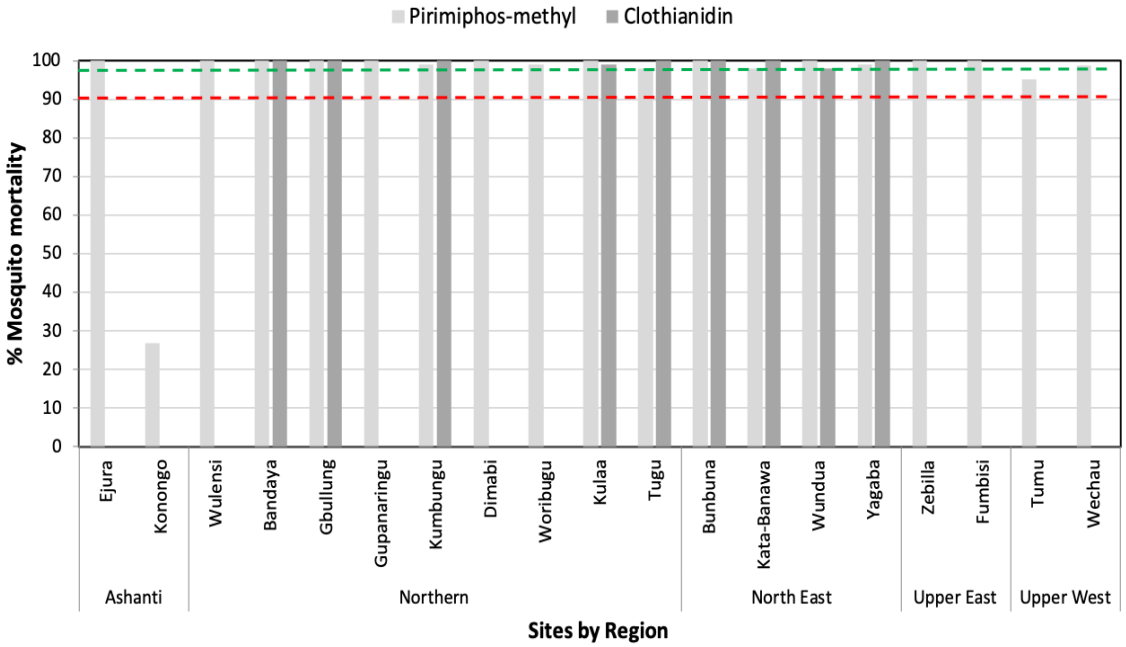
What is the current insecticide resistance profile of the primary malaria vectors?

Supporting Data

The primary malaria vector, *An. gambiae* s.l., is susceptible to Pirimiphos-methyl in all insecticide resistance monitoring sites located in PMI and Global Fund-supported IRS regions, with the exception of one site in Ashanti Region (Figure A5). *An. gambiae* s.l. is susceptible to clothianidin in all sites where tests have been completed. In contrast, resistance to pyrethroids,

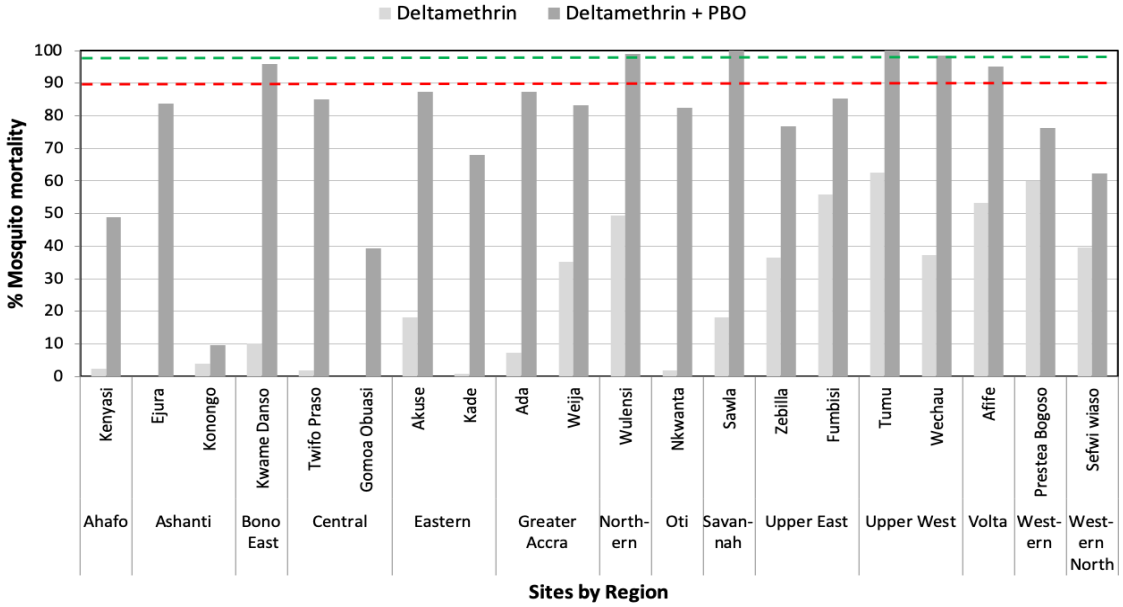
both deltamethrin and permethrin, has been detected in all 20 NIRMOP sites (Figure A7). However, pre-exposure to the synergist PBO shows increased susceptibility of *An. gambiae* s.l. to deltamethrin, and to a lesser extent, permethrin.

Figure A5. *An. gambiae* s.l. Susceptibility to Pirimiphos-methyl and Clothianidin in PMI and Global Fund-Supported* IRS regions, 2018.



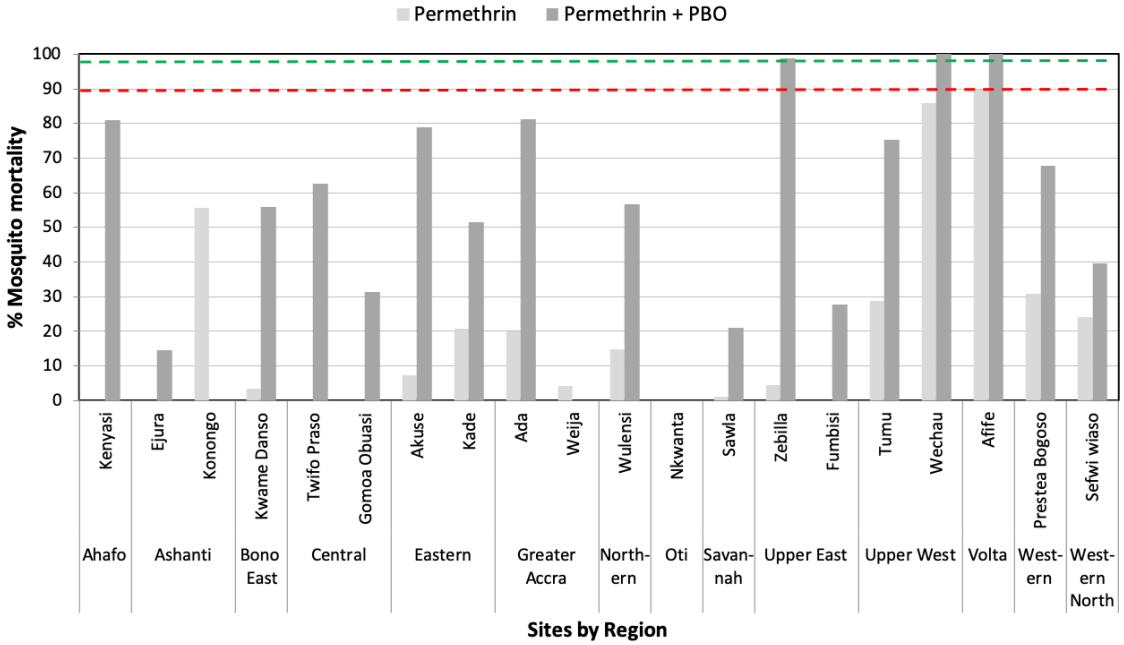
*Clothianidin susceptibility testing was not conducted at sites in Ashanti, Northern (Wulensi, Gupanaringu, Dimabi, and Woribugu sites only), Upper East, or Upper West Regions; Green and red dashed lines represents thresholds for susceptibility (≥98 percent mortality) and resistance (<90% mortality), respectively.

Figure A6. *An. gambiae* s.l. Susceptibility to Deltamethrin, With and Without Preexposure to the Synergist PBO, Across NIRMOP Sites, 2018.



Green and red dashed lines represents thresholds for susceptibility (≥98% mortality) and resistance (<90% mortality), respectively.

Figure A7. *An. gambiae* s.l. Susceptibility to two pyrethroids, Permethrin With and Without Preexposure to the Synergist PBO, Across NIRMOP Sites, 2018.



Green and red dashed lines represents thresholds for susceptibility (≥98% mortality) and resistance (<90% mortality), respectively.

Conclusion

Data suggest that both Pirimiphos-methyl and clothianidin remain viable insecticides for IRS in all regions currently sprayed, with the exception of Ashanti. In FY 2019, both insecticides plus a clothianidin + deltamethrin mixture (Fludora Fusion) will be used in PMI-supported IRS districts in Northern and North East Regions. Residual efficacy data will be used to select appropriate clothianidin-based insecticide(s) for FY 2020. Synergist assay data suggest that pyrethroid + PBO ITNs, particularly those with deltamethrin, are likely to be more effective than standard pyrethroid-only ITNs throughout Ghana. As such, PMI will procure only pyrethroid + PBO nets in FY 2019 and FY 2020 for distribution in the CY 2021 UCC.

Key Question 3

Are there any other considerations that impact your funding allocation in this category? If there is a specific budget line item in Table 2 that is not covered by the above questions, please address here.

Supporting Data

From June 2017 through April 2019, PMI supported operational research to investigate how mosquito behavior and malaria transmission were affected by IRS in the Northern Region (now Northern and North East Regions). The study revealed that the predominant vector species, *An. gambiae* s.l., was primarily collected from resting places outside of sleeping rooms in both sprayed (94.9 percent) and unsprayed (82.7 percent) areas. Of those mosquitoes collected resting outside of sleeping rooms, most were caught in animal shelters, 89 percent in sprayed and 77

percent in unsprayed areas. The human blood index among mosquitoes collected from animal shelters was lower in the sprayed areas (80 percent) compared to the unsprayed areas (89 percent), though the number and type of animals in both areas was similar, but *An. gambiae* s.l. was still predominantly anthropophilic. Mortality of mosquitoes collected alive from animal shelters and held for 24hrs was 55 percent and 13 percent in IRS and unsprayed areas, respectively. This indicates that even mosquitoes resting outdoors have been exposed to insecticides on sprayed surfaces or nets. *Plasmodium falciparum* sporozoites were only detected in mosquitoes collected from animal structures. These findings suggest that further vector control interventions may be required to target outdoor resting mosquitoes and achieve further reductions in malaria transmission.

Conclusion

In CY 2020, the PMI-supported IRS campaign will include spraying of animal structures in one half of the areas receiving IRS: four of the eight districts that will be sprayed with either clothianidin or clothianidin + deltamethrin, and half of the one district that will be sprayed with Pirimiphos-methyl. Pending positive results, the PMI-supported IRS campaign will expand to include animal structures in all districts beginning in 2021. A 10 percent increase in the budget for procurement of insecticide has been included in FY 2020 to cover this activity.

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

Do you propose expanding, contracting, or changing any ITN activities? If so, why, and what data did you use to arrive at that conclusion?
PMI will allocate FY 2019 (utilizing existing commodity pipeline and pending reprogramming) and FY 2020 funding to support the procurement of approximately 4.5 million ITNs for the CY 2021 mass distribution campaign, with support for warehousing and distribution funded in FY 2020. Therefore, support for ITN activities in both years will be considerably higher than average. In FY 2020, PMI will not support procurement of ITNs for school-based distribution in CY 2021, as it is a mass distribution campaign year. PMI will continue to support technical assistance for continuous distribution channels in FY 2020. Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

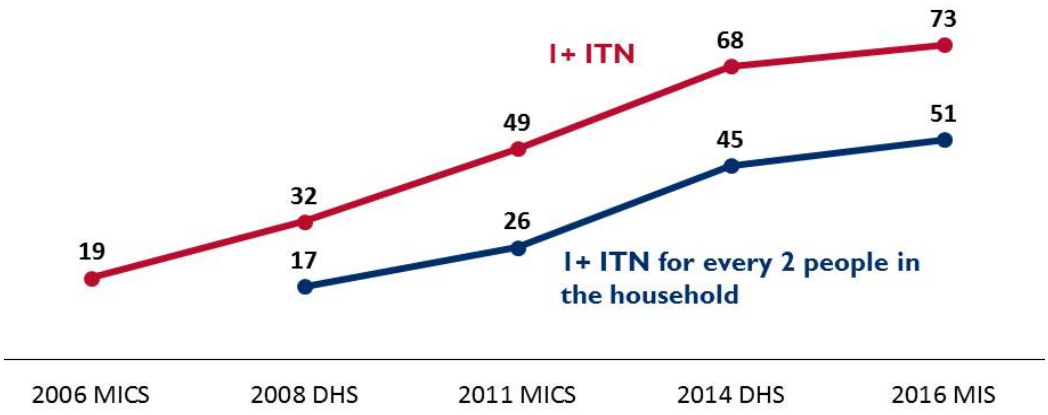
Key Question 1

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

Supporting Data

Figure A8. Trends in ITN Ownership

Percent of households



Conclusion

Since the start of PMI support to Ghana, ITN ownership increased significantly, from 19 percent to 73 percent of households owning at least one ITN in 2006 and 2016, respectively. The steady increase was achieved through the use of different but complementary channels: continuous distribution through ANC and CWC, school-based distribution, and mass distribution campaigns. PMI will continue to work with the NMCP, GHS, Malaria Vector Control Oversight Committee (MAVCOC), and implementing partners to support these different distribution channels for ITNs through quantification, storage and warehousing, distribution to districts and service delivery points, trainings on accurate data capture, validations, reporting and requisitions.

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 A9. 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

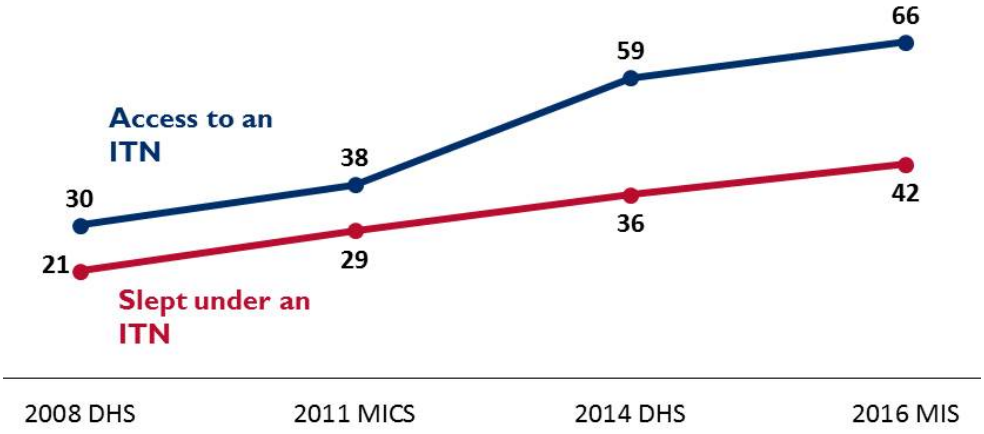
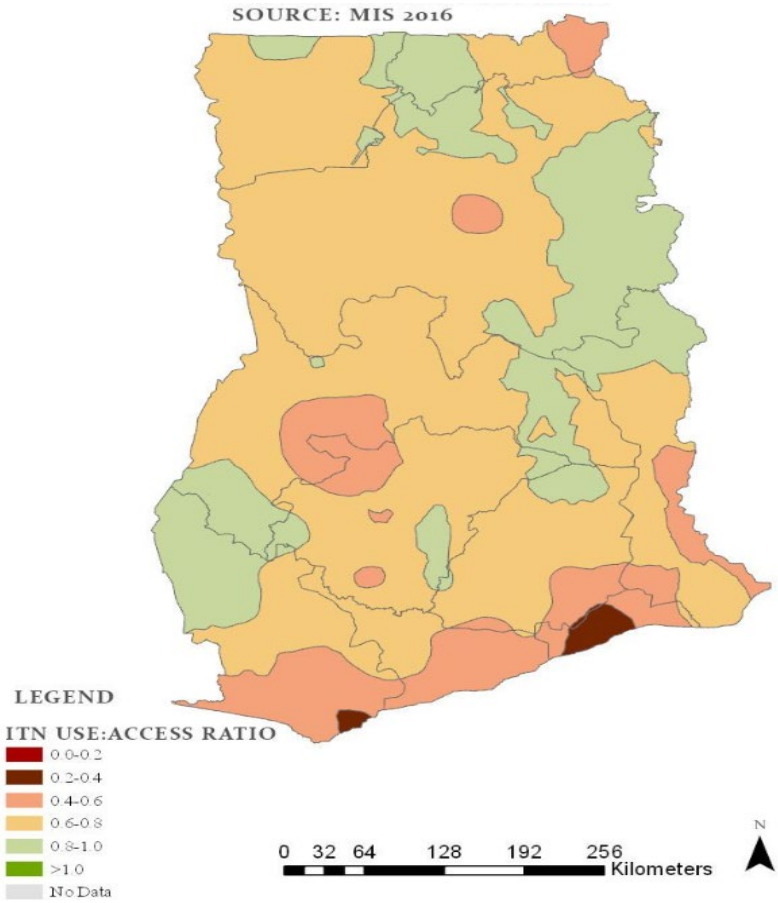


Figure A10. Ghana ITN Use: Access Ratio



Source: MIS 2016

Conclusion

The ITN use: access ratio in Ghana is low, oscillating around 0.4 to 0.6 for the majority of the country. ITN use: access ratio is higher (0.8 and 1.0) in rural areas, but urban/peri-urban areas remain a challenge (ITN use: access <0.6). The NMCP, MAVCOC, PMI, and regional and district management teams have further explored ITN use: access ratios in urban settings (i.e., Accra, Kumasi, Takoradi, and Tamale) and have found ranges from 20 - 40 percent. During the 2018 mass campaign, many individuals in urban settings also refused to take the nets when they were offered. Therefore, the 2021 mass campaign quantification has reduced the ITNs needed for urban settings and will work with district teams to target ITN receptive areas (i.e. shantytowns). Findings from a PMI-supported ITN use gap qualitative study completed in 2018 will be used to inform the SBC strategy to improve ITN care and use through the ongoing malaria community engagement and outreach pilot in Volta Region that is led by the GHS Health Promotion Division. Following an assessment of this pilot, started in 2019 and to be continued in 2020, it is expected that these activities will be refined and expanded through additional PMI support in FY 2020.

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

A qualitative research study to identify factors influencing ITN use among those with access was carried out in 2018 in three sites (Gomoa West District in Central Region, Fanteakwa District in Eastern Region, and Savelugu District in Northern Region), representing different epi-ecological zones in Ghana. Through focus group discussions with community members, health workers, and community leaders, as well as home visits and interviews, PMI identified a number of key barriers and facilitators to ITN use (Figure A11). Having a personal experience getting malaria, or having a loved one fall ill from malaria, were the most powerful motivators for consistent ITN use. Growing up using an ITN, benefits of a good night's sleep, and economic and time benefits associated with prevention over treatment were also listed as facilitating factors. Barriers to ITN use throughout the year included the perception that ITNs provide limited value because of exposure to mosquito bites during early evening hours and nighttime activities, experiences with skin irritation even after airing the ITN, congestion and lack of airflow in the sleeping space, and, in some cases, a lack of information on the connection between the use of ITNs and malaria prevention. However, participants reported that ITN use is possible outdoors, and that sleeping outdoors with an ITN is a viable option for getting a good night’s sleep during the dry season. Some participants noted that ITN use was perceived as a weakness among men.

Figure A11. Key Barriers and Facilitators to ITN Use in Ghana.

Facilitator	Type of Factor	Data Source	Evidence
Positive experience using an ITN	Social	Net use gap study, PMI/Ghana VectorWorks, 2018[1]	Growing up in a household where ITN is used correctly makes it the “normal" thing to do
High perceived risk	Internal, Social		First-hand experience with illness or death related to malaria
Sound sleep	Internal, Social		Avoiding nuisance biting leads to ITN use
Costs savings	Internal		Prevention saves resources which could go to treatment of the disease
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Sleeping space characteristics	Social, environmental	Net use gap study, PMI/Ghana VectorWorks, 2018	Outdoor sleeping is a barrier to net hang-up
ITN characteristics	Environmental		Experiencing itching, burning, chemical scent in particular with new ITNs
Nighttime activity	Internal		Outdoor activities before entering the bednet and receiving mosquito bites, perception that using the ITN is useless because already exposed
Smell, heat, and difficulty in hanging	Internal		Sleeping discomfort accounts for low consistent use of ITNs at night by pregnant women

[1] PMI VectorWorks Ghana. 2018. Understanding the Gap between Access and Use: A Qualitative Study on Barriers and Facilitators to Consistent Use of Insecticide-Treated Nets in Ghana.

Conclusion

Given the considerable gap between ITN use and access, PMI/Ghana will work with all malaria partners, in particular implementing partners, to utilize the findings from the 2018 Net Use Gap study to inform the SBC strategy to improve ITN use. PMI will primarily support these SBC activities through the ongoing malaria community engagement and outreach pilot in Volta Region that is led by the GHS Health Promotion Division. Following an assessment of this pilot, to be conducted in 2020, it is expected that these activities will be refined and expanded through additional PMI support in FY 2020. In addition, PMI/Ghana will support efforts to target some peri-urban areas where ITNs could make a difference in malaria prevention if correctly used.

Key Question 4

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

Supporting Data

Figure A12. Trends in ITN Use among Children and Pregnant Women

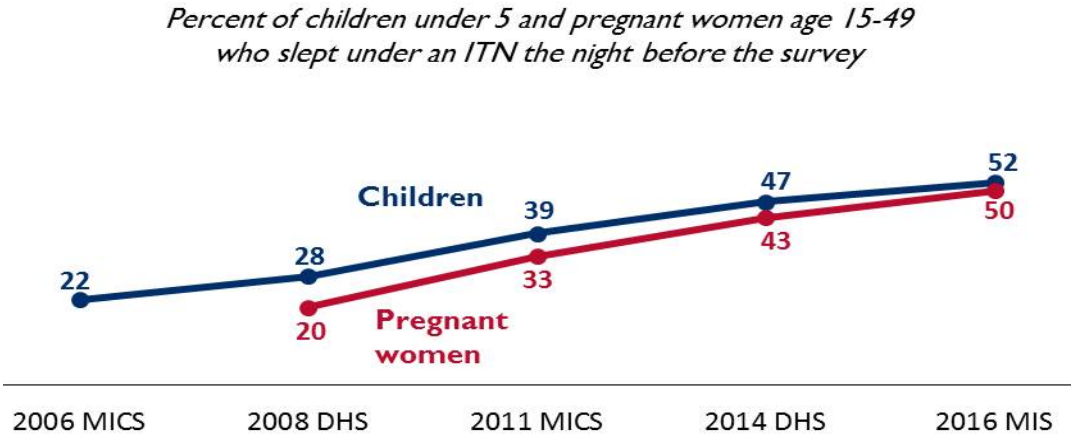
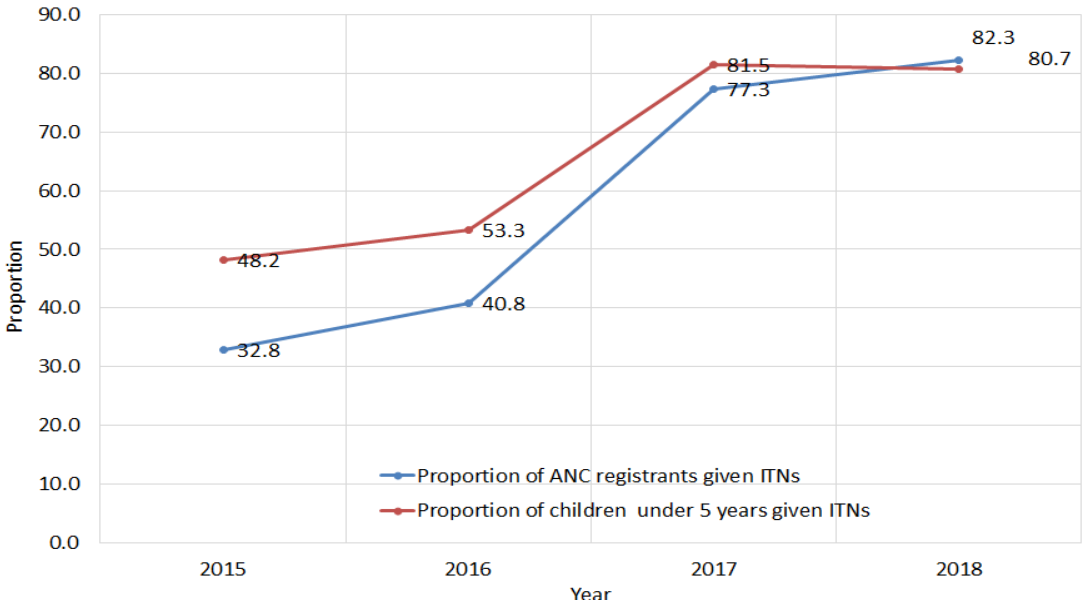


Figure A13. Proportion of ANC Registrants and Children Under Five Years of Age Given ITNs in Ghana 2015 - 2018



Conclusion

ITN use among children under five and pregnant women has followed the same trend as that of the general population in Ghana, with both increasing from approximately 20 percent in 2006 to 50 percent in 2016. As described above, PMI will primarily support SBC activities targeting ITN use among children and pregnant women through the ongoing malaria community engagement and outreach pilot in Volta Region that is led by the GHS HPD. Following an assessment of this

pilot, to be conducted in 2020, it is expected that these activities will be refined and expanded through additional PMI support in FY 2020.

Key Question 5

What channels are used to distribute ITNs?

Supporting Data

In Ghana, ITNs are distributed through mass campaigns every three years in non-IRS districts, with a target of one ITN per two people, as well as through continuous channels, including ANC and CWC to target pregnant women and children under five, primary schools targeting pupils in grades two and six, as well as boarding high schools (Figure A14). PMI, the Global Fund, and AMF jointly support the procurement and distribution of ITNs through mass campaigns. PMI supports continuous distribution of ITNs through primary schools while the Global Fund supports all other continuous channels, with the exception of boarding high schools, which GHS will support beginning in CY 2020.

Figure A14. ITN Distribution Channels, 2015-2021

Channel	2015	2016	2017	2018	2019*	2020*	2021*
EPI (CWC)	341,367	1,406,434	929,135	788,886	1,044,617	1,070,602	1,097,368
ANC			728,498	770,082	1,194,865	1,224,737	1,255,355
Primary Schools	0	936,357	1,396,206	0	1,303,000	1,404,536	0
Boarding High Schools	0	0	0	0	0	466,366	0
Community	0	0	0	0	0	0	0
Mass Campaign	7,283,104**	4,888,772**	202,725***	15,470,814	0	0	16,038,826

*Denotes targets;

**January 2015 Central Medical Stores (CMS) fire (which destroyed over 1.4 million ITNs) forced the NMCP to adjust the distribution schedule for the 2014 mass distribution campaign and extend as a rolling campaign into 2016;

***Piloting the NetApp in four districts in preparation of the 2018 mass campaign

Conclusion

PMI has supported and plans to continue supporting procurement and distribution of ITNs for malaria control in Ghana. School-based distribution and mass campaigns are the two major channels which benefit from PMI support. PMI will utilize FY 2019 and FY 2020 funds, as well as commodity savings from previous years, to procure approximately 4.53 million ITNs, or ~28 percent of the total need (16.04 million ITNs) for the CY 2021 mass distribution campaign. PMI will not procure any ITNs for school-based distribution in FY 2020 as this channel is not used in those years when mass distribution campaigns are conducted.

Key Question 6

What was the estimated need for ITNs during calendar year 2019? What are the estimated ITN needs over calendar years 2020 and 2021? What volume of ITNs are available from partners and the public sector for the next three calendar years?

Supporting Data

Figure A15. Gap Analysis of ITN Needs 2019 - 2021

Calendar Year	2019	2020	2021
Total Targeted Population (Point Mass Distribution) [1]			26,245,351
Continuous Distribution Needs			
Channel #1: ANC [2]	1,194,865	1,224,737	1,255,355
Channel #2: EPI [2]	1,044,617	1,070,602	1,097,368
Channel #3: Schools [3]	1,404,536	1,404,536	0
Channel #4: Special Distribution to sr. high school boarding students		446,366	446,366
Estimated Total Need for Continuous Channels	3,644,018	4,146,241	2,799,089
Mass Campaign Distribution Needs			
2021 mass distribution campaign(s)	0	0	**16,038,826**
Estimated Total Need for Campaigns		0	16,038,826
Total LLIN Need: Routine and Campaign	**3,644,018**	**4,146,241**	**18,837,915**
Partner Contributions			
LLINs carried over from previous year [4]	0	710,348	4,546,073
LLINs from MOH [5]	446,366	446,366	0
LLINs from Global Fund	2,408,000	2,465,600	
LLINs from other donors (AMF)	0	0	
LLINs planned with PMI funding [6]	1,500,000	5,070,000	566,000
Total LLINs Available	**4,354,366**	**8,692,314**	**5,112,073**
Total LLIN Surplus (Gap)	**710,348**	**4,546,073**	**-13,725,841**

[1] LLIN mass distribution campaign will only be in 2021. Targeted population does not include highly urbanized areas (approximately 12% of the total population)

[2] The needs for ANC was based on the estimated population (2010 population census, applying a 2.5% intercensal population growth rate) for each year; 4% of the population estimated to be pregnant women and an estimated ANC coverage of 97% (Ref: 2014 GDHS). EPI distribution is through child welfare clinics (CWC) targeting children under five when receiving measles vaccine

[3] The forecasts were based on needs for 9 regions (excludes Region with IRS districts). Schools distribution will not be conducted in 2021, since there will be mass distribution campaigns in 2021.

[4] Carry-over for CY 2019: All LLINs were exhausted the previous year 2018 due to mass campaign. CY 2021: for use in mass campaign.

[5] Quantities are for Special Distribution to sr. high school boarding students which will occur in the year following their procurement.

[5] CY 2020 PMI contribution is for school base distribution (1.3 million) with the remaining amount (3.77 million) for the CY 2020 campaign. No school-based distribution planned for CY 2021 except for sr. high school boarding students

Conclusion

ITN needs for CY 2019 were met and are also expected to be met for CY 2020. The gap indicated for CY 2021 is created by the need for over 16.04 million nets for the mass campaign, however it is expected to be filled by a combination of contributions from PMI, the MOH, the Global Fund, and other partners. Malaria mosquito vector populations in Ghana have demonstrated high pyrethroid resistance nationwide, but the synergist PBO has been shown to greatly improve mosquito susceptibility to these insecticides. Therefore, the NMCP, MAVCOC, and PMI have determined that pyrethroid-only nets are no longer indicated for use in Ghana, and only pyrethroid + PBO or dual active ingredient ITNs should be distributed throughout the country moving forward. PMI plans to procure approximately 4.53 million pyrethroid + PBO ITNs for the CY 2021 mass distribution campaign, which slightly exceeds the quantity provided for the CY 2018 campaign. It is unclear at this time what types of ITNs will be procured by other

donors for distribution in the 2021 mass campaign, however PMI will collaborate closely with other donors and advocate for the procurement of pyrethroid + PBO ITNs. Ghana has opted to not conduct school-based distribution in mass distribution campaign years, however continued distribution via CWC and ANC will continue uninterrupted.

Key Question 7

What is the current status of durability monitoring?

Supporting Data

PMI supports durability monitoring of two brands of ITNs (DawaPlus 2.0 and Olyset) distributed during the 2018 mass distribution campaign in two districts (Zabzugu and Nanumba South) in the Northern Region of Ghana. Baseline and 12 months data have been collected and analyzed. Data collection for 24 and 36 months will be collected in 2020 and 2021, respectively (Figure A16).

Figure A16. Status of ITN Durability Monitoring in Ghana

Campaign Date	Sites	Brands	Baseline	12-month	24-month	36-month
June 2018	Zabzugu, Northern Region	DawaPlus 2.0	x	x		
June 2018	Nanumba South, Northern Region	Olyset	x	x		

Conclusion

Durability monitoring of nets distributed during the 2018 mass campaign is ongoing, and PMI will support the remaining 24 and 36 month data collection points with FY 2019 and FY 2020 funding, respectively. Conclusions will be presented at the end of the durability monitoring activity.

Key Question 8

Are there any other considerations that impact your funding allocation in this category?

Supporting Data

There are no other considerations that impact FY 2020 funding allocations for ITN activities.

Conclusion

Not applicable.

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 expanding, contracting, or changing any IRS activities? If so, why, and what data did you use to arrive at that conclusion?

In FY 2018, PMI had planned to support the expansion of IRS to one additional district, for a total of nine districts in the Northern and North East Regions, but was unable to do so due to local conflict and security concerns in the new district, Cheroponi (North East Region). Expansion to a ninth district was re-initiated in FY 2019, but to Tatale-Sangule (Northern Region) instead of Cheroponi. PMI will continue to support IRS in nine districts in FY 2020. 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

The selection of IRS districts in Ghana is done in consultation with the NMCP with oversight from the MaVCOC. Districts are selected based on high malaria burden (>40 percent parasitemia in children under five), poor healthcare and economic infrastructure, and a relatively short, intense malaria transmission season in the region. IRS is currently implemented in Ashanti, Northern, North East, Upper East, and Upper West Regions (Figure A17).

AGAMal, with the support of the Global Fund, currently implements IRS in all eleven administrative districts in the Upper West Region, three districts (Kassena Nankana West, Builsa South and Builsa North) in Upper East Region, and one district in Ashanti Region (Obuasi). In 2019, PMI supported IRS in three districts in the Northern Region and five districts in the Northeast Region. PMI had planned to expand to a sixth district, Cheroponi, in North East Region in 2019, but was unable to spray it due to security concerns stemming from local conflict.

Figure A17. 2019 IRS Districts in Ghana, by Donor.

Donor	Region	Districts	Insecticide
PMI	Northern	Gushegu, Karaga, Kumbungu	Pirimiphos-methyl
	North East	Cheroponi*, East Mamprusi, Mamprugu Moaduri, West Mamprusi	Clothianidin
		Bunkpurugu-Nakpanduri, Yunyoo-Nasuan	Pirimiphos-methyl
Global Fund	Ashanti	Obuasi	Clothianidin
	Upper East	Builsa North and Builsa West, Kassena Nankana West	Clothianidin
	Upper West	Daffiama Bussie Issa, Jirapa, Lambussie Karni, Lawra, Nadowli, Nandom, Sissala East, Sissala West, Wa East, Wa West, Wa	Clothianidin

*Cheroponi district was not sprayed due to local conflict and security concerns

Conclusion

Global Fund support for IRS is expected to continue in Ashanti, Upper East, and Upper West. PMI support for IRS will expand to include one additional district, Tatale Sanguli, in Northern Region, in CY 2020 and this support will be maintained in FY 2020. Three insecticides (Pirimiphos-methyl, clothianidin, and clothianidin + deltamethrin) will be sprayed in the PMI-supported districts in CY 2020.

Key Question 2

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

Supporting Data

Spray coverage in PMI-supported IRS districts has consistently exceeded both PMI (85 percent) and NMCP (90 percent) targets since 2016 (Figure A18) IRS is effectively implemented in collaboration with local authorities, traditional leaders, and NMCP/GHS, and beneficiary communities are receptive.

Figure A18. IRS Spray Coverage and Population Protected in PMI-Supported Districts, 2016-2019.

Calendar Year	Number of Districts Sprayed	District Names**	Number of Structures Sprayed	Coverage Rate	Population Protected
2016	5	Bunkpurugu-Yunyoo, East Mamprusi, Kumbungu, Mamprugu Moaduri, West Mamprusi	211,283	92.7%	570,871
2017	7	Bunkpurugu-Yunyoo, East Mamprusi, Gushegu, Karaga, Kumbungu, Mamprugu Moaduri, West Mamprusi	304,648	94%	840,438
2018	7	Bunkpurugu-Yunyoo, East Mamprusi, Gushegu, Karaga, Kumbungu, Mamprugu Moaduri, West Mamprusi	298,701	92%	836,376
2019	9**	Bunkpurugu-Nakpanduri, Cheroponi, East Mamprusi, Gushegu, Karaga, Kumbungu, Mamprugu Moadori, West Mamprusu, Yunyoo-Nasuan	298,385	94.3%	875,481
2020*	9	Bunkpurugu-Nakpanduri, East Mamprusi, Gushegu, Karaga, Kumbungu, Mamprugu Moadori, Tatale-Sangue, West Mamprusu, Yunyoo-Nasuan	346,285	85% PMI; 90% NMCP	990,579

*Denotes targets; **Increase from 7 to 9 districts in 2019 did not represent an actual geographical expansion of IRS because 1) changes to administrative boundaries resulted in division of Bunkpurgu-Yunyoo into two separate districts (Bunkpurugu-Na and Yunyo-Nasuan), and 2) planned expansion to a new district, Cheroponi, was not feasible due to security concerns arising from local conflict.

Conclusion

PMI will continue to target spray coverage rates above 90 percent for IRS implemented in nine districts in FY 2019 and FY 2020.

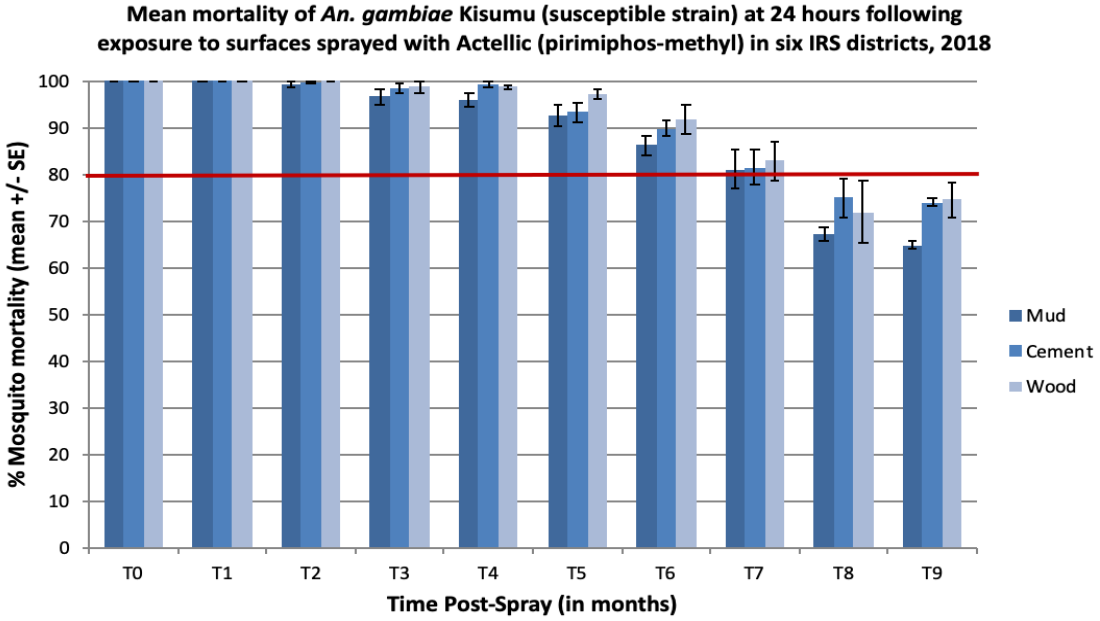
Key Question 3

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

Supporting Data

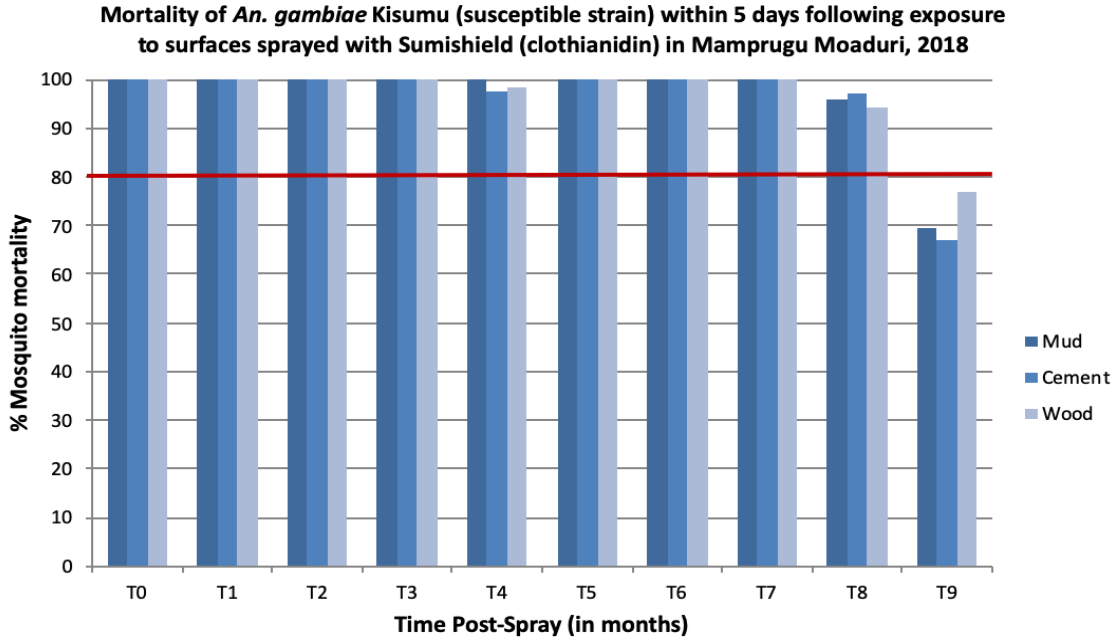
Bioassays conducted following the 2018 IRS campaign demonstrate that Pirimiphos-methyl (Actellic) remains effective above the cut-off mortality level (80 percent at 24-hours post-exposure) on all surfaces in the communities tested for approximately seven months, while clothianidin (SumiShield) was found to be effective with up to 90 percent mortality when mosquitoes were held for up to 120 hours (five days) at eight months post-spray (Figure A19).

Figure A19. Residual Efficacy of Pirimiphos-Methyl Following IRS in Ghana, 2018.



Red line denotes 80% mortality, the WHO threshold for residual efficacy.

Figure A20. Residual efficacy of clothianidin following IRS in Ghana, 2018.



Red line denotes 80% mortality, the WHO threshold for residual efficacy.

Conclusion

Both Pirimiphos-methyl (Actellic) and clothianidin (SumiShield) represent viable options for IRS in Ghana. In 2020, PMI will continue to support spraying with Pirimiphos-methyl (Actellic) and clothianidin (SumiShield), and will also introduce a clothianidin + deltamethrin mixture (Fludora Fusion) for the first time. Clothianidin-based insecticide selection in future campaigns will depend on the comparative residual efficacy of SumiShield and Fludora Fusion.

Key Question 4

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

Supporting Data

Ghana does not currently have a national insecticide rotation strategy for IRS, but was among the first countries to introduce clothianidin in 2018 following World Health Organization (WHO) Prequalification (PQ) of SumiShield the previous year. PMI has supported IRS with both Pirimiphos-methyl and clothianidin since 2018, and will introduce clothianidin + deltamethrin mixture (Fludora Fusion) in 2020 (Figure A21). Insecticide resistance monitoring in all nine PMI-supported IRS districts indicates that the local vector populations are susceptible to both Pirimiphos-methyl and clothianidin.

Figure A21. IRS Insecticide Rotations in PMI-Supported Spray Districts, 2017-2020.

District	2017	2018	2019	2020
Bunkpurugu-Nakpanduri	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Neonicotinoid (clothianidin)
East Mamprusi	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Neonicotinoid (clothianidin)	Neonicotinoid + Pyrethroid combination (clothianidin + deltamethrin)
Gushegu	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Neonicotinoid + Pyrethroid combination (clothianidin + deltamethrin)
Karaga	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Neonicotinoid (clothianidin)
Kumbungu	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Neonicotinoid + Pyrethroid combination (clothianidin + deltamethrin)
Mamprugu Moaduri	Organophosphate (Pirimiphos-methyl)	Neonicotinoid (clothianidin)	Neonicotinoid (clothianidin)	Organophosphate (Pirimiphos-methyl)
Tatale-Sangule	N/A	N/A	N/A	Organophosphate (Pirimiphos-methyl)
West Mamprusi	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Neonicotinoid (clothianidin)	Neonicotinoid (clothianidin)
Yunyoo-Nasuan	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Organophosphate (Pirimiphos-methyl)	Neonicotinoid (clothianidin)

*Denotes planned insecticide classes

Conclusion

It is expected that Ghana will develop a national insecticide resistance management plan, including a formal insecticide rotation strategy for IRS, in CY 2020. Given the current data on insecticide resistance and residual efficacy, both Pirimiphos-methyl and clothianidin represent viable options for IRS in Ghana, and both will be utilized in PMI-supported IRS campaigns in CY 2020. Selection of insecticides for future years will depend on the new national insecticide resistance management plan as well as residual efficacy data generated for newly deployed insecticides (clothianidin + deltamethrin mixture) in the CY 2020 campaign.

Key Question 5

Are the NMCP and PMI considering withdrawing IRS from any PMI-supported? 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

NMCP and PMI are not currently considering withdrawing IRS from any PMI-supported districts.

Conclusion

There are no implications for programming.

Key Question 5

Are there any other considerations that impact your funding allocation in this category?

Supporting Data

Independent environmental compliance assessments of PMI-supported IRS operations are required every two years, and the last assessment in Ghana was completed in CY 2019.

Conclusion

In FY 2020, PMI will support environmental compliance monitoring for IRS implementation in nine districts in the Northern and North East Regions.

2. HUMAN HEALTH

2.A CASE MANAGEMENT in health facilities and communities

NMCP objective
Ghana's strategic plan for malaria case management aims to provide correct diagnosis to all suspected malaria cases and prompt and effective treatment to 100 percent of confirmed malaria cases in accordance with treatment guidelines by 2020. Specific malaria case management objectives include: • Routine laboratory testing by microscopy or RDTs to address the issue of rational use of ACTs. Ghana's policy recommends that all suspected malaria cases are confirmed in accordance with the "Test, Treat, and Track" Initiative. • Strengthening health worker capacity for malaria case management via supportive supervision

- Increasing access to underserved communities where there is no Community-based Health Planning and Services (CHPS) compound through the integrated community case management (iCCM)
- Improving access to diagnosis and treatment in the private sector and enforcing adherence to guidelines in the private sector

NMCP approach

Diagnosis

Since 2014, Ghana's malaria treatment guidelines have mandated laboratory confirmation (via microscopy or RDT) before treatment, and routine HMIS data indicate an increasing trend in malaria testing, which is currently above 90 percent. Ghana aims for universal diagnostic testing where microscopy is performed at the hospital and health centers (except in OPDs, where RDTs are used) and RDTs are used at CHPS compounds at the community level. Ghana implements a multipronged approach to ensure quality assurance (QA) of diagnostic testing through:

- Regional malaria diagnostic refresher trainings to improve microscopy and RDT use are led by the Clinical Laboratory Unit (CLU) and facilitated in coordination with the NMCP, Regional Health Management Teams (RHMTs), and District Health Management Teams (DHMTs).
- Laboratory Outreach Training and Supportive Supervision (OTSS) is conducted with NMCP, CLU, region, and district participation where biomedical scientists at hospitals and health centers are evaluated on malaria slide proficiency panels and RDT implementation.
- Conduct RDT QA at laboratories in hospitals and health centers where discordant results are reported.
- Monitoring of histidine-rich protein (HRP) deletions, which are currently below 10 percent nationally.

Facility-based case management

In 2019, NMCP updated malaria treatment guidelines to better align with current WHO malaria treatment recommendations. The GHS has teaching referral hospitals, regional referral hospitals, district referral hospitals, and health centers. Regional Health Authorities (RHAs) supervise DHMTs, which in turn supervise lower health centers. Malaria diagnosis at health facilities use primarily microscopy although RDTs are used in OPDs to expedite malaria treatment and reduce workload. Severe malaria cases are referred from the community level to health centers and hospitals where patients receive injectable artesunate and supportive therapy. The NMCP has regional and district malaria focal points who liaise with the regions (RHAs) and districts (DHMTs) to improve malaria case management through training, job aids, and supportive supervision. Ghana also implements malaria specific supportive supervision through the NMCP, RHMTs, and DHMTs, which is termed OTSS and includes both laboratory and clinical practices. The GHS has mandated a

shift to an integrated supportive supervision (ISS) approach through the regions and districts. ISS is conducted by interdisciplinary teams from the regions and districts and uses a comprehensive integrated checklist, which includes adherence to treatment guidelines, laboratory, supply chain, management, monitoring and evaluation, MCH, nutrition, malaria, etc. Unlike the integrated nature of ISS, OTSS only focuses on malaria. PMI worked with the GHS stakeholders to include adequate malaria topics in the comprehensive ISS checklist. ISS incorporates a broad range of health topics/areas and is supported by multiple USAID programs, including maternal and child health, family planning, and nutrition. ISS is funded through government-to-government funding flowing directly through the Ghana Health Service (GHS). The GHS plans to make ISS its long term strategy for improving service delivery, whereas the NMCP sees the OTSS as a viable tool for malaria case management. In CY 2020, in order to avoid redundancy in funding the two interventions, PMI will conduct an assessment of the relative benefits of funding one or both interventions to inform USAID support moving forward. PMI and USAID Ghana are also supporting the National Health Insurance Authority (NHIA) to achieve universal coverage and increase access to care throughout Ghana, which includes strengthening NHIA through an actuarial analysis.

Community-based case management

In 1999, based on numerous efficacy and impact studies of various community health worker (CHW) models, Ghana adopted the Community-based Health Planning and Services (CHPS) Initiative to expand health access at the community level where a trained community health nurse (CHN) and midwife provide iCCM and ANC services in a facility constructed by the community and coordinated through the community health committee. CHPS compounds serve a catchment population of around 3500 people and CHPS CHNs and midwives are supported by Community Health Volunteers (CHVs) from the community. CHPS provide RDT testing, ACT treatment, IPTp through ANC, ITNs through ANC and CWCs, and rectal artesunate suppositories (RAS) and referral for severe malaria and malaria in pregnancy. CHPS staff are government employees who receive salaries through the GHS. CHPS are supervised and provisioned through their sub-district and DHMTs. Ghana CHPS policy continues to evolve and many new CHPS compounds are constructed, staffed, and accredited annually, improving access.

Private sector case management

The 2016 MIS showed that 72 percent of children with fever in the last two weeks before the survey sought treatment, 51 percent through the private sector and 48 percent in the public sector. Private sector treatment is higher in urban settings and usually starts with pharmacies or medicine sellers. Ghana mandates laboratory confirmation in the private sector but patients must pay for testing (either RDT or microscopy) as well as ACT treatment, which often leads to treatment without testing. The NMCP is increasing private sector engagement through inclusion in supportive supervision to improve compliance with case management guidelines. NHIA also provides reimbursement of private facilities and conducts clinical audits to improve adherence to malaria treatment guidelines.

PMI objective, in support of NMCP

PMI contributed to the update of malaria treatment guidelines in 2019 and the support is aligned with the 2014 - 2020 Malaria NSP to improve implementation of the test, treat, and track (3Ts) strategy. Specifically, PMI supports:

- Procurement, warehousing, and distribution of RDTs, microscopes, and severe malaria treatments (injectable and rectal artesunate). The Government of Ghana (GOG) has assumed procurement of 100 percent of the country's ACT needs, in line with the Journey to Self-Reliance.
- Malaria case management strengthening in partnership with RHMTs and DHMTs at the facility level through trainings, mentorship, malaria-specific supportive supervision (OTSS), integrated supportive supervision (ISS), and data analysis and use with wall charts.
- G2G financing through the GHS to support laboratory OTSS and clinical ISS at the facility and community level to make it effective and sustainable.
- CHOs community outreach activities and follow-up visits for malaria case management

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

Over the past 12-18 months, PMI supported the following case management activities:

- Review, revision, and roll-out of the malaria treatment guidelines in collaboration with the NMCP, GHS, PMI implementing partners, research institutions, and other key malaria stakeholders.
- Implementation of quality improvement (QI) teams in public health facilities to analyze their malaria data and identify and respond to challenges such as lack of RDT adherence, stock outs, and low IPTp uptake.
- Malaria case management trainings, including malaria diagnostic refresher trainings, in collaboration with NMCP, RHMTs, and DHMTs.
- Support for strengthening malaria case management at the community level through CHPS mentorship programs for Community Health Officers (CHOs) to work alongside nurses or doctors at district hospitals to improve their malaria case management skills.
- Support improving CHPS malaria outreach activities into the community.
- Identification of facilities in the Northern Region with high burden of malaria deaths and root cause analyses to identify challenges that may be mitigated to reduce malaria mortality.
- Implementation of one round of malaria-specific OTSS and three rounds of malaria laboratory OTSS to improve malaria diagnosis and treatment.

- Support the implementation and expansion of the Electronic Tracker (E-Tracker) to strengthen monitoring of maternal child health and malaria indicators through the health facilities and CHPS compounds
- Support NHIA conduct clinical audits to improve adherence to malaria treatment guidelines.
- Development and digitalization of the GHS ISS checklist to include adequate malaria-specific priorities (such as testing, ACT adherence, ITNs, IPTp), initial supervisory training, and two rounds of implementation. ISS is also supported by other USAID Ghana Health Promotion and Nutrition Office (HPNO) programs.
- Procurement[1] of the following malaria commodities:
    - 1,490,435 ACTs
    - 80,000 gloves for mRDTs
    - 324,683 units of injectable artesunate
    - 4,000,000 RDTs

Bottlenecks/Challenges

- Selective stocking of artemether-lumefantrine (AL) formulations by health facilities affects the availability of the entire range of ACTs for treatment though facilities retain the ability to treat all age-groups with AL.
- Some activities supported through G2G funding experienced delays in implementation as release of funding was delayed from the GHS headquarters to the regions and districts.

[1]In-country warehousing and transportation of PMI-funded commodities are discussed in the Supply Chain section of the MOP

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

Over the next 12-18 months, PMI will support the following case management activities:

- Procurement[1] of 30,000 RAS (100mg/1ml), which is 100 percent of the annual need.
- Supply microscopes to new facilities and replace broken microscopes to support prompt diagnosis at hospitals.
- Malaria case management trainings, including malaria diagnostic refresher trainings.
- CHPS CHO mentorship program to improve community-level malaria case management.
- Implementation of two rounds of malaria-specific OTSS targeting hospitals, health centers, and CHPS and three rounds of malaria laboratory OTSS to improve malaria diagnosis and treatment at hospitals and health centers.
- Digitalization of the GHS ISS checklist, initial supervisory training, and two rounds of implementation. ISS is also supported by other USAID Ghana HPNO programs.

- Support the expansion of E-tracker to strengthen monitoring of MCH and malaria indicators.

[1]In-country warehousing and transportation of PMI-funded commodities are discussed in the Supply Chain section of the MOP

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 expanding, contracting, or changing any Case Management activities? If so, why, and what data did you use to arrive at that conclusion?

PMI/Ghana will increase funding for case management activities in FY 2020 as compared to FY 2019, largely due to procurement of RDTs and injectable artesunate (none will be procured in FY 2019), and support to the GHS to conduct ISS with the newly finalized checklist. The GHS plans to make ISS its strategy for improving service delivery, whereas the NMCP sees the OTSS as a viable tool for malaria case management. In order to avoid redundancy in funding the two interventions, In CY 2020, PMI will conduct an assessment of the relative benefits of funding one or both interventions.

While PMI planned to procure 4 million RDTs and 150,000 injectable artesunate injections in FY 2019, these procurements were deemed unnecessary based on the current surplus of both commodities and confirmation of additional Global Fund procurements. Quantities of both commodities will be reduced to zero through FY 2019 reprogramming. Subsequently, FY 2019 support for central level warehousing and central to regional distribution in CY 2020 will be decreased by approximately half. At the request of the NMCP, PMI will return to supporting a portion of the national RDT and injectable artesunate needs and 100 percent of the rectal artesunate need in FY 2020, and support for warehousing and distribution will increase accordingly.

From 2015 to 2018, PMI supported malaria case management activities through an integrated bilateral activity in USAID/Ghana's five focus regions, per the current Country Development Coordination Strategy (CDCS), 2013-2020. However, PMI realized that improving malaria case management required a nationwide approach and therefore expanded support to include non-USAID focus regions beginning in 2018 through another implementing partner.

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

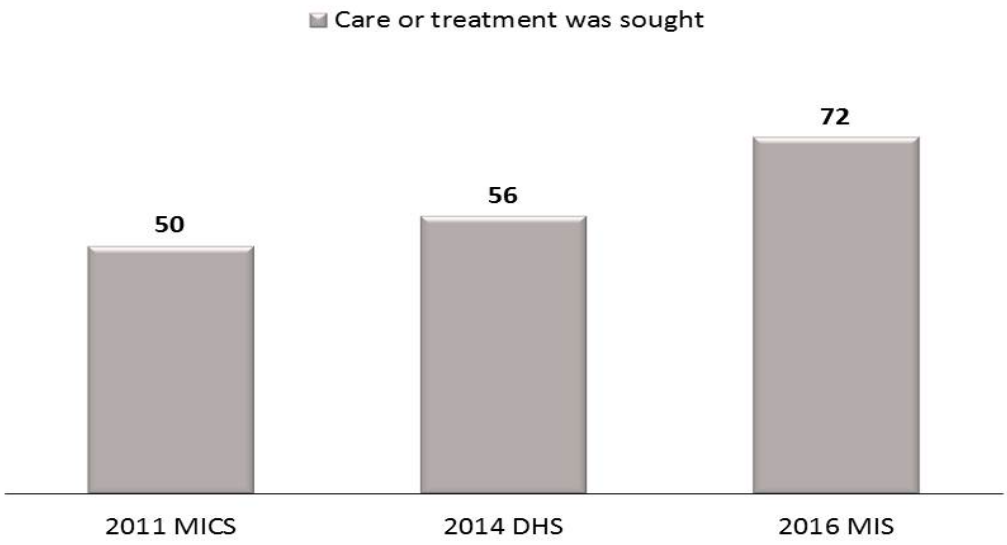
Key Question 1

What is the status of care-seeking?

Supporting Data

Figure A22. Trends in Care-Seeking for Fever

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



Conclusion

Timely care seeking has improved in Ghana by 22 percent from 2011 to 2016. This can likely be attributed to improved access to services resulting from the continuing expansion of CHPS compounds throughout the country, as well as the National Health Insurance Scheme (NHIS) which has removed or reduced financial barriers over time. The 2016 MIS also showed that the private sector provides a major role in care seeking (51 percent versus 48 percent) and the NMCP, PMI, and other malaria stakeholders will continue to work with the private sector to improve laboratory confirmation, adherence to RDT results, and quality ACT treatments. PMI is supporting the 2019 MIS that is currently in progress, which will provide additional insight into the increasing trend. In FY 2020, PMI will support the GHS HPD to strengthen malaria SBC activities through expansion of malaria community engagement activities. Support will engage district health promotion officers as well as CHPS compound CHNs, CHOs, and CHVs to engage with communities to promote malaria care-seeking behaviors.

Key Question 2

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

Supporting Data

Over the years, care seeking behavior in Ghana has evolved. Multiple studies (qualitative and quantitative) conducted across the country from the Upper West Region, Volta region, Ashanti Region, Brong Ahafo Region and Greater Accra representing three distinct ecological zones show that distance, receptive experience with a health staff, and possession of valid health insurance were key facilitators for prompt malaria care seeking (Figure A23). Key barriers such

as poor knowledge, local beliefs, and payment for testing and treatment compounded by negative attitudes of health staff leads to patients staying away from health facilities.

Figure A23. Key Facilitators and Barriers to Care Seeking in Ghana.

Facilitator	Type of Factor	Data Source	Evidence
Positive experience with health care worker	Social	Duku et al. 2018	Others were encouraged to attend by people with positive experiences with health care workers.
CHPS, Health Center, or Hospital was accessible	Environment	Duku et al. 2018	The more accessible a health center and CHPS are to a community, the more likely people will seek care t from the facilities
Malaria commodities were available	Environment	Duku et al. 2018	When malaria commodities are readily available at the health facility, the more likely people will seek care from a facility.
Care seeking for fever is not prioritized by the community	Social	Duku et al. 2018	Societal norms push others to first seek informal care before seeking care for malaria at formal health facilities
Attitudes, Beliefs, and Knowledge	Internal	Duku et al. 2018	Lack of knowledge about malaria, attitudes that fever is normal, and beliefs about how it is transmitted, prevented, and cured
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Negative experience with an HCW	Social	Duku et al. 2018	Patients do not return after a negative experience with a healthcare worker
Distance and lack of transportation	Environmental	Duku et al. 2018, Dalaba et al. 2018, Fenny et al. 2015	Health center is too far. Non direct medical cost (e.g. transportation) is a barrier
Malaria commodity stockouts	Environmental	Duku et al. 2018	No malaria commodities available for the first time deter people from subsequent visits for care
Financial barriers to care	Environmental	Duku et al. 2018; Dalaba et al. 2018; Fenny et al. 2015	Patients have to pay for services, tests, and drugs and they cannot afford it. Non-insured persons do not seek care.

[1]Duku SKO, Nketiah-Amponsah E, Janssens W, Pradhan M (2018) Perceptions of healthcare quality in Ghana: Does health insurance status matter? PLoS ONE 13(1);

[2]Dalaba MA, Welaga P, Oduro A, Danchaka LL, Matsubara C (2018) Cost of malaria treatment and health seeking behavior of children under-five years in the Upper West Region of Ghana. PLoS ONE 13(4): e0195533. https://doi. org/10.1371/journal.pone.0195533;

[3]Ama Pokuaa Fenny, Felix A Asante, Ulrika Enemark and Kristian S Hansen (2015) Malaria care seeking behavior of individuals in Ghana under the NHIS: Are we back to the use of informal care? BMC Public Health (2015) 15:370.

Conclusion

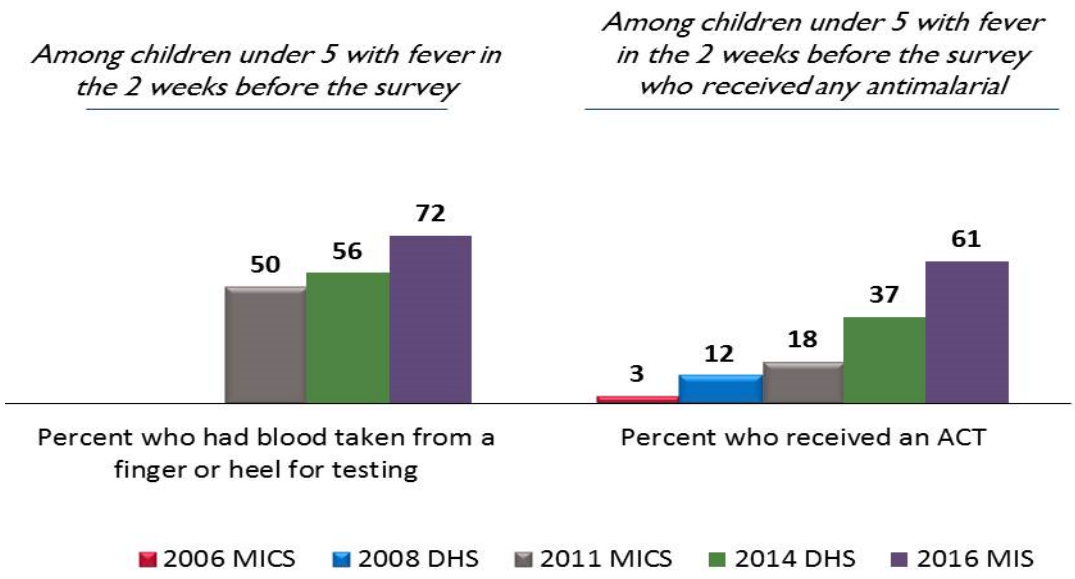
Although care-seeking is improving in Ghana, PMI/Ghana will work with all malaria partners, in particular implementing partners, to utilize existing data and literature (published and unpublished) to inform the SBC strategy to further increase care-seeking behavior. PMI will primarily support these SBC activities through the ongoing malaria community engagement and outreach pilot in Volta Region that is led by the GHS Health Promotion Division. Following an assessment of this pilot, to be conducted in 2020, it is expected that these activities will be refined and expanded through additional PMI support in FY 2020.

Key Question 3

How have malaria testing and treatment practices evolved over time?

Supporting Data

Figure A24. Trends in Diagnosis and Treatment of Children with Fever



Conclusion

Periodic household surveys show an increasing trend in malaria diagnosis (through recall of finger or heel blood testing) and ACT treatment in Ghana. HMIS reports a significantly higher percentage of malaria testing (>90 percent) and ACT treatment adherence to laboratory results is improving. Supportive supervision visits have revealed that some health care workers prioritize microscopy over RDTs even to the point of referring to RDTs as sub-standard. In FY 2020, PMI will continue to support the NMCP, RHAs, and DHMTs to strengthen the test, treat, and track approach through supportive supervision (laboratory and clinical, malaria-specific and integrated), trainings, job aids, coaching, mentorships, quarterly data analysis/review, and holistic assessments.

Key Question 4

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

Supporting Data

Figure A25. Key Barriers and Facilitators to Appropriate Testing and Treatment Practices in Ghana.

Facilitator	Type of Factor	Data Source	Evidence
Laboratory confirmation is available (microscopy or RDT) and not a financial burden	Environmental	Antwi et al. 2016	When RDTs or microscopy is available for testing, no stock outs of reagents and test conducted free or covered by NHIA
HCW adheres to laboratory results	Internal	Antwi et al. 2016, Baiden et al. 2014	HCW does not treat patients with a negative test result with an ACT
HCW performs the laboratory test correctly (microscopy or RDT)	Internal	Antwi et al. 2016	RDT or microscopy is conducted correctly
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Lack of confidence in RDT results	Internal	Antwi et al. 2016	Doubt in RDT results and overdependence on microscopy. Perception that RDTs are substandard.
Adherence to clinical guidelines	Internal	Baiden et al. 2014	Poor performance of prescribers to screen for other causes of fevers

[1]Antwi GD, Bates LA, King R, Mahama PR, Tagbor H, Cairns M, et al. (2016) Facilitators and Barriers to Uptake of an Extended Seasonal Malaria Chemoprevention Programme in Ghana: A Qualitative Study of Caregivers and Community Health Workers. PLoS ONE 11(11);

[2] F. Baiden,, K. Malm , C. Bart-Plange , A. Hodgson , D. Chandramohan,, J. Webster and S. Owusu-Agyei (2014) Shifting from presumptive to test-based management of malaria- Technical basis and implications for malaria control in Ghana. Ghana Medical Journal, 2014, Volume 48, Number 2.

Conclusion

A number of studies utilizing a Knowledge, Attitudes, and Practices (KAP) methodology with individual and focus group interviews have been conducted in Ghana to identify key facilitators and barriers to appropriate malaria testing and treatment practices (Figure A25). Results revealed major facilitators to diagnosis included availability of RDTs or microscopy without a financial barrier (free) and that the test was conducted correctly. Barriers included doubt in the validity of RDT test results and a preference towards microscopy, which is not supported by the literature, as well as HCWs immediately treating for malaria without testing and not exploring other possible causes of fever. Testing is widely available to healthcare seekers and tests are generally adhered to, especially at lower health facilities and CHPS compounds. However, some

healthcare workers do not have confidence in RDT results and even have the perception that they are sub-standard, which creates unnecessary reliance on microscopy for confirming suspected malaria cases, resulting in both delays and presumptive treatment of malaria. Collaborative effort to use RDTs for suspected uncomplicated cases of malaria is necessary to reduce presumptive treatment and improve patient experience. PMI will continue to support the NMCP, CLU, regions, and districts to conduct supportive supervision (malaria OTSS [clinical and laboratory] and ISS), training, coaching, and mentorships to improve laboratory confirmation and adherence to testing results.

Key Question 5

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

Supporting Data [Ghana]

Figure A26. Donor Supported Facility and Community-Based Malaria Case Management by Region

Donor	Facility-based case management		Community-based case management[1]	
	Regions	Interventions	Regions	Interventions
PMI	All regions	Laboratory OTSS, Clinical OTSS, Clinical ISS, Dx and Tx	All regions	Malaria OTSS, ISS, Dx and Tx
Global Fund	All regions	Laboratory OTSS, Clinical OTSS, Clinical ISS, Dx and Tx	All regions	Malaria OTSS, ISS, Dx and Tx

Conclusion

PMI is providing nationwide support for malaria-specific laboratory and clinical OTSS as well and G2G mechanisms for ISS to strengthen case management at the central, regional, district, and community levels (CHPS compounds).

Key Question 6

What was the estimated need for RDTs during calendar year 2019? What are the estimated RDT needs over calendar years 2020 and 2021?

[1] In Ghana community based case management refers to care services delivered by CHO and CHN from CHPS compound, along with outreach community and home visits for preventive activities

Supporting Data

Figure A27. Gap Analysis of RDT Needs, 2019-2021

Calendar Year	2019	2020	2021
RDT Needs			
Total Projected suspected malaria cases to be tested in the public sector [1]	14,476,608	13,984,404	13,508,934
Country target for diagnostic coverage [2]	95%	97%	98%
Total number of projected suspected malaria cases to be tested in the public health facilities	13,752,778	13,564,872	13,238,755
% of suspected cases to be tested by RDT	71.8%	71.8%	71.8%
Number of suspected cases tested with an RDT	9,874,494	9,739,578	9,505,426
Total RDT Needed for routine services [2]	9,874,494	9,739,578	9,505,426
% RDT allocations for: Outreach, Research, Training and QA	3%	3%	3%
No. of RDTs allocated to Training and QA	296,235	292,187	285,163
Total RDT needs for Public sector health facilities	**10,170,729**	**10,031,765**	**9,790,589**
Total RDT needs for Private sector health facilities [3]	**197,490**	**486,979**	**665,380**
Total RDT needs for ALL (Public and Private) sector health facilities	**10,368,219**	**10,518,744**	**10,455,969**
Partner Contributions (to PMI target population if not entire area at risk)*			
RDTs carried over from previous year	8,276,101	5,726,679	10,096,778
RDTs from Government	0		
RDTs from Global Fund	7,970,375	14,888,843	
RDTs from other donors			
RDTs planned with PMI funding	4,000,000		2,000,000
Total RDTs Available	**20,246,476**	**20,615,522**	**12,096,778**
Total RDT Surplus (Gap)	**5,726,679**	**10,096,778**	**1,640,809**

[1.] The quantification team reached a consensus to use the service based forecast for the 2019 national quantification review, as the demographic forecast had historically produced a much higher estimates. The starting point was to use suspected malaria cases (from 2016 - 2018) and subsequently adjusted for an 82% reporting rate (historical average for 2016 - 2018). Adjusted for the non-reporting by the major teaching hospital at 10%. The quantification team agreed to maintain the net change in suspected malaria cases in 2018 (i.e. -3.4%) and applied across all projected years (2019 - 2021).

[2.] Diagnostic coverage is projected by NMCP to increase via advocacy and interventions over the next 3 years to achieve up to a 100% testing rate

[3.] It was estimated that between 2019 to 2021 a proportion of estimated RDT needs in the public sector will be allocated to the private sector, as the channels for distribution to the private sector will be improved over the years of the forecast. Projected RDT supplies to the private sector accounts for about 2% of the total RDT needs in 2019. Based on increasing demand for RDTs in the private sector, it was estimated that the supplies are likely to increase to 5% (in 2020) and 7% (in 2021).

Conclusion

RDT needs for CY 2019 were met and those for CY 2020 are expected to be met as well. Even with a surplus of 12 months of stock (MOS)[max stock levels] projected for the end of CY 2020, PMI will support procurement of additional RDTs for CY 2021 to mitigate any delays for other procurements, particularly those supported by the Global Fund.

Key Question 7

What was the estimated need for ACTs during calendar year 2019? What is the estimated need for ACTs over calendar years 2020 and 2021?

Supporting Data

Figure A28. Gap Analysis of ACT Needs, 2019 - 2021

Calendar Year	2019	2020	2021
ACT Needs			
Total country population	30,795,491	31,565,378	32,354,512
Population at risk for malaria	30,795,491	31,565,378	32,354,512
PMI-targeted at-risk population [1]	30,795,491	31,565,378	32,354,512
Total projected number of malaria cases [2]	**5,314,048**	**5,340,618**	**5,367,321**
Total ACT Needs [3]	**4,481,230**	**4,503,637**	**4,526,155**
Partner Contributions (to PMI target population if not entire area at risk)[1]			
ACTs carried over from previous year	1,353,694	2,209,789	3,405,456
ACTs from Government [4]	1,600,000	4,000,000	4,000,000
ACTs from Global Fund [5]	1,858,790	1,699,304	
ACTs from other donors			
ACTs planned with PMI funding	1,878,535	0	0
Total ACTs Available	**6,691,019**	**7,909,093**	**7,405,456**
Total ACT Surplus (Gap)	**2,209,789**	**3,405,456**	**2,879,301**

1Ref: 2010 population census and applying 2.5% intercensal growth rate for each year

2 Ref: 2018 National quantification review. Forecasts were based on historical service data (source: HMIS) and application of national assumptions taking into consideration NMCP targets. These forecasted total malaria cases include those to be recorded from Christian Health Association of Ghana (CHAG) and some private health facilities. These facilities may receive RDT and other malaria commodities from the public sector but not all of CHAG facilities source ACTs from the public sector

3 Total forecasted consumption for ACTs. (Ref: Nov 2018 National quantification review spreadsheet and report). Note: These figures represent total malaria cases to source treatment from the public sector. Therefore, these figures are a smaller number of cases from some CHAG facilities and other private health facilities, as they do not source ACTs from the public sector

4 The 2020 ACT quantity from GoG represents approximately a 70% contribution towards needs requiring funding by the GoG. Orders for CY 2020 not confirmed at the time of the development of the MOP

5 Source: NMCP

Conclusion

With advocacy from the NMCP, the GOG has prioritized procuring their own ACTs in the context of "Ghana beyond Aid". Therefore, ACT needs for CY 2019 were met and those for CY 2020 are expected to be met through contributions funded by the Global Fund and GOG. ACT needs for CY 2021 are expected to be met if GOG continues to procure approximately 70 percent of the needs and the Global Fund supports procurement of the remainder.

Key Question 8

What was the estimated need for severe malaria treatment and any other treatments as applicable during calendar year 2019? What is the estimated need for calendar years 2020 and 2021?

Supporting Data

Figure A29. Gap Analysis of Injectable Artesunate, 2019-2021

Calendar Year	2019	2020	2021
Artesunate Injection Needs			
Total country population	30,795,491	31,565,378	32,354,512
Population at risk for malaria	30,795,491	31,565,378	32,354,512
PMI-targeted at-risk population [1]	30,795,491	31,565,378	32,354,512
Total projected number of malaria cases [2]	**5,314,048**	**5,340,618**	**5,367,321**
Total malaria cases that will require treatment from the public sector [3]	**4,410,660**	**4,432,713**	**4,454,877**
Total severe malaria cases [4]	**127,909**	**128,549**	**129,191**
Total severe malaria cases that will require Artesunate injection [5]	**125,351**	**125,978**	**126,608**
Artesunate injection breakdown [6]			
Artesunate injection 30mg vials needed	100,281	100,782	101,286
Artesunate injection 60mg vials needed	185,519	186,447	187,379
Artesunate injection 120mg vials needed	215,604	216,682	217,765
Total Artesunate injection Needs	**501,404**	**503,911**	**506,430**
Partner Contributions			
Artesunate injection carried over from previous year	324,220	1,261,186	819,275
Artesunate injection from Government			
Artesunate injection from Global Fund	1,113,687	62,000	
Artesunate injection from other donors			
Artesunate injection planned with PMI funding	324,683	0	300,000
Total Artesunate injection Available	**1,762,590**	**1,323,186**	**1,119,275**
Total Artesunate injection Surplus (Gap)	**1,261,186**	**819,275**	**612,845**

1. Ref: 2010 population census and applying 2.5% intercensal growth rate for each year
2. Ref: 2018 National quantification review. Forecasts were based on historical service data (source: HMIS) and application of national assumptions taking into consideration NMCP targets. These forecasted total malaria cases include those to be recorded from Christian Health Association of Ghana (CHAG) and some private health facilities. These facilities may receive RDT and other malaria commodities from the public sector but not all of CHAG facilities source ACTs from the public sector
3. Ref:2018 quantification review spreadsheet and report
4. This represents 2.9 % of total malaria cases requiring treatment from the public sector
5. 98% of severe malaria cases will require treatment with artesunate injection
6. Estimates were guided by dosage regimen referenced from the Malaria Case Management guideline based on assumed weight breakdown for expected cases

Figure A30. Gap Analysis of Rectal Artesunate, 2019 - 2021

Calendar Year	2019	2020	2021
Rectal Artesunate Needs			
Total country population	30,795,491	31,565,378	32,354,512
Population at risk for malaria	30,795,491	31,565,378	32,354,512
PMI-targeted at-risk population [1]	30,795,491	31,565,378	32,354,512
Total projected number of malaria cases [2]	5,314,048	5,340,618	5,367,321
Total malaria cases that will require treatment from the public sector [3]	4,410,660	4,432,713	4,454,877
Total severe malaria cases [4]	127,909	128,549	129,191

Calendar Year	2019	2020	2021
Total malaria cases that will require pre-referral from lower level facilities [5]	**19,186**	**19,282**	**19,379**
Rectal Artesunate Suppository (RAS) Needs (100mg)	**29,739**	**29,888**	**30,037**
Total RAS 100mg	29,739	29,888	30,037
Partner Contributions			
RAS carried over from previous year	0		
RAS from Government [5]	0		
RAS from Global Fund [6]	0		
RAS from other donors	0		
RAS planned with PMI funding	0	30,000	30,000
Total RAS Available	**0**	**30,000**	**30,000**
Total RAS Surplus (Gap)	**-29,739**	**112**	**-37**

[1.] Ref: 2010 population census and applying 2.5% intercensal growth rate for each year

[2.] Ref: 2018 National quantification review. Forecasts were based on historical service data (source: HMIS) and application of national assumptions taking into consideration NMCP targets. These forecasted total malaria cases include those to be recorded from Christian Health Association of Ghana (CHAG) and some private health facilities. These facilities may receive RDT and other malaria commodities from the public sector but not all of CHAG facilities source ACTs from the public sector

[3.] Ref:2018 quantification review spreadsheet and report

[4.] This represents 2.9 % of total malaria cases requiring treatment from the public sector

[5.] 15% of severe malaria will be pre-referred from lower level facilities

Conclusion

The needs for injectable artesunate were met in CY 2019 and are expected to be met in CY 2020 as well. In FY 2020, PMI will support procurement of approximately 60 percent of the annual national need of injectable artesunate injection to accommodate possible gaps created through the development and implementation of the next Global Fund grant. Rectal artesunate suppositories (RAS) needs in CY 2019 were unable to be met due to a misalignment between MOH and WHO policy restricting any donor funded procurements. MOH policy has subsequently been revised and PMI plans to support the procurement of enough RAS to meet 100 percent of the national needs in CYs 2020 and 2021.

Key Question 9

Are the first-line ACTs effective and monitored regularly?

Supporting Data

Artesunate-amodiaquine (AS/AQ) was adopted to replace chloroquine as the first line drug for uncomplicated malaria in 2004, based on therapeutic efficacy and cost. AL and Dihydroartemisinin-piperaquine (DHAP) were added as alternatives to AS/AQ in 2007 following a review of existing policy and guidelines. NMCP, in collaboration with NMIMR, monitors the efficacy of ACTs in the country every other year with support from the Global Fund and NAMRU. Recently completed and ongoing therapeutic efficacy studies (TES) indicate that over the years (2010-2016) PCR-corrected AS/AQ efficacy was >90 percent in all the sentinel sites in Ghana. PCR corrected AL efficacy was also >90 percent except for one site in Navrongo (2010)

and in Cape Coast (2016). NMIMR and the NMCP will continue to monitor the AL efficacy in these sites in 2019.

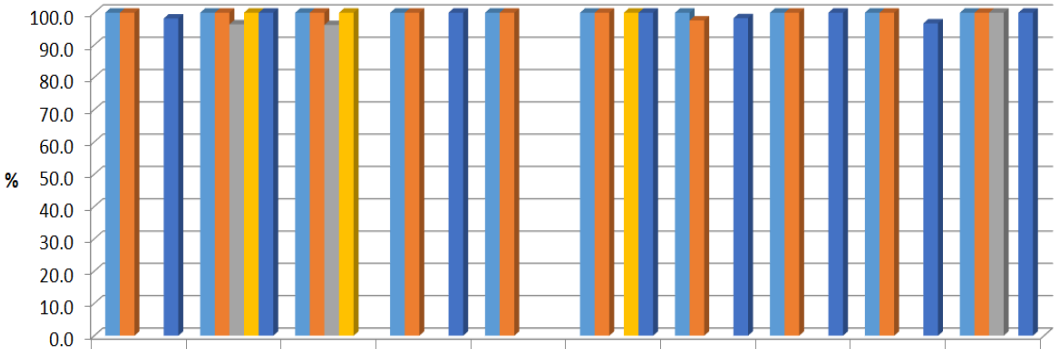
Figure A31. Recently Completed and Ongoing Antimalarial Therapeutic Efficacy Studies

Year	Sites	Treatment arms	PCR-corrected ACPR>90%?	Where molecular resistance work was completed or the plan, if any, for molecular resistance work
2017[1]	Navrongo, Wa, Yendi, Hohoe, Sunyani, Bekwai, Begoro, Tarkwa, Accra	AL, AS/AQ	Yes	NMIMR
2019	Navrongo, Wa, Yendi, Hohoe, Sunyani, Bekwai, Begoro, Tarkwa, Accra	AL, AS/AQ	NA (ongoing)	NMIMR (with potential PARMA visit)

[1]Source: Presentation: Antimalarial Drug Efficacy Testing in Ghana

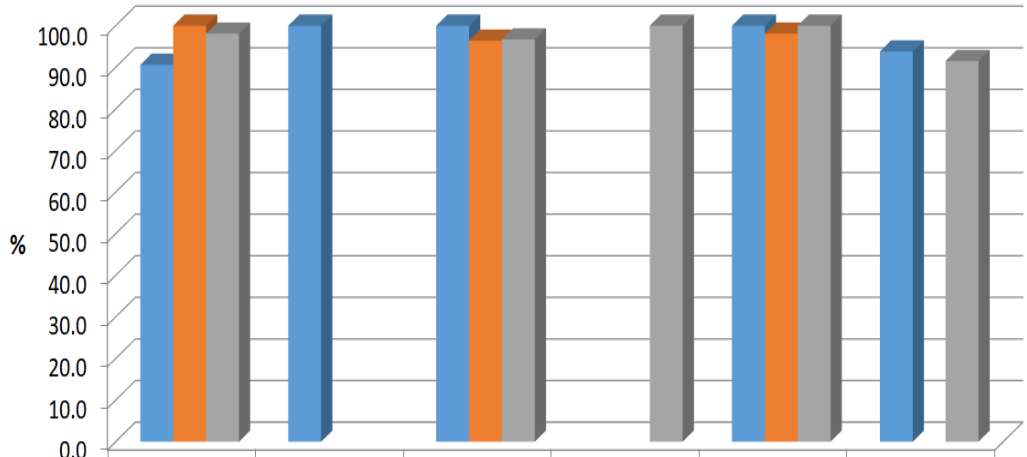
Footnotes - ACPR: adequate clinical and parasitological response; AL: artemether-lumefantrine; AS/AQ: amodiaquine-artesunate; DP: Dihydroartemisinin-piperaquine; PARMA: PMI-supported Antimalarial Resistance Monitoring in Africa

Figure A32. AS/AQ (PCR corrected)



	Navrongo	Wa	Yendi	Sunyani	Bekwai	Hohoe	Begoro	Accra	Cape-Coast	Tarkwa
2005	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2007	100.0	100.0	100.0	100.0	100.0	100.0	97.6	100.0	100.0	100.0
2010		96.4	96.2							100.0
2013		100.0	100.0			100.0				
2016	98.2	100.0		100.0		100.0	98.3	100.0	96.7	100.0

Figure A33. AL (PCR corrected)



	Navrongo	Sunyani	Bekwai	Hohoe	Begoro	Cape-Coast
2010	90.6	100.0	100.0		100.0	93.8
2013	100.0		96.4		98.1	
2016	98.1		96.7	100.0	100.0	91.5

Conclusion

Historically, therapeutic efficacy testing in Ghana has been conducted by the NMCP in collaboration with NMIMR with Global Fund support. NMCP has shared results and PMI has provided feedback. AS/AQ and AL remain effective (>90 percent PCR corrected). With innovation and newly available molecular tools, PMI would like to support NMIMR to expand molecular testing with next generation sequencing (NGS). A study visit to CDC is planned in 2020 and PMI will support molecular testing with future TES and possibly have Ghana join the PMI-supported Antimalaria Resistance Monitoring in Africa (PARMA) network.

Key Question 10

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

Supporting Data

Since 2008, PMI has supported laboratory strengthening through lab OTSS. Proficiency testing scores show high capacity throughout the system. With the view of expansion and sustainability, PMI would like to decentralize lab OTSS where regions or even districts can provide lab support to their facilities. PMI is working with NMCP and CLU to eventually transition to a decentralized system. Ghanaian universities also train a cadre of biomedical scientists who are technicians and can repair and rehabilitate microscopes. Currently, these microscope technicians move quickly into the private sector due to a lack of career support through the GHS. PMI and CDC will engage these microscope technicians to revitalize microscope care and repair with a view of sustainability.

Conclusion

In FY 2020, PMI will continue to support laboratory OTSS with the NMCP and CLU but will focus on decentralization using high performing biomedical scientists in the regions and districts to provide laboratory OTSS support to their catchment areas. This will empower biomedical scientists at lower levels and build sustainability. PMI will also work with the NMCP, GHS, and universities to support a cadre of biomedical scientists who can repair microscopes.

Key Question 11

Are there any other considerations that impact your funding allocation in this category?

Supporting Data

There are no other considerations that impact the FY 2020 funding allocation for case management.

Conclusion

Not applicable.

2.B. DRUG-BASED PREVENTION

NMCP objective
Ghana's national strategy to protect at least 80 percent of the population at risk with effective malaria prevention interventions by 2020 includes: • Phased implementation of SMC implemented in the northern part of the country where malaria transmission is highly seasonal • Prevention of malaria in pregnancy (MIP) offered as a package of interventions including the use of ITNs and IPTp with Sulfadoxine-pyrimethamine (SP)
NMCP approach
Ghana's strategy for drug-based prevention includes both IPTp and SMC for the prevention of malaria in pregnancy and among children under five years of age. Ghana updated the national MIP treatment guidelines in 2019, including updating IPTp guidance to better align with that of the WHO. The guidance aims to increase IPTp coverage, specifically to three or more doses of IPTp for each pregnant woman, and address healthcare worker concerns about SP and adverse reactions. Ghana implements SMC in the Sahelian zone in the northern part of the country where malaria transmission is seasonal (Northern, North East, Savannah, Upper East, and Upper West Regions), targeting children under five with four monthly doses of Sulfadoxine-pyrimethamine + amodiaquine (SPAQ) before and during the malaria transmission season (from July - October).

PMI objective, in support of NMCP

PMI support for drug-based prevention of malaria is in line with that of the national strategy. PMI supports procurement of SPAQ and operational costs for SMC in the Northern, North East, and Savannah Regions as well as procurement of SP for IPTp, as needed. PMI strengthens the capacity of health care workers at health facilities and CHPS compounds in all 16 regions to effectively deliver malaria prevention services to pregnant women through supportive supervision, including on-site training of IPTp at every ANC visit and ensuring the distribution of an ITN at first ANC visit.

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

Over the past 12-18 months, PMI has supported the following drug-based prevention activities in Ghana:

- Procurement and distribution of 1,189,100 units of SPAQ, approximately 50 percent of the total need for SMC in Northern, North East, and Savannah Regions.
- Implementation of SMC by GHS (through G2G agreement) in the Northern, North East, and Savannah Regions in July - October 2019, protecting approximately 297,000 children through four rounds of dosing during high transmission season.
- Support health care workers at health facilities and CHPS compounds to effectively deliver malaria prevention services to pregnant women, including supportive supervision and on-site training of IPTp at every ANC visit and ensuring the distribution of an ITN at first ANC visit.
- Provision of technical assistance to support the GHS and NMCP in continuous distribution of ITNs though ANC clinics in health facilities.

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

Over the next 12-18 months, PMI plans to support the following drug-based prevention activities:

- Procurement and distribution of SPAQ to meet 80 percent of the total need for approximately 475,000 children for the CY 2020 SMC campaign in the Northern, North East, and Savannah Regions.
- Implementation of SMC by GHS in the Northern, North East, and Savannah Regions in July - October 2020.
- Support health care workers at health facilities and CHPS compounds to effectively deliver malaria prevention services to pregnant women, including malaria-specific OTSS and ISS and on-site training of IPTp at every ANC visit and ensuring the distribution of an ITN at first ANC visit.

2.B.i SEASONAL MALARIA CHEMOPREVENTION (SMC)

PMI Goal

Support the national strategy for SMC addressing relevant geographic areas and age groups, which includes four rounds for children 3-59 months, in accordance with the WHO recommendations.

Do you propose expanding, contracting, or changing any SMC activities? If so, why, and what data did you use to arrive at that conclusion?

In FY 2020, PMI will increase the amount of SMC commodities that are procured to 100 percent of the need for the Northern, North East, and Savannah Regions. This increase in commodity support over previous years is enabled through a reduction in unit price estimates and not due to an actual increase in funding allocation. Associated increases in warehousing and distribution are reflected in Supply Chain Annex 3.a. PMI will continue to support implementation of SMC by the GHS in FY 2020 at the same level as in FY 2019. Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

What was the estimated need for SMC commodities during calendar year 2019? What is the estimated need for SMC commodities over calendar years 2020 and 2021?

Supporting Data

Figure A34. Gap Analysis of SP+AQ Needs

Calendar Year	2019	2020	2021
SMC drug (SP+AQ) Needs			
Population targeted for SMC [1]	1,013,825	1,039,170	1,065,150
PMI-targeted population for SMC [2]	594,529	609,393	624,627
Total SP+AQ Needs [3]	**2,378,118**	**2,437,570**	**2,498,510**
Partner Contributions (to PMI target population if not entire area at risk)			
SP+AQ carried over from previous year		82	0
SP+AQ from Government	1,189,100	537,488	0
SP+AQ from Global Fund	0	0	
SP+AQ from Other Donors	0	0	
SP+AQ planned with PMI funding [4]	1,189,100	1,900,000	2,498,510
Total SP+AQ Available (for NR only)	**2,378,200**	**2,437,570**	**2,498,510**
Total SP+AQ Surplus (Gap)	**82**	**0**	**0**

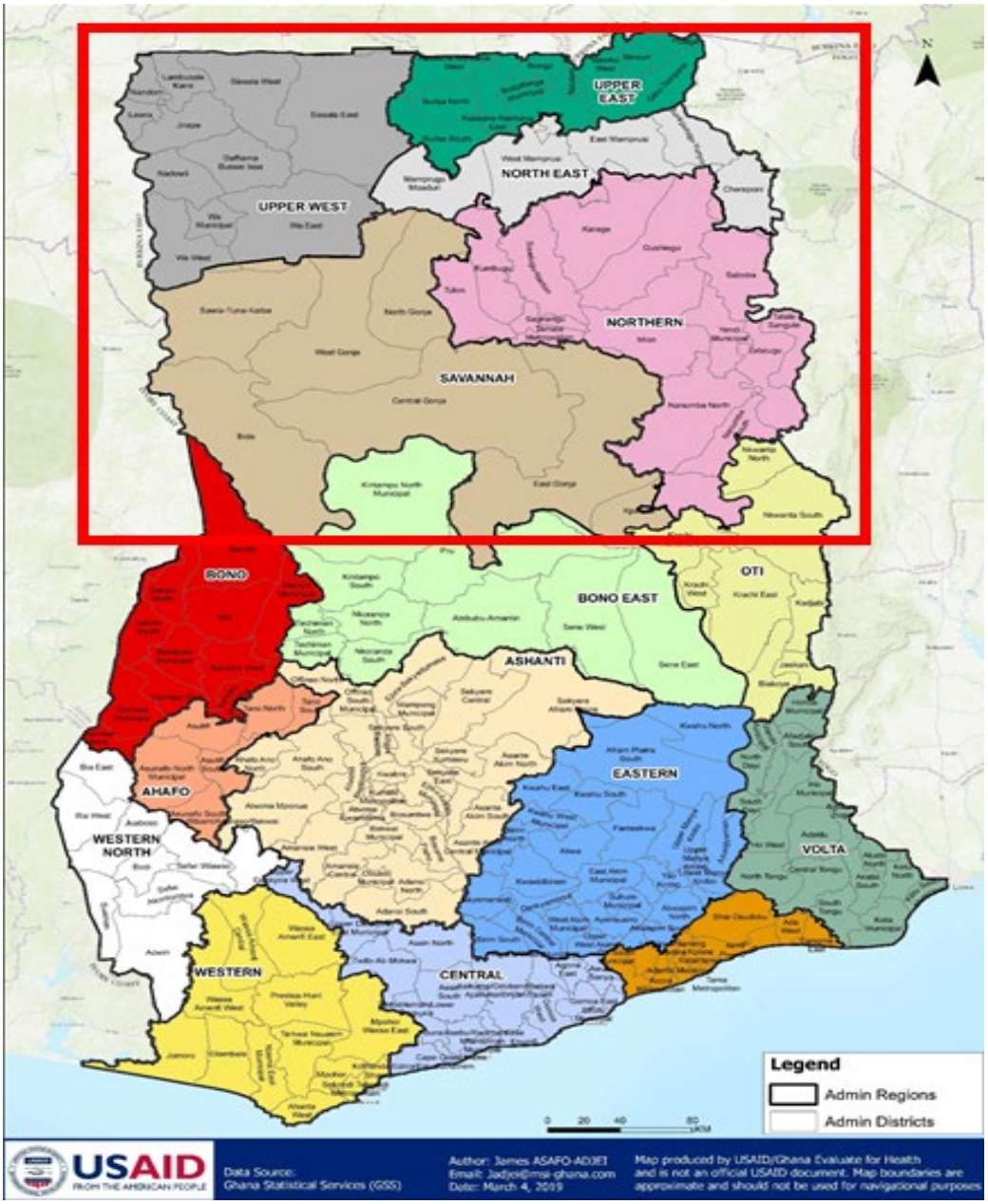
[1] Geographic coverage: 19.2% of the total population in the Upper East, Upper West, Northern, North East, and Savannah regions are children aged 3-59 months

[2] Geographic coverage: 19.2% of the total population in the Northern, North East, and Savannah regions (formerly the Northern Region) are children aged 3-59 months

[3] Four rounds of dosing per eligible child

[4] PMI contribution for 2019: Half of the required SPAQ for June 2019 SMC campaign in the Northern, North East and Savannah Regions. PMI contribution for CY 2020 is ~80% of total needs. PMI contribution for CY 2021 is 100% of total needs.

Figure A35. Regions Targeted for SMC in Ghana



Conclusion

In FY 2019, PMI supported procurement of 80 percent of SPAQ requirements for the CY 2020 SMC campaign in the Northern, North East, and Savannah Regions, with the remainder of the needs for these regions, as well as the Upper East and Upper West Regions, procured by the GOG with Global Fund resources. In FY 2020, PMI will support procurement of 100 percent of the needs for Northern, North East, and Savannah Regions and GOG, with Global Fund

resources, will support procurement of 100 percent of the need for the Upper East and Upper West Regions.

Key Question 2

What are the estimated non-commodity resources needed to properly deliver SMC over the next 3 years?

Supporting Data

In addition to the procurement of SPAQ, proper delivery of SMC requires support for distribution of commodities and implementation, namely human resources for pre-dosing, dosing, and supervision activities. SMC is primarily implemented by CHVs, (number required is based on the population of children aged 3 to 59 months), sub-district supervisors (five per sub-district), district supervisors, (one per district), regional supervisors (one assigned to each district), national supervisors for districts (one assigned to each district), national supervisors for the focus areas (planning and coordination, social behavior change (SBC), procurement/supply chain management, M&E, information technology), and health workers at various facilities for adverse drug reaction management. Stakeholders at the regional and district levels (Regional/District Health Management Team, Regional/District Assembly, Food and Drugs Authority, Ghana Education Service, Information Service Department, Police Service and other security agencies, traditional leaders, religious leaders and all other relevant departments and agencies) are engaged prior to and during the SMC implementation for the purposes of pharmacovigilance, security, community mobilization, information dissemination, and logistical support. Because SMC commodities do not get distributed along with other health commodities under routine resupply programming, an ad hoc distribution from central level directly to districts is required.

Conclusion

Because PMI will be supporting an increased amount of the SMC commodity requirements in both FY 2019 and FY 2020, PMI support to temporarily warehouse these commodities at the central level and transport them to more districts than were delivered to in the past will also increase. In FY 2020, PMI will continue to support operational costs associated with the CY 2021 SMC campaign in Northern, North East, and Savannah regions, which will be implemented by the GHS.

Key Question 3

What does the data show about SMC refusal rates? How do refusal rates change from round to round? What barriers are contributing to SMC refusal rates?

Supporting Data

SMC coverage in Ghana exceeds the national target of 80 percent (Figure A36). Currently, there is limited data available on SMC refusal rates, or barriers and facilitators to SMC acceptance and uptake (Figure A37). However, very few children whose parents refused SMC medicines were

found to have reacted adversely to the medicines in previous rounds and hence were considered ineligible (allergic to the medicine).

Figure A36. SMC Coverage Per Round in Upper East, Upper West, and Northern (now Northern, North East, and Savannah) Regions, Ghana 2019.

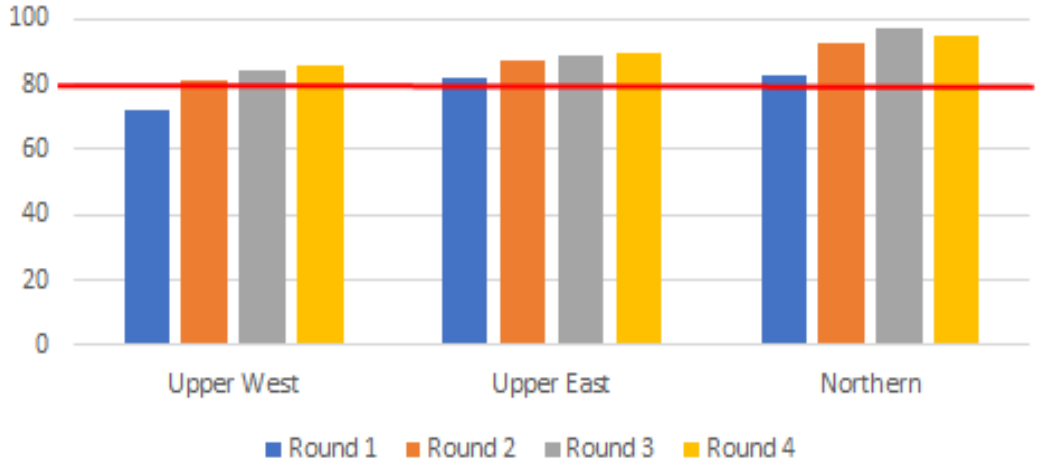


Figure A37. Key Barriers and Facilitators to SMC Acceptance and Uptake in Ghana

Facilitator	Type of Factor	Data Source	Evidence
Benefits of SMC	Internal	DHIMS2	Reduced morbidity and mortality in children under five in SMC zones.
Trust for health personnel	Internal	Antwi GD et al. 2016	The level of uptake of SMC in community is influenced by the trust for health personnel in communities
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Culture and beliefs	Social	Activity reports and interviews	Preference for herbal medicines (especially among the Fulanis nomads)
Fear of adverse drug reactions	Internal	Activity reports and interviews	Few children have adverse reactions to SPAQ, but creates the fear among the community
Physical barrier for SMC administration	Environmental	Antwi et al. 2016[1]	Communities cut-off by water bodies, no access routes into communities and located outside of health administrative areas are likely to be denied SMC

[1]Antwi GD, Bates LA, King R, Mahama PR, Tagbor H, Cairns M, et al. (2016) Facilitators and Barriers to Uptake of an Extended Seasonal Malaria Chemoprevention Programme in Ghana: A Qualitative Study of Caregivers and Community Health Workers. PLoS ONE 11(11).

Conclusion

Since the introduction in 2015, SMC coverage has been above the NMCP goal of 80 percent in all regions. Refusal rates have been low, however clustering of refusals in a particular community has occurred during a specific round of SMC in the Upper West Region due to misinformation which was speedily addressed by health personnel. The NMCP continues to work with CHOs and CHVs to identify challenges with SMC, including monitoring SMC-associated adverse reactions. PMI will continue to support the NMCP to use community-based SBC to encourage SMC adherence.

Key Question 4

Are there any other considerations that impact your funding allocation in this category?

Supporting Data

There are no other considerations that impact the FY 2020 funding allocation for SMC.

Conclusion

Not applicable.

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

PMI Goal
Support the national strategy for MIP, which includes provision of ITNs at first antenatal care (ANC) visit, intermittent preventive treatment for pregnant women (IPTp) to all pregnant women in malaria endemic area starting at 13 weeks gestational age, for a minimum of 3 doses, and effective case management of malaria, in accordance with WHO recommendations

Do you propose expanding, contracting, or changing any MIP activities? If so, why, and what data did you use to arrive at that conclusion?
PMI support for MIP activities in FY 2020 will increase as compared to FY 2019. Though the GOG has been funding 100 percent of the SP needs for Ghana in recent years, PMI will support the procurement of approximately 25 percent of the annual need for CY 2021 in order to mitigate against the risk of supply pipeline disruptions occurring due to GOG funding delays, local manufacturing constraints, or prolonged Ghana Food and Drug Administration (Ghana FDA) clearance processes. In addition, PMI support for health care workers at health facilities and CHPS compounds to effectively deliver malaria prevention services to pregnant women will expand to include malaria-specific OTSS and ISS in all 16 regions to ensure IPTp at every ANC visit and distribution of an ITN at first ANC visit. 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 A38. Trends in ANC Coverage

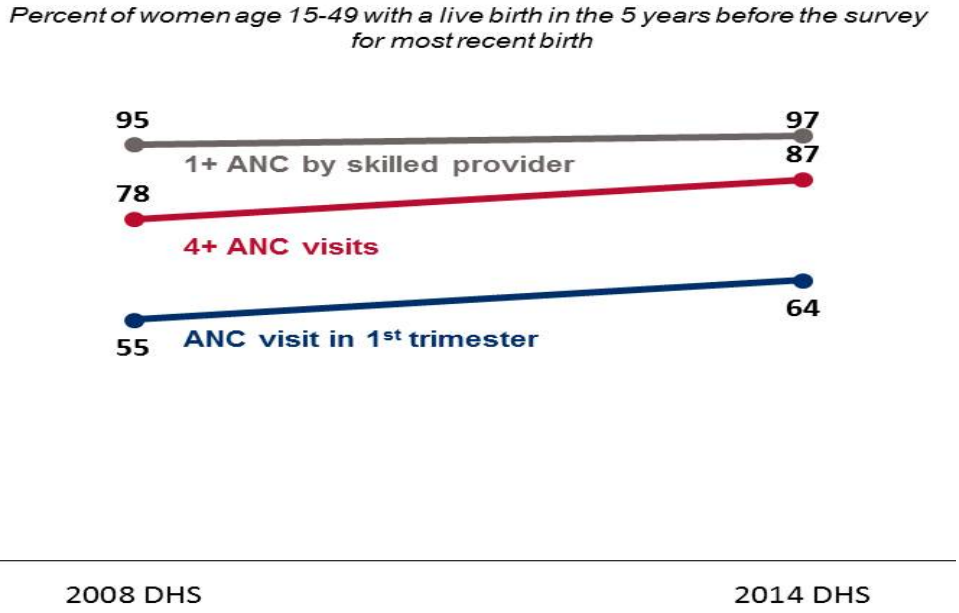


Figure A39. Key Barriers and Facilitators to ANC Attendance in Ghana.

Facilitator	Type of Factor	Data Source	Evidence
Positive experience at ANC	Social	Hill et al. 2013 Odjidja et al. 2017	Pregnant women have positive ANC experiences with HCWs
Early and often ANC attendance and healthy baby	Internal	Hill et al. 2013 Odjidja et al. 2017	Pregnant women attend ANC early and often to ensure the health of their baby
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Negative experience at ANC by late ANC attendees	Social	Hill et al. 2013 Odjidja et al. 2017	Pregnant women have negative experiences at ANC including verbal abuse for coming late, subtle coercion to purchase baby products and request for payments for lab screening and scans
Distance to facilities offering ANC services	Environmental	Hill et al. 2013 Odjidja et al. 2017	Health facilities that operate ANC are too far from clients

[1] Hill J, Hoyt J, van Eijk AM, D'Mello-Guyett L, ter Kuile FO, Steketee R, et al. (2013) Factors Affecting the Delivery, Access, and Use of Interventions to Prevent Malaria in Pregnancy in Sub-Saharan Africa: A Systematic Review and Meta-Analysis. PLoS Med 10(7);

[2] Odjidja EN, Kwanin C, Saha M (2017) Low Uptake of Intermittent Preventive Treatment in Ghana; An Examination of Health System Bottlenecks. Health Syst Policy Res. Vol. 4 No. 3:58.

Conclusion

A number of studies utilizing a KAP methodology with individual and focus group interviews have been conducted in Ghana to identify key facilitators and barriers to ANC attendance (Figure A39). Major facilitators included positive experiences at ANC and pregnant women who attended ANC early and often knew the importance of ANC for the health of their baby. Barriers included negative experiences at ANC mainly around mistreatment, especially young mothers, and distance to ANC making it inaccessible.

The trend in ANC attendance has been positive since 2008. Ghana has largely adopted the 2016 WHO ANC guidance, but recommends one contact in the first trimester, three contacts in the second trimester (instead of the WHO recommended two contacts to better facilitate early access to IPTp), and a minimum of four contacts in the third trimester. The updated ANC guidelines are reflected in the updated Ghana National Safe Motherhood Service Protocol and Maternal and Child Health record book.

Key Question 2

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

Supporting Data

Figure A40. 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

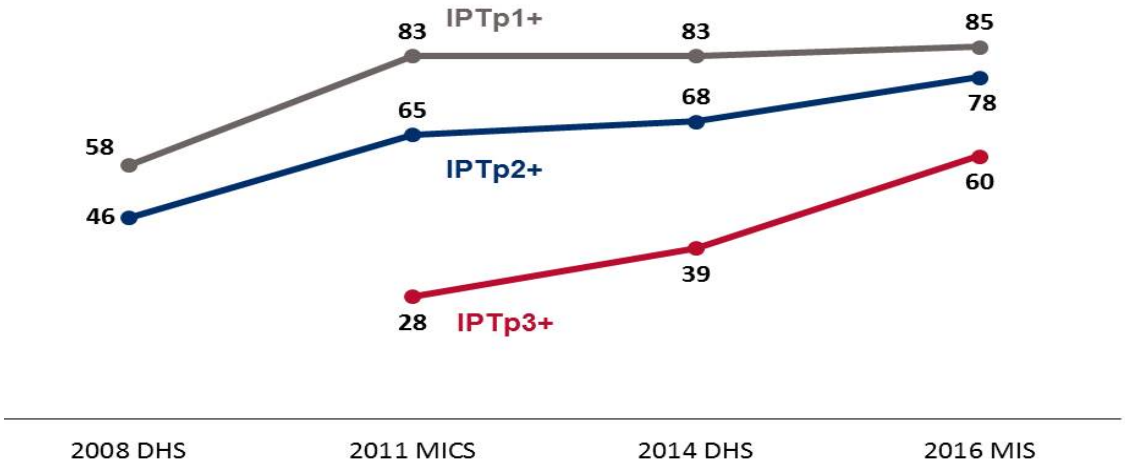
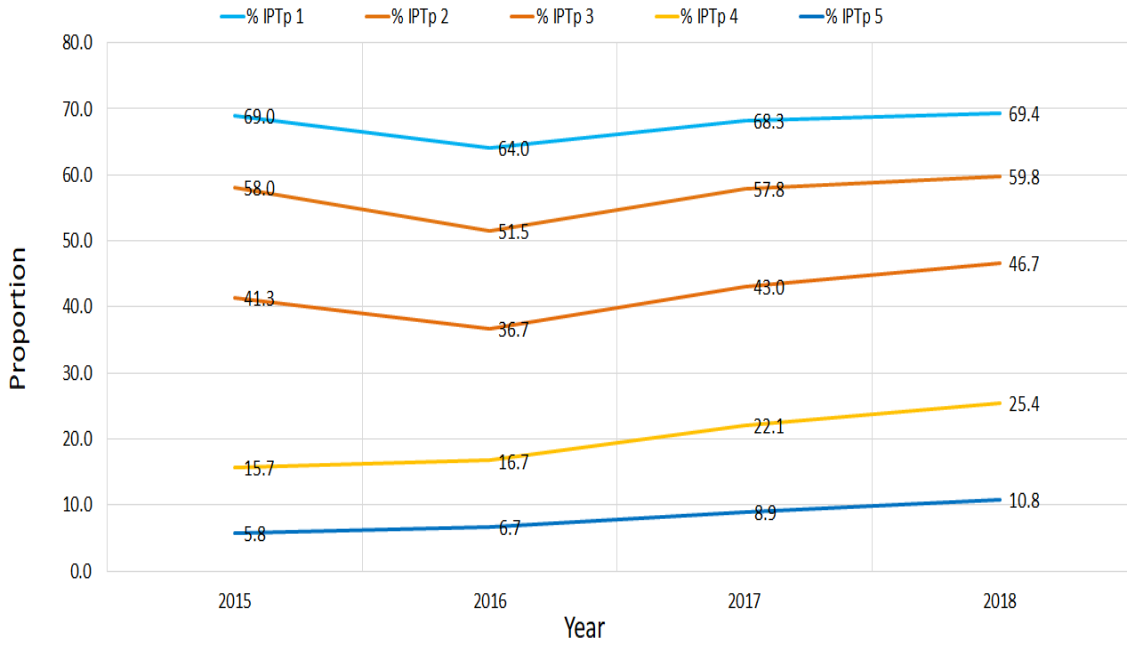


Figure A41. Trends in IPTp Uptake



Conclusion

Trends in IPTp uptake have been positive, with IPTp1+ and IPTp2+ increasing by 27 percent and 32 percent, respectively, between 2008 and 2016; however, IPTp3 uptake lags behind at 60 percent in 2016. Access to ANC is high, especially given the recent expansion of CHPS nationwide, but stockouts of SP remain a persistent problem and need to be addressed holistically. In FY 2020, PMI will support procurement of 25 percent of the national annual need of SP to ensure adequate and consistent supply for IPTp3+ as the GoG continues to strengthen their procurement processes. In addition, PMI will continue to support health care workers at health facilities and CHPS compounds in all 16 regions to effectively deliver IPTp at every ANC visit through supportive supervision and on-site training, and will support the GHS HPD to strengthen malaria SBC activities through expansion of malaria community engagement and outreach. Support will engage CHPS CHNs, CHOs, and CHVs to engage with communities and promote correct and consistent uptake of both preventative malaria interventions.

Key Question 3

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

Supporting Data

Figure A42. Trends in Missed Opportunities for IPTp

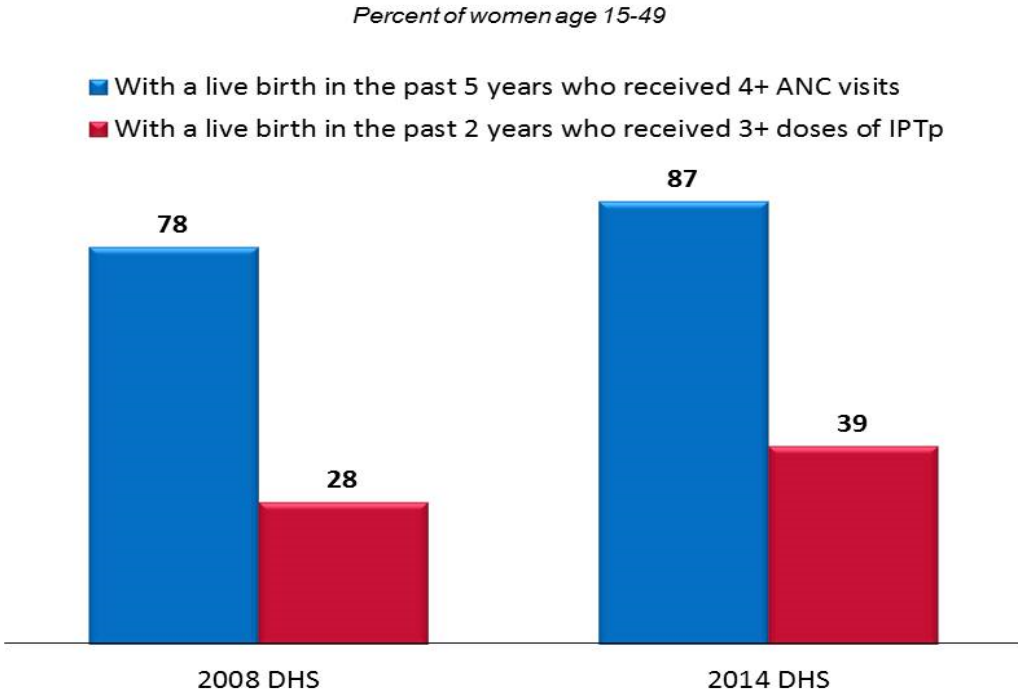


Figure A43. Key Barriers and Facilitators to IPTp Administration at ANC Visits in Ghana

Facilitator	Type of Factor	Data Source	Evidence
Availability of ANC service in most locations	Environment	Partner reports; desk review; Hill et al. 2013	Access to midwives at health facilities and CHPS increases ANC attendance
Positive/respectful provider attitude	Internal	Hill et al. 2013	Good ANC experience encourages additional ANC attendance
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Inconvenience of side effects of IPTp drugs	Internal	Partner reports, facility survey; Hill et al. 2013	Adverse reactions to SP reduce IPTp adherence
Stockout of SP	Environmental	Hill et al. 2013	Absence of SP leads to clients being provided a prescription to buy SP outside health facilities (non-adherence to DOT administration), which reduces IPTp adherence

Conclusion

A number of studies utilizing a KAP methodology with individual and focus group interviews have been conducted in Ghana to identify key facilitators and barriers to IPTp administration at ANC (Figure A43). Major facilitators included availability of ANC and provider attitude. Significant barriers included adverse reactions to SP, perceived adverse reactions, and lack of SP availability. Periodic facility-level stockout of SP and complaints of side effects of SP are the major barriers to administration of IPTp at ANC visits in health facilities. These barriers will form the basis of the SBC strategy to improve IPTp uptake through the ongoing malaria community engagement and outreach pilot in Volta Region that is led by the GHS HPD. Following an assessment of this pilot, to be conducted in 2020, it is expected that these activities will be refined and expanded through additional PMI support in FY 2020.

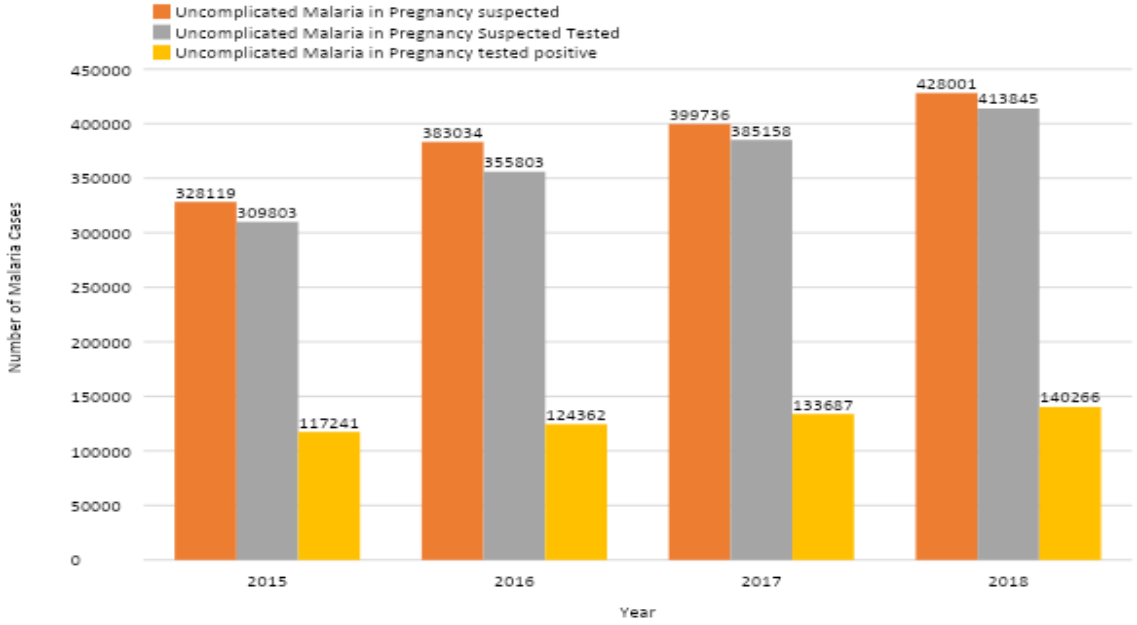
Key Question 4

What proportion of pregnant women with fever and malaria infection are getting diagnosed and treated?

Supporting Data

In 2018, suspected MIP cases totaled 428,001. Of these, 96.7 percent were tested for malaria and 32.4 percent (140,266) were confirmed positive. Malaria treatment data are not disaggregated and cannot be reported for MIP.

Figure A44. Malaria in Pregnancy Cases at OPD in Ghana, 2015 - 2018



Conclusion

Malaria in pregnancy cases are adequately tested, but there is a need to capture information on treatment. PMI is supporting the expansion of the E-tracker together with other USAID/Ghana health programs. The E-tracker follows individual pregnant women through their ANC visits and

subsequent IPTp doses. This will improve the denominator and ultimately routine IPTp reporting validity.

Key Question 5

What was the estimated need for IPTp commodities during calendar year 2019? What is the estimated need for IPTp commodities over calendar years 2020 and 2021?

Supporting Data

Figure A45. Gap Analysis of SP Needs 2019 - 2021

Calendar Year	2019	2020	2021
Total Population	**30,795,491**	**31,565,378**	**32,354,512**
SP Needs			
Expected pregnancies per year	1,231,820	1,262,615	1,294,180
Expectant Registrants for ANC [1]	1,194,865	1,224,737	1,255,355
Total SP Need (in treatments) [2]	**3,111,429**	**3,495,398**	**3,896,622**
Partner Contributions			
SP carried over from previous years	2,103,122	2,333,571	1,738,173
SP from Government	2,251,920	2,900,000	3,200,000
SP from Global Fund	0		
SP from Other Donors	0		
SP planned with PMI funding	0		970,000
Total SP Available	**4,355,042**	**5,233,571**	**5,908,173**
Total SP Surplus (Gap) [3]	**2,333,571**	**1,738,173**	**2,011,550**

[1.] This should be ANC1, ANC2, ANC3. Please refer to country quantification exercise for the information. For example, if total pregnant population is 1000 women and 90% go to ANC1 and 20% to ANC2 and 10% to ANC3, then total number of visits is 900+200+100=1200 pregnant women attending ANC.

[2.] This is number of treatments not number of pills. For examples, a woman who gets IPTp at 2 visits is counted as 2 treatments.

[3.] CY 2019: Surplus is calculated based on late CY 2019 clearance of GoG-procured amounts. Amounts for other years represent ideal qty to keep minimum stock in pipeline (6 months)

Conclusion

Though the GOG has been funding 100 percent of the SP needs for Ghana in recent years, PMI will support the procurement of approximately 25 percent of the annual need for CY 2021 in order to mitigate against the risk of supply pipeline disruptions occurring due to GOG funding delays, local procurement constraints, or prolonged Ghana FDA clearance processes.

Key Question 6

Are there any other considerations that impact your funding allocation in this category?

Supporting Data

There are no other considerations that impact the FY 2020 funding allocation for MIP.

Conclusion

Not applicable.

3. CROSS-CUTTING AND OTHER HEALTH SYSTEMS

3.A. SUPPLY CHAIN

NMCP objective
The NMCP largely relies on other GOG entities and donors to manage the physical warehousing and distribution of malaria commodities used in Ghana, but the current national strategy includes the following supply chain objectives: • Improved availability of malaria commodities at the national, regional, and facility levels • Strengthening of routine data collection systems to capture timely and reliable information to be used for supply chain decision making • Strengthened regulatory system for medicines and other pharmaceutical products • Improved storage conditions for malaria commodities • Engagement of partners to support the procurement of ITNs, medicines and other pharmaceutical products • Alignment of supply chain interventions related to malaria commodities with the GOG's plan for universal health coverage • Collaboration with Global Fund and other donors to fund prioritized supply chain initiatives involving malaria commodities and harmonize supply chain system strengthening approaches
NMCP approach
Ghana's supply chain master plan (2015-2020), which has been the backbone guiding implementation of prioritized interventions for supply chain reforms in the health sector, ends in 2020. This plan has been used to guide long-term transformational investments into the national health sector supply chain by government and development partners and move Ghana's health supply chain toward the desired future state of universal health care and a healthier population. The master plan established a vision for an efficient and effective health supply chain to be realized through enhanced logistics management, data visibility, the use of framework contracts for commodity procurement and last-mile distribution. Commodities for case management, including those required to treat severe malaria and IPTp, are supplied to service delivery points via the same routine commodity resupply processes managed under the stewardship of the GHS for other health programs and are partially funded by the Global Fund and PMI. The transportation of ITNs and SMC commodities, which is partly funded by PMI, is

managed directly under the auspices of the NMCP rather than GHS. However, ITNs for distribution through routine channels will eventually be transitioned into the routine resupply system.

PMI objective, in support of NMCP

The Ministry of Health's five-year supply chain master plan calls for strong supply chain systems that enable effective management of health commodities. PMI contributes to this strategy through the following activities:

- Provide subject matter technical assistance to the Global Fund supported team and the GHS to support the implementation of GhiLMIS nationwide, including on-boarding of all facilities and quality assurance during rollout
- Provision of quality central-level warehousing for PMI-funded commodities
- Distribution of PMI-funded commodities from central to regional and district levels
- Last mile distribution (LMD) of GHS managed commodities, including malaria commodities, from select regional levels to service delivery points
- Technical assistance to the MoH and GHS to advocate for GS1 standards among local manufacturers and importers of malaria and other health program commodities and develop a national traceability strategy for GS1 implementation in Ghana
- Assisting with the NMCP-led annual quantification and supply plan reviews of malaria commodities
- Strengthening transparency and accountability of public procurement of health commodities through the implementation of framework contracting mechanisms to address cost price variation and quality assurance related issues and leverage economies of scale for better unit cost price of quality assured essential medicines.

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

Over the past 12-18 months, PMI has supported the following supply chain activities:

- Assessed the national supply chain to inform the 2021-2025 supply chain master plan.
- Provided technical assistance to MoH and GHS for quantification and pipeline monitoring of malaria commodities, promoting skills transfer to the NMCP and decreasing reliance on external support in the future
- Assisted in the implementation of MoH framework contract and procurement compliance monitoring
- Designed a process to enable region-specific procurement and direct delivery of USAID donated commodities into two Regional Medical Stores (RMSs)

- Supported MoH and GHS to develop coding standards for health commodities to ensure quality and tracking of products throughout the supply chain
- Provided training to build in-country capacity to install and use temperature monitoring instruments/devices
- Assisted the NMCP with the distribution of SMC commodities to selected districts
- Leveraged private sector capacity to reduce cost and pricing of PMI-funded central level warehousing of malaria commodities by approximately 40 percent
- Provided direct logistics support to Eastern, Northern, North East, Savannah, Ashanti, and Upper West Regions to strengthen and sustain the implementation of LMD for the routine resupply of health commodities to facilities
    - Achieved an LMD coverage rate of 99.7 percent of hospitals, polyclinics, and health centers and 85 percent of CHPS compounds and clinics being reached at least once in CY 2018
    - Distributed USD $4,070,835 worth of malaria commodities from the central level to 10 RMSs and four teaching hospitals.
- Provided technical assistance to Bono East, Ahafo, Western and Western North regions to strengthen region-financed and region-managed LMD
- Provided project management and technical support for finalizing development and initial rollout of GhiLMIS to central, regional, and district levels and reinforced data use for supply chain decisions
- Conducted semi-annual end user verification (EUV) at 104 randomly selected health facilities
- Developed a framework, initiated in partnership with the University of Ghana School of Public Health, designed towards developing a high performing supply chain workforce in Ghana

Challenges or Bottlenecks

- There are low levels of monitoring and supportive supervision provided at the lower levels by RHAs a result of financial and HR constraints. PMI and Global Fund collaborate closely to enhance and improve support to the 10 RMSs to boost their reporting on program commodities and improve lower level monitoring and supervision.
- Limited availability at the central level of consumption data from service delivery points (SDPs) significantly affects the accuracy of forecasting and supply planning. Though PMI is collaborating with the Global Fund and GHS to support the complete rollout of GhiLMIS to all health centers, this will only be achieved towards the end of CY 2020. Furthermore, once rolled out, PMI will need to support efforts to promote a culture of GhiLMIS system use to

assist with the collection of consumption data for planning in order to fully realize the objectives of investing in the GhiLMIS.

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

Over the next 12-18 months, PMI will support the following supply chain activities:

- Support the MoH and GHS to develop a new Supply Chain Master Plan (2021 - 2025) based on recommendations from the National Supply Chain Assessment
- Support warehousing and transportation of PMI-funded commodities through private sector logistics providers
- Provide technical support to the NMCP-led annual quantification and reviews of malaria commodities
- Engage with Global Fund to increase its support of LMD from four to five regions
- Strengthen the implementation of LMD and develop and implement region-specific transition plans for LMD to be funded and managed with GOG funding
- Provide technical assistance to the MoH to strengthen transparency and accountability of public procurement of health commodities through its e-procurement platform and framework contracting mechanisms
- Design and pilot region-specific procurement and direct delivery of PMI-funded malaria commodities to one or two RMSs
- Provide technical assistance to the MoH and GHS to advocate for GS1 standards among local manufacturers and develop a national traceability strategy for GS1 implementation in Ghana
- Provide distribution planning and transport support to the NMCP to conduct SMC in the Northern, North East, and Savannah Regions
- Collaborate with the Global Fund and the GHS to conduct onboarding of all facilities to achieve full operating capacity of GhiLMIS. This will include:
    - Technical assistance to MoH and GHS towards the development of a culture of GhiLMIS usability among relevant staff across the supply chain
    - Provision of technical assistance and training for GHS staff at the central and regional levels for improving supply chain data analytics
- Provide technical assistance and support to MoH, GHS, and RHAs to strengthen the functioning of supply chain coordination mechanisms at central and regional levels, including monthly monitoring of stock levels and commodity consumption from GhILMIS, reinforcement of semi-annual quantification and procurement review, continue to strengthen the last mile delivery.

- Conduct EUVs to assess supply chain performance at the last mile to provide verifiable data for decision making
- Build on partnership with University of Ghana School of Public Health and other public training institutions to develop and implement tailor made regional supply chain quality improvement programs to improve the productivity of human resources working in health supply chains in Ghana

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 expanding, contracting, or changing any supply chain activities? If so, why, and what data did you use to arrive at that conclusion?
Supply chain activities in FY 2020 will not vary considerably from those supported in FY 2019. Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

Has the central level 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 A46. Central Stock Levels for AL

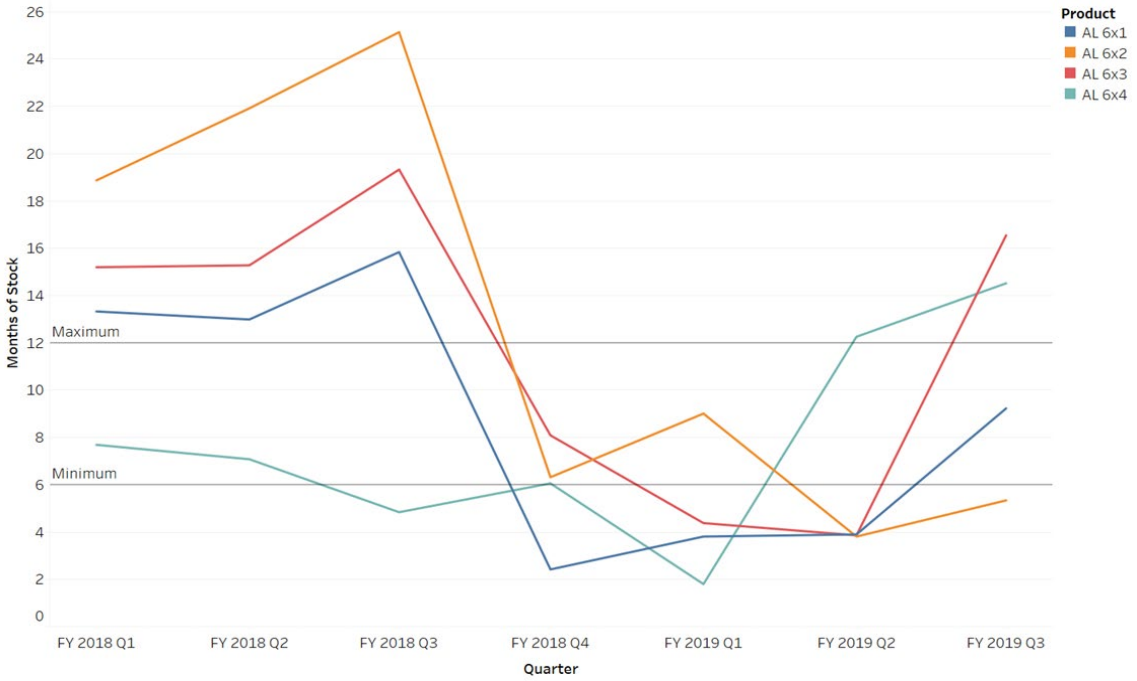
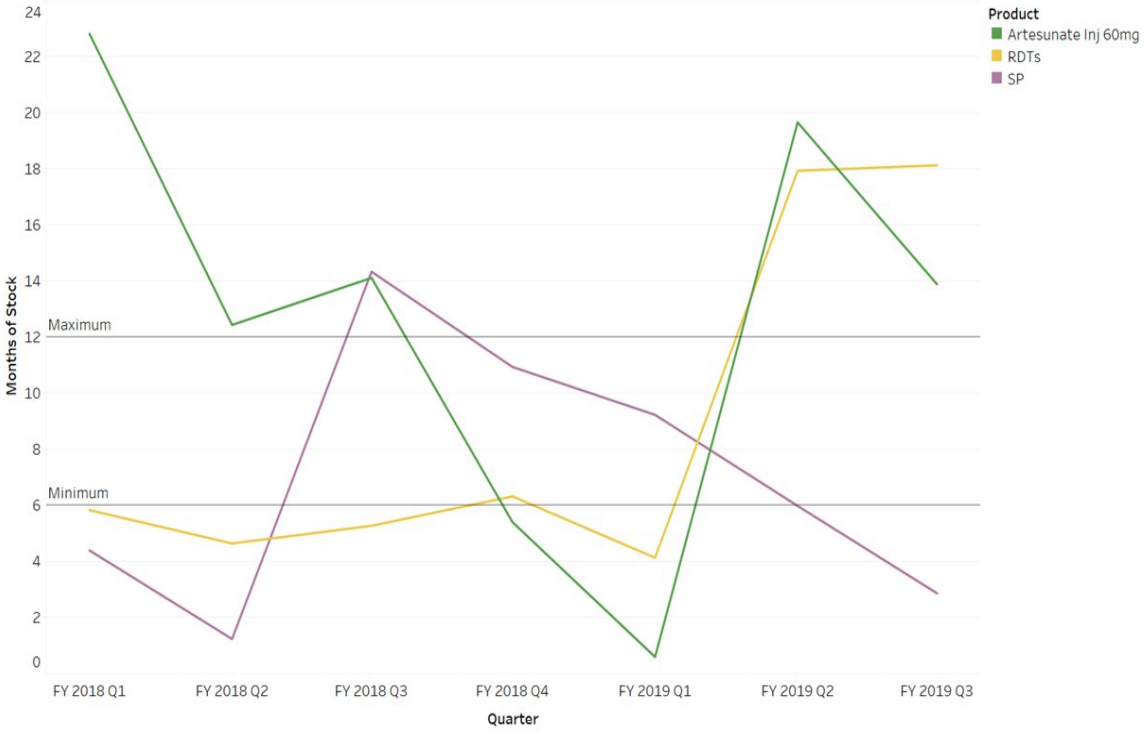


Figure A47. Central Stock Levels for AS/AQ

Figure A48. Central Stock Levels for RDTs, SP, and Injectable Artesunate, 60mg



Conclusion

The central level has been stocked somewhat according to plans for AL, RDTs and SP over the last year. AS/AQ has been understocked over the last year with Global Fund-supported procurements being insufficient to bring stock levels to minimum desired months of stock (MOS) and PMI-funded orders being cancelled because the product was determined to be out of specifications during the QA process. The understocking of AS/AQ at the central level subsequently increases demand for AL throughout the supply chain. Besides ongoing support for the preparation and monitoring of supply plans, for which GHSC-PSM HQ support is also provided, one specific activity, detailed in the planned activities section, aimed at smoothing out the central level MOS a bit more is the designing and piloting of regional specific procurements and direct delivery of PMI-funded commodities.

Key Question 2

What are the trends in facility- and community health worker-level stock out rates for ACTs, RDTs, and SP over the last year? Is there a seasonal or geographic difference in stock out rates?

Supporting Data

Figure A49. AL Stockout Rates (EUV Data)

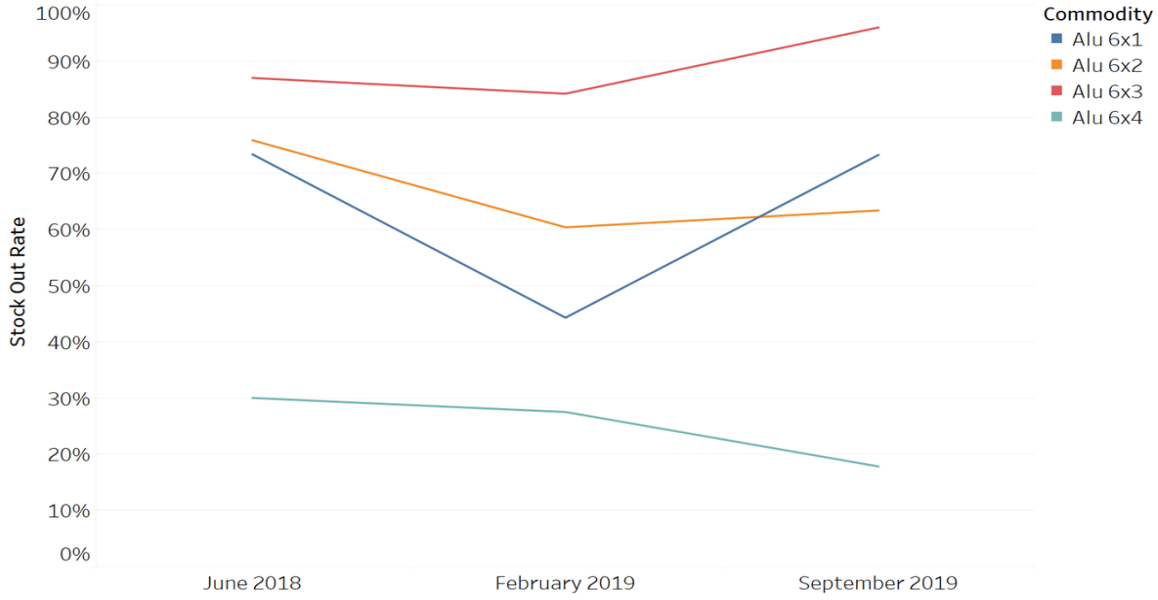


Figure A50. AS/AQ Stockout Rates (EUV Data)

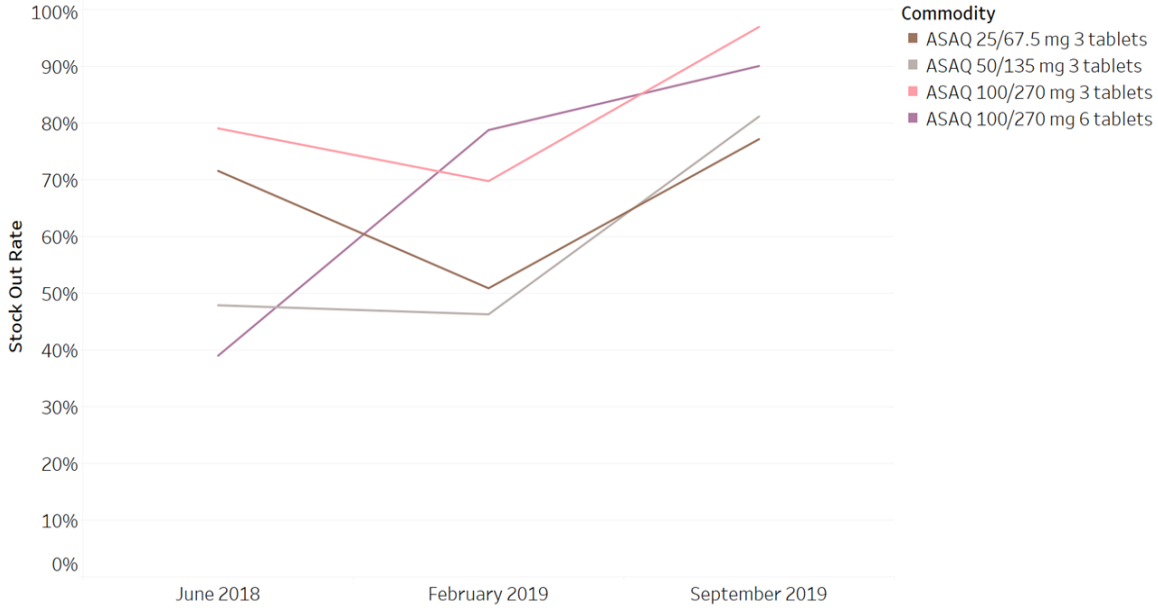
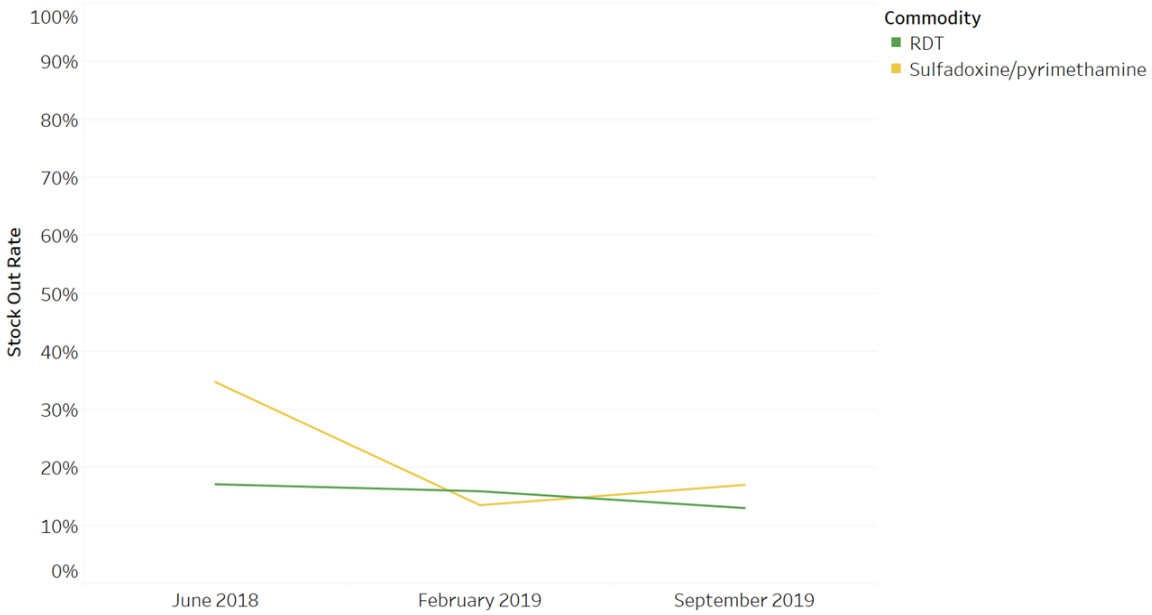


Figure A51. Stockout Rates for RDTs and SP (EUV Data)



Conclusion

Despite the central-level supplies of AL being available and LMD facilities being supplied via LMD efforts, high stock out levels were encountered for all ACT presentations, with the exception of AL 6X4 during EUVs conducted in CYs 2018 and 2019. The high stock out rates for three out of four AL presentations is a direct result of HCWs only ordering and stocking the 6X4 presentation, as it can be cut to treat all age and weight bands. The stock out rates for all AS/AQ presentations can be attributed to the central level not being stocked according to plan, as described under Key Question 1 above. Adults have little preference for AS/AQ and it is used by providers to treat children. The option to treat clients from the AL 6X4 results in many SDPs not ordering and thus not stocking, or stocking in very minimal quantities, AS/AQ. This increases demand on AL. The relatively low stock out rates for RDTs, SP, and AL 6X4 reflects continuous availability of these commodities at the central level as well as continual resupply via LMD. PMI and GF will work with NMCP and RMSs to monitor LMD performance, which varies among regions, and strengthen as required and expects this monitoring to be better facilitated through the continued rollout of GHiLMIS.

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

ACT and RDT discrepancies data are not available.

Conclusion

In previous years, and throughout most of CY 2019, the quantities of ACTs and RDTs consumed at each service delivery point (SDP) were mandated to report monthly to the district level via the paper-based logistics management information system (LMIS) RRIRV-Report, Requisition, Issue and Receipt Voucher, which is used for multiple GHS health programs. However, the malaria commodity data from these reports, when they are submitted, has not routinely been forwarded in either aggregated or disaggregated form, to the central level. Subsequently, the quantities of ACTs or RDTs that have been consumed at a national level across a specific period of time are not available and quantification is limited to the use of higher level issues data.

The GhiLMIS, for which rollout commenced in mid-CY 2019 and will be completed in late 2020, will eventually be forwarding LMIS data, disaggregated by service delivery point, to the central level from around 3,800 of approximately 5,500 sites. This will include approximately 2,500 of 4,160 CHPS compounds where there is sufficient infrastructure in place to support the platform. As GhiLMIS rollout continues through CY 2020, periodic reporting of the consumption of ACTs, RDTs, and other malaria commodities from sites having reported into the system on time will be able to be compared with case management data.

Key Question 4

What are the trends in LMIS reporting rates?

Supporting Data

There are currently no data systematically made available at the central level to inform LMIS reporting rates for the entire country.

Conclusion

A paper-based LMIS is used for multiple GHS health programs by lower level facilities to report information on stock status and replacement product requirements to the next highest level in the supply chain. This reporting is used to inform the routine resupply to these facilities via LMD. However, information on the timeliness of the submission of these reports is not routinely forwarded to the next-highest level in the supply chain. As a result, data is not systematically made available at the central level to inform LMIS reporting rates for the entire country.

The GhiLMIS, for which rollout commenced in mid-CY 2019 and will be completed in late 2020, will eventually be forwarding LMIS data, disaggregated by SDP, to the central level from around 3,800 of approximately 5,500 sites. This will include approximately 2,500 of 4,160 CHPS compounds where there is sufficient infrastructure in place to support the platform. In other sites without sufficient infrastructure LMIS data will be forwarded to higher level facilities via paper forms. As GhiLMIS rollout continues through CY 2020, periodic reporting of the number sites having reported into the system on time will be presented against the total number of sites in which GhiLMIS has been implemented and then against the total number of sites for which LMIS (whether electronic or paper-based) should be being produced. In FY 2020, PMI

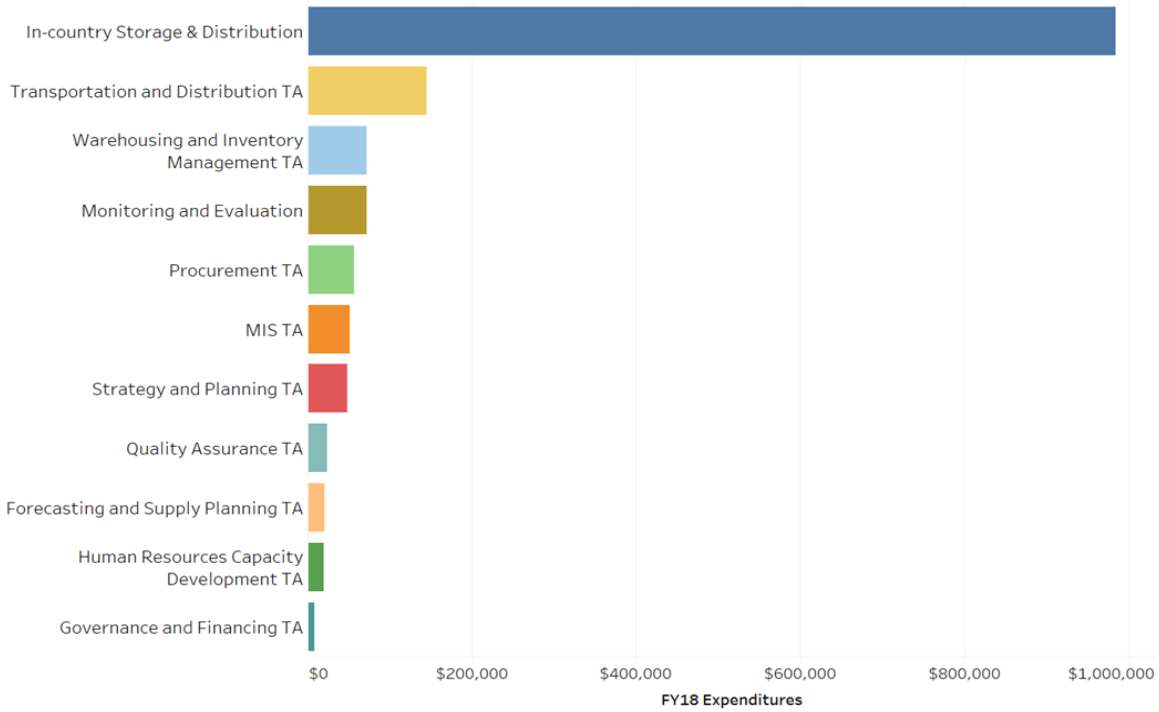
programming support will have transitioned from supporting the rollout of GHiLMIS to supporting the routine use of the data generated by this platform.

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 make? In areas performing well, is it dependent on PMI/donor funding and so should be maintained?

Supporting Data

Figure A52. PMI Supply Chain Investments in FY 2018



Conclusion

The warehousing and distribution of PMI-funded commodities, particularly ITNs, consumes the majority of PMI supply chain support in Ghana. With each successive ITN campaign, both the planning and execution of the logistics involved with getting ITNs down to the household level has improved tremendously, but has increasingly become more dependent on the funding provided by PMI and other donors to manage the central level staging, warehousing, and in-country distribution.

The distribution of other PMI-funded malaria commodities using commercial transportation logistics providers has supported the availability of these commodities at service delivery sites. The lower costs for using commercial providers as compared to the GHS has provided strong evidence to regions to invest in their ability to manage the services provided by commercial transporters rather than invest directly in the infrastructure that would be required to undertake

these efforts internally. Eastern Region has adopted this concept and uses a combination of private transport companies and the fleet of the RMS for commodity delivery.

Key Question 6

Are there any other considerations that impact your funding allocation in this category?

Supporting Data

The portion of PMI funding that supports just the temporary warehousing required for the execution of school-based distribution and mass campaigns amounts to approximately 10 percent of the overall associated logistics costs of PMI's support for ITN distribution.

PMI past support to the Ghana-FDA has resulted in identification/removal of counterfeit ACTs (and other medicines) off the shelves. Substandard ACTs have decreased significantly (<10 percent) due to post-market surveillance by the Ghana-FDA.

Conclusion

There is an expectation that in FY 2020, the GOG will have been sufficiently engaged in advance of the 2021 ITN mass distribution campaign to have secured portions of the necessary temporary staging warehousing required, and this will not need to be supported by PMI. As these warehousing needs are temporary and do not require the same degree of operational complexity as required with health commodities incorporated into the routine supply system, the infrastructure of other government ministries or even the private sector may be solicited as part of the NMCP's formalized resource mobilization efforts.

PMI envisions continuing to support the Ghana-FDA and private manufacturers to jointly enable the achieving and maintaining of WHO standards for good manufacturing practices.

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

NMCP objective
The NMCP objective is to strengthen the systems for surveillance and M&E in order to ensure timely availability of quality, consistent and relevant malaria data at all levels by 2020. Specific objectives include: • Enhancing routine surveillance and coordinated monitoring of program progress • Supporting population based surveys: Demographic and Health Survey (DHS), Multiple Indicator Cluster Survey (MICS), Malaria Indicator Survey (MIS), and Knowledge, Attitudes and Practices (KAP) survey • Improving data quality and dissemination of survey and surveillance reports

NMCP approach

The Ghanaian NMCP adapts their implementation of malaria interventions through programmatic decision making based on various data sources, including DHIMS2, periodic household surveys, and supportive supervision visits. The National Malaria Control Monitoring and Evaluation Plan (2014-2020) guides the M&E strategic framework for malaria control in Ghana. The objective of the M&E plan is to reinforce health information systems and processes to provide timely, accurate, reliable, and valid data for programmatic planning, management, and decision-making. In 2014, the NMCP established 30 sentinel sites (which are primarily district level hospitals) for monitoring trends in malaria burden and other disease indicators with support from the Global Fund and DFID. Sentinel sites were used to alleviate concerns regarding data quality at the facility level and to create a platform for special studies, such as therapeutic efficacy testing of ACTs and assessing the motivation towards non-adherence to test results (i.e., treating despite negative test results). For malaria, these sites provide data on number of suspected cases, number of suspected cases tested, and number of confirmed positive cases. Thick and thin stain smears are also performed on every suspect case.

Ghana uses DHIMS2 as the main source of data for tracking and measuring programmatic progress. The DHIMS2 web-based platform is managed by the GHS Policy, Planning, Monitoring, and Evaluation (PPME) Division through the Centre for Health Information Management. This system is used for reporting and analyzing district level data from health facilities, is available in all districts, and includes a customized dashboard to report malaria-focused indicators. Entering patient information into this system is a multi-step process. In theory, data entries into DHIMS2 are first recorded into standard registers at health facilities with patient consultations. Data are then collated and aggregated from these registers into standardized reporting forms on a monthly basis. Facility Health Information Officers are responsible for the collection and verification of data from facility departments at the end of every month and for submission to the District Health Information Officer. The data is quality checked monthly by a district validation committee which provides recommendations to improve data quality. The head of the facility reviews and endorses the collated facility data after it has been cleared by the data validation committee, and before it is submitted to the district.

PMI objective, in support of NMCP

PMI contributes to Ghana's SM&E strategy for malaria, which prioritizes DHIMS2 data validation, analysis, and use at all levels of the health system through quarterly data review meetings at the districts and capacity building of health information officers in districts, sub-districts, health centers, and CHPS compounds. PMI support for this activity is nationwide and includes:

- Improving supportive supervision and training at all health levels to ensure proper data collection, reporting, and interpretation

- Continuing to support regional malaria data review workshops to discuss DHIMS2 data use and programmatic implications
- Work with the NMCP on the integration of DHIMS2 data with ISS and other health facility data from GhiLMIS

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

PMI works with the NMCP and other partners to improve the quality of data and build capacity for evidence-based decision-making at the district level. DHIMS2 data has improved with PMI support with completeness at >90 percent and improved timeliness. Increased laboratory confirmation with either RDTs or microscopy are also providing a better picture of the trends and burden of malaria throughout Ghana. Routine data quality audits (DQAs), data validation committees, and other data quality checks at different levels continue to increase the quality of the data entered in DHIMS2. Utility as defined by data analysis and use for program improvement is also a PMI priority and we are working at the CHPS compound, health center, regional hospital, and national NMCP levels to ensure this comes to fruition. Quarterly data analysis and use meetings provide weekly and monthly trends to health care personnel where malaria increases can be detected and responded to timely and effectively. Specific support over the past 18 months has included:

- Data coaching visits conducted in 14 districts across two regions (Eastern and Upper West). A total of 18 health facilities received coaching on data collection, reporting, and use of data for local planning. Representatives from each district included the regional health information officer, regional malaria focal person, district health information officer, and NMCP person).
- Refresher training for 31 OTSS supervisors in malaria data management (Upper East and Upper West) at 43 health facilities with 193 staff supervised.
- Collaborated with NMCP to develop facility-based wallcharts for key malaria indicators, including ACT adherence, MIP, and in-patient and out-patient.
- Trained 120 health information officers and malaria focal persons from 37 health facilities and DHAs to customize DHIMS2 dashboard and roll-out facility-based wallcharts.
- Supported 37 facilities to develop change ideas using data and the Plan Do Study Act (PDSA) quality improvement approach to address challenges at the facility level.
- Supported four regions (Ashanti, Bono East, and Ahafo Region, Eastern and Upper West) to prioritize facilities using their performance data for key malaria indicators.
- Training of 1,155 staff in malaria case management, MIP, data quality and use, and quality improvement.
- Supported 60 CHO internships in malaria and febrile fever case management.

- Training of 11 national-level trainers (NMCP and CLU) and 45 regional Laboratory OTSS Supervisors on the use of health network quality improvement system (HNQIS) Electronic Data System (EDS) for conducting round 17 OTSS and the 5th Proficiency Testing Scheme (PTS 5) in 250 health facilities nationwide.
- Supported national M&E technical working group meeting and regional annual performance review.
- Supported the 2019 MIS to track progress in terms of malaria control and prevention
- Supported the implementation and expansion of E-tracker to strengthen monitoring of malaria indicators.

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

Over the next 12-18 months, PMI will support the following SM&E activities as part of a coordinated multi-pronged approach aimed at strengthening data quality and use at the lower levels of the health system:

- Support health facilities, subdistricts, and districts to strengthen data quality to help inform programmatic decisions. Activities will include:
    - Providing integrated data coaching visits to health facility data management staff to validate and audit data collection, analysis, and reporting to improve data quality
    - Supporting regional mid-year review meetings that focus on improved analysis and data use; supporting the PPME Division's Center for Health Information Management boot camp meetings to routinely assess and discuss malaria data
    - ISS by GHS to improve collection and reporting of data from the health facility up to the district level.
    - Support the E-tracker implementation in the Central region (following previous support in the Upper East, Eastern, and Volta regions). The E-tracker is a transactional electronic register to help track patient service delivery and streamline data collection.
    - Support training of health facility and subdistrict GHS personnel (30 per cohort for 3 months) in the FRONTLINE Field Epidemiology Training Program (FETP) to strengthen a "data quality and use" culture at the service delivery points. FRONTLINE FETP includes two weeks of didactic training and the field support and application of training competencies (surveillance, outbreak investigation, data analysis/use, SBC, etc.) through daily mentoring.

- Support quarterly data review meetings at the subdistrict levels where service providers must analyze, present, and make programmatic improvements based on their data. FRONTLINE FETPs will facilitate these important meetings.

- Planning, implementation, analysis, and dissemination of the malaria module in the 2021 DHS. Malaria specific indicators will include ITNs, case management, MIP, and national/regional malaria parasite positivity in children under five.
- Technical assistance from PMI headquarters M&E team to work with the NMCP to support strengthening M&E and health management information system activities.

PMI Goal

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

Do you propose expanding, contracting, or changing any SM&E activities? If so, why, and what data did you use to arrive at that conclusion?

In FY 2020, PMI will increase funding for SM&E activities in order to support the 2021 DHS. PMI will maintain support for improving data quality, including implementation of the E-tracker system through the GHS PPME. 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 A53. Data Collection Activities 2015 - 2023

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				(X)
	Multiple Indicator Cluster Survey (MICS)			X*	X*					
	EPI survey									

Data Source	Data Collection Activities	Year								
		2015	2016	2017	2018	2019	2020	2021	2022	2023
Health Facility Surveys	Service Provision Assessment (SPA)									
	Service Availability Readiness Assessment (SARA) survey									
	Other Health Facility Survey									
Other Surveys	EUV	X	X	X	X	X	(X)	(X)	(X)	(X)
	School-based Malaria Survey									
	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	X*	X*	X*	X*	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 (Supply Chain Early warning System, eLMIS)	X	X	X	X	X	(X)	(X)	(X)	(X)
	Other (Malaria Rapid Reporting System)									

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

Conclusion

In FY 2020, PMI will contribute funding to support the malaria module of the 2021 DHS. PMI will continue to support and strengthen routine systems through DHIMS2 data validation, quarterly data review meetings at districts, and tools to improve data analysis and use such as dashboards and wall charts. PMI will contribute to supporting the nationwide roll-out of GhiLMIS. By 2021, GhiLMIS is envisioned to be expanded to district facilities and the CHPS. PMI will also contribute along with other USAID Ghana health programs to the expansion of E-

tracker to improve malaria case management and affording the opportunity to track pregnant women longitudinally.

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 A54. Donor-Supported HMIS Activities in Ghana, 2018 - 2020

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this? (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		
Data quality assessments (separate from supervision – funding for travel to lower levels)	X	X	X	X	
Program monitoring and technical assistance (funding for travel to lower levels)	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	
Human Resources (secondment of person in NMCP 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	
External relations/Communications/Outreach (support travel to international meetings and publications)	X	X	X		
Support to annual operational plans for national malaria program				X	

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this? (X)
	FY 18	FY 19	FY 20		
Desk review to catch "logic errors system" (provide TA to catch logic errors)					
Admin 1 Level (Region). PMI supports activities in [16] regions while Global Fund supports activities in [16] regions.					
Registers (warehousing, printing, distribution)				X	
Data quality assessments (separate from supervision – funding for travel to lower levels)	X	X	X	X	
Program monitoring and technical assistance (funding for travel to lower levels)	X	X	X	X	
Training (funding for Admin 2 staff to conduct training at lower levels, capacity building (i.e. on the job training for Admin 2 level staff)	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)		X		X	
Adaptation of checklists and job-aides	X	X	X		
Participation in national meetings (support for travel costs)				X	
Support to Annual Operational Plans for Admin 1 Malaria Program				X	
Admin 2 Level (District)					
Data entry, summary, and transmission (training, re-training, computers, internet, tools)	X	X	X		
Supervision (training, traveling, supervision tools/checklists, create/design system for organized/methodical supervision)	X	X	X	X	

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this? (X)
	FY 18	FY 19	FY 20		
Data validation (data validation activities before monthly data submission - organize health facilities)	X	X	X	X	
Monthly/Quarterly data quality review meetings (venue, meeting support)			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 Admin 1 (support travel)				X	
Facility Level					
Data collection/entry, summary, and transmission (training, re-training, computers, internet, tools)	X	X	X		
Supervision of CHWs (training, traveling, administering supervision tools/checklists of community health workers)	X	X	X		
Data use (analysis, interpretation, visualization (dashboards), dissemination/feedback to CHWs, decision-making)	X	X	X		
Monthly/Quarterly data quality review meetings(support for travel)			X		
Community Level					
Data collection/entry and transmission (training, re-training, tools	X	X	X		
Data use (analysis, interpretation, decision-making)	X	X	X		
Monthly/quarterly data quality review meetings (support for travel)			X		

Conclusion

PMI has worked with the NMCP and other malaria stakeholders to strengthen DHIMS2, and data completeness and timeliness of reporting have improved. PMI has supported regional, district, facility, and community (CHPS compound) data collection, analysis, and use. In FY 2020, PMI

will strengthen routine data use by supporting quarterly data review meetings at the regional and district levels. PMI will also support the GHS to expand the E-tracker, which is an electronic tablet based system that provides real-time OPD data and improves data validation, visualization, analysis, and use. A DHS was planned in 2019, however adequate funding was not mobilized, so PMI along with the NMCP, Ghana Statistical Service (GSS), and the Global Fund moved funding to support a MIS. A DHS is envisioned in 2021 and PMI is working with the USAID Ghana Health Office, NMCP, GSS, and other stakeholders to ensure adequate funding.

Key Question 3

What are the outcomes of HMIS strengthening efforts?

Supporting Data

Figure A55. HMIS Strengthening Efforts, 2018 - 2018

		2017	2018
Timeliness	% of reports received on time	100	98.4
Completeness	“Confirmed malaria cases for children under 5 years of age" was reported in X% of facility-months	100	100
Accuracy	Populate with most recent DQA data	Not available	Not available

Conclusion

DHIMS2 quality is improving over time with timeliness, completeness, and reliability when triangulated with other data sources (i.e. sentinel sites and household surveys). Data validation, analysis, and use remain key challenges especially at lower levels. In FY 2020, PMI will support data reviews, validations, and analyses at district and sub-district levels to increase the use of data for decision making and address quality of data going into the DHMIS2 platform.

Key Question 4

Are there any other considerations that impact your funding allocation in this category?

Supporting Data

There are no other considerations that impact the FY 2020 funding allocation for SM&E activities.

Conclusion

Not applicable.

3.C. SOCIAL AND BEHAVIORAL CHANGE (SBC)

NMCP Objective
To increase awareness and knowledge of the entire population on malaria prevention and control so as to improve uptake and correct use of all interventions by 2020.
NMCP Approach
Ghana's malaria control efforts are supported by a five year malaria control communication strategy (2015-2020), which supports the malaria NSP objective that aims "to increase awareness and knowledge of the entire population on malaria prevention and control so as to improve uptake and correct use of all interventions by 2020". The goal of the communication strategy is to achieve significant shifts in behavior change among key target groups nationwide. The communication strategy document presents communication approaches for seven technical areas of malaria control, including ITN utilization, uptake of SMC in target areas, IPTp with SP, IRS, case management with special focus at community, environmental management for malaria control, and introduction of malaria vaccine. Each communication approach includes audience segmentation, behavioral analysis and prioritization, communication channels, and messages as well as tools to be used to carry out SBC activities. The National Malaria Communication Committee is the entity charged with oversight of the implementation of the communication strategy. Officially, a sub-committee of the Malaria Interagency Coordination Committee (MICC), the National Malaria Communication Committee is a working group with responsibility for reviewing, approving, and initiating the development of communication materials for malaria. The committee provides oversight and input to the NMCP's Advocacy, Communication, and Social Mobilization (ACSM) sub-committee, which is a GHS program and thus receives technical and normative guidance and inputs from the GHS HPD. The GHS HPD, which GHS recently elevated from department to division, is responsible for the design, implementation, and evaluation of all SBC activities in Ghana. In addition, the National SBC Technical Review Committee (SBC/TRC) comprised of directors of key departments and divisions of the GHS including the NMCP provides the final clearance and endorsement for production, dissemination, and broadcast of all SBC materials including materials on malaria. The committee is under the office of the GHS Director General. Historically, SBC activities in Ghana have been largely comprised of mass communications through TV, radio stations, and print media, with limited training and interpersonal communication activities for specific malaria interventions (i.e., SMC and IRS campaigns) and capacity strengthening of NMCP and GHS HPD staff. PMI and the Global Fund have provided coordinated support to NMCP for the design and implementation of SBC activities for malaria interventions, except for larval source management, which is entirely covered by the GOG. These SBC efforts have focused on promoting adherence to national malaria case management guidelines (i.e. correct and consistent use of ACTs and adherence to RDT results), adherence to IPTp guidelines, ANC attendance, prompt

care seeking, acceptance of IRS, correct and consistent use of ITNs, and ITN care practices. Recognizing a gap in SBC efforts, PMI and USAID Ghana have shifted support to focus on "below the line" interventions, namely the GHS HPD community engagement program, a malaria-specific community engagement is currently being piloted in Volta Region. PMI will support an assessment of this pilot in CY 2020, which will be used to inform nationwide expansion of the community engagement program for malaria through PMI's support for direct G2G financing to GHS HPD and provision of technical assistance.

PMI Objective in Support of NMCP

PMI is an active member of the national malaria communication committee. At the national level, PMI aims to improve the uptake of key malaria interventions by the population and adherence to national guidelines by service providers. PMI primarily designs SBC efforts that target the population to increase the use of ITNs, the uptake of IPTp given the recent shift from IPTp3 to IPTp5, and early care seeking. PMI also targets SBC activities to service providers to improve adherence to IPTp and case management guidelines and strengthen interpersonal communication skills to promote desired behaviors for the uptake and use of key malaria control interventions. In particular, PMI builds community outreach skills of CHNs and CHOs at CHPS compounds to engage community members and opinion leaders to adopt and promote desired malaria control behaviors. In targeted districts, PMI supports SBC activities to increase coverage and acceptance of IRS and SMC interventions. PMI will also support the HPD through G2G funding to implement integrated community engagement to improve health outcomes.

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

During the past 18 months, PMI has supported SBC activities through a variety of channels, including mass media, health facility-based interpersonal communication, limited community engagement for malaria prevention, and school-based interpersonal communication. During the same period, PMI supported mass media activities focused primarily on promoting correct and consistent use of ITNs, ITN care, ANC attendance, and prompt care seeking for fever. The malaria-specific components of this mass media campaign seek to:

Create a positive net culture to promote acquisition of ITNs, correct and consistent use of ITNs, and proper care behaviors

Promote timely and regularly scheduled ANC attendance

Increase adherence to national IPTp guidelines

Encourage prompt and timely care-seeking for febrile children

Increase adherence to national malaria case management guidelines, including correct and consistent use of ACTs and adherence to RDT results

Improve acceptance of SMC and IRS

Facility- and community-based interpersonal communication activities have targeted adherence to national malaria case management guidelines, adherence to IPTp guidelines, ANC attendance, and prompt care seeking. In the past year, PMI has supported the design and implementation of a community engagement pilot program for malaria prevention, an initiative led by the GHS HPD, aimed at increasing awareness of the malaria burden, and facilitating community action planning for malaria prevention. The initiative started in 95 functional CHPS compounds in seven districts of the Volta region. A total of 135 frontline health workers have been trained to support the Community Health Management Committee Members to design and implement tailored malaria community action plans in their respective localities. The initiative will be expanded with the objective to increase demand and use of malaria control service at the CHPS compound, sub-district, and district level health facilities.

School-based interpersonal communication activities, in tandem with school-based ITN distribution activities, have focused on correct and consistent use of ITNs and ITN care practices. In 2019, these efforts targeted primary school pupils, teachers, parents and families, and community leaders in the 9 regions that participated in the school-based distribution activities. PMI also supported the development of web-based SBC training tools, which will remain available and readily accessible to new school health teams who may require coaching from peers or who may want to use the material to self-tutor. These user-friendly electronic versions of the school SBC materials are accessible on Android app and web-based platforms. The materials include "*Promoting Malaria Prevention Through Primary Schools – Communication Guide for Teachers"*, "*Drama Guide* comprising *Sampled Scripts for Malaria Prevention"*, and "*Net Use and Care"* poster.

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

Over the next 12-18 months, PMI will support the following SBC activities:

- Continue mass media malaria activities to increase the use and uptake of malaria prevention nationwide and targeting all population groups
- Conduct an assessment of the GHS HPD community engagement for malaria prevention pilot in Volta Region and use the findings to inform expansion of the program through G2G support
- Improve interpersonal communication (IPC) in health facilities and adherence to national malaria guidelines through support to NMCP and HPD
- Strengthen capacity of HPD to conduct focused formative research and develop evidence-based SBC interventions to respond to community malaria prevention needs
- Strengthen institutional capacity of HPD to lead, coordinate, and mobilize resources for SBC interventions, including malaria prevention
- Improve SBC learning and knowledge management

PMI Goal
Through the use of social and behavior change 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.

Do you propose expanding, contracting, or changing any SBC activities? If so, why, and what data did you use to arrive at that conclusion?
In FY 2020, PMI will increase support for SBC activities to put more emphasis on below the line communication compared to the strong focus on mass media as in previous years. The Ghana 2016 MIS showed that 33 percent and 38 percent of women interviewed received messages on malaria control from radio and TV, respectively, while only 24 percent and 14 percent received the message from health workers and community health workers, respectively. With FY 2019 funds, PMI is currently supporting a community engagement for malaria prevention pilot in the Volta region, which will be assessed in CY 2020. Lessons from the pilot will inform the design for nationwide expansion of the activity in 2021. PMI will increase support for this expansion by working through the GHS HPD to train and equip community health nurses and community health officers with needed skills to work with health volunteers and communities to design tailored malaria control plans based on identified barriers and individual community pledges. 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

In FY 2020, PMI will prioritize the following behaviors for its SBC programming:

- **ITN ownership and use:** The 2016 MIS shows that ITN access is 66 percent and ITN use is 42 percent among the general population in Ghana, with a low net use: access ratio of 0.4 to 0.6. SBC activities will focus on increasing awareness of the benefits of ITNs, increasing demand for ITNs during first ANC visit, and using multiple channels such community durbars, mother-to-mother groups, father-to-father groups, Village Savings and Loan Association (VSLA) platform, and farmers groups such women out growers to promote ITN use.
- **IPTp uptake:** While 85 percent and 78 percent of women received IPTp1+ and IPTp2+ during their last pregnancy according to the 2016 MIS, IPTp3+ lags behind at only 60 percent. SBC activities will focus on missed opportunities for IPTp by increasing pregnant women's ability to ask for SP during ANC, ensure availability of SP at service

delivery points, explore the feasibility of resupplying SP outside ANC clinics, and improve provider attitudes towards SP administration based on supportive supervision and peer review findings.

- **Health provider interpersonal communication:** The Ghana 2016 MIS found that 46 percent of women reported having seen or heard general malaria messages in the past six weeks, with television (38 percent), radio (33 percent), a health worker (26 percent), and word of mouth (24 percent) being the most common sources of exposure to malaria messages. However, only 14.3 percent reported receiving malaria messages from community health workers. SBC activities will aim to strengthen the capacity of health providers in general to provide quality IPC to mothers and caregivers on malaria prevention and control. In particular, CHNs and CHOs from CHPS compounds will be equipped with IPC skills to engage the population behind malaria control activities specific to their communities. Support for CHO community outreach activities and follow-up visits into homes with the support of CHVs to promote consistent use of ITNs, early care seeking for fever, early ANC visits for IPTp uptake, SMC, and IRS will improve acceptance in targeted districts.

Figure A56. Prioritized Behaviors with FY2020 Funds

Behavior	Target Population	Geographic Focus	Justification
Ownership, use, and proper care of ITNs	General population, including pregnant women and children under five	Nationwide	ITN ownership is 73%, below the national target of 80%, and the net use: access ratio remains low at 0.4 - 0.6.
Demand and uptake of IPTp every month after the first trimester and throughout pregnancy	Pregnant women, health providers	Nationwide	The percentage of women who received IPTp2+ and IPTp3+ during their last pregnancy was 78%, and 60%, respectively, which is below the national target of 80%.
IPC by health providers	Health Providers	Nationwide	Only 46% of women report having seen or heard general malaria messages, with communications from a health worker or community health worker comprising only 26% and 14% of these messages, respectively. This suggests limited time spent by health workers to explain to clients desired behaviors for preventive and curative malaria control interventions to succeed.

Conclusion

The available data from various surveys and the DHIMS2 have been used to identify three priority behaviors to target through PMI-supported SBC activities in FY 2020 (Figure A56). PMI support will include national-level coordination and technical assistance to develop new malaria-specific communication materials and inform below the line communication efforts through the GHS HPD community outreach program.

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 A57. Prioritized Behaviors with FY2020 Funds

Behavior	Target Population	Geographic Focus	Justification
Ownership, use, and proper care of ITNs	General population, including pregnant women and children under five	Nationwide	ITN ownership is 73%, below the national target of 80%, and the net use: access ratio remains low at 0.4 - 0.6.
Demand and uptake of IPTp every month after the first trimester and throughout pregnancy	Pregnant women, health providers	Nationwide	The percentage of women who received IPTp2+ and IPTp3+ during their last pregnancy was 78%, and 60%, respectively, which is below the national target of 80%.
IPC by health providers	Health Providers	Nationwide	Only 46% of women report having seen or heard general malaria messages, with communications from a health worker or community health worker comprising only 26% and 14% of these messages, respectively. This suggests limited time spent by health workers to explain to clients desired behaviors for preventive and curative malaria control interventions to succeed.

Conclusion

Identified gaps in SBC vary and are dependent on geographical area, cultural practices, and level of formal education in the communities. PMI will support SBC programming based on the

current knowledge of gaps as described above and support the assessment of new emerging issues and gaps for better tweaking of SBC interventions for impact.

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 GHS HPD was recently elevated from a department to a division. There are health promotion workforce at all levels of service delivery: national-regional and district level. The district level cadre, the Technical Officer for Health Promotion (TOHP), are dotted across the country in each district. They support and work with the community-based health workers to plan, design, implement and monitor evidence-based SBC interventions at the community level. As a new division, HPD requires the appropriate organizational and workforce capacity strengthening to sustainably execute its mandate.

Conclusion

Strengthening the GHS HPD capacity for SBC planning, implementation, and monitoring will bolster Ghana's capacity in SBC. PMI will increase support for below the line SBC activities, and at the same time, will strengthen the GHS HPD to implement malaria control SBC activities nationwide, through training, equipment, and tailored technical assistance based on continually assessed and identified needs.

Key Question 4

Are there any other considerations that impact your funding allocation in this category?

Supporting Data

There are no other considerations that impact the FY 2020 funding allocation for SBC activities.

Conclusion

Not applicable.

3.D. PROGRAM EVALUATION AND OPERATIONAL RESEARCH

NMCP objective
The National Malaria Control Strategic Plan for 2014-2020 reinforces operational research (OR) as a means to mobilize resources and inform programmatic direction. OR activities in Ghana have become an integral strategy to measure impact of malaria control and prevention activities and to identify gaps and weaknesses to improve program implementation.

NMCP approach
The GHS, in collaboration with the NMCP, holds a biannual research symposium to discuss OR priorities in Ghana. The NMCP works with donors and in-country research institutions to review current studies and identify priority areas requiring OR. The MoH has also established a new knowledge translation platform to apply medical research to improve health programs efficacy and impact.
PMI objective, in support of NMCP
PMI-supported OR in Ghana is guided by the current NSP and is in alignment with PMI OR priorities.
PMI-supported recent progress (past ~12-18 months)
Current or recently completed OR studies supported by PMI include: • Effect of IRS on *Anopheles* vector behaviors and their impact on malaria transmission in the Northern Region of Ghana (FY 2016 MOP-funded, conducted June 2017 - April 2019) • Small-scale field pilot of partial IRS with Pirimiphos-methyl in households in Northern Ghana for malaria vector control (FY 2018 core-funded, conducted April - December 2019)
PMI-supported planned activities (next ~12-18 months, supported by currently available funds)
No program evaluation or OR activities are currently planned.

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

Do you propose expanding, contracting, or changing any program evaluation and operational research activities? If so, why, and what data did you use to arrive at that conclusion?
PMI/Ghana is not proposing to support any program evaluation or operational research activities in FY 2020. Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

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

Supporting Data

The NMCP is currently conducting the Malaria Program Review, analyzing country data to develop subnational malaria stratification, and conducting a study to investigate HRP deletions (Figure A58). At the time of the FY 2020 MOP, NMCP shared present and new program evaluation or operations research priorities.

Figure A58. PE/OR Currently Conducted in Country with USG, GF, Multilaterals or Other Major Donors.

Source of Funding	Implementing institution	Research Question/Topic	Current status/ timeline
WHO, GF	WHO	Malaria Program Review	Ongoing
GF	NMCP NMIMR	HRP deletions	Ongoing
GF	WHO	Stratification through HBHI	Ongoing

Conclusion

No program evaluation or operational research topics are being proposed for FY 2020 MOP or core-funding.

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

With the development of a new malaria strategic plan (2021 - 2025), the NMCP, PMI, WHO, and partners are focusing on analyzing and using data at lower levels in order to stratify malaria risk and target malaria interventions more effectively.

Conclusion

No implications for FY 2020 programming.

Key Question 3

Are there any other considerations that impact your funding allocation in this category?

Supporting Data

There are no other considerations that impact the FY 2020 funding allocation for operations research.

Conclusion

Not applicable.

3.E. OTHER HEALTH SYSTEMS STRENGTHENING

NMCP objective
Ghana's current NSP does not include any specific health systems strengthening (HSS) objectives. However, under the Global Fund grant (2018-2020), a Resilient and Sustainable Systems for Health (RSSH) module was developed with malaria funding. The objective of the RSSH is to improve procurement and supply chain management systems through a functional electronic logistics management and information system, enhance the financial management processes, and improve the monitoring and evaluation of the health information system through the E-tracker.
NMCP approach
The NMCP does not have a specific approach to HSS. However, it is acknowledged that sustained progress against malaria in Ghana requires new approaches, strategies, and solutions to combat the emerging threat of drug resistance, address presumptive prescribing and treatment practices, and ensure the sustainability of existing programs. A widely-recognized approach to overcoming these challenges is to strengthen health systems to be more transparent, responsive, and effective so that medicines, including antimalarials, and other health products can be made widely available and accessible to those who need them.
PMI objective, in support of NMCP Infrastructure
PMI prioritizes key health system investments that cut across intervention areas to improve Ghana's capacity to meet its malaria control goals, including: • Strengthening provision of health services • Improving the health sector workforce • Enhancing health information systems • Supporting the supply chain to deliver essential medical products and technologies to health facilities • Strengthening health financing • Enhancing leadership and governance
PMI-supported recent progress (past ~12-18 months)
Over the past 12-18 months, PMI has supported HSS activities through the Field Epidemiology Laboratory Training Program (FELTP), continued partnership with the Peace Corps, central level capacity building, and clinical audits under the NHIS. PMI continues to support the "malaria track" of the FELTP at the School of Public Health at the University of Ghana. Residents completed their practical training in field epidemiology, focusing on priority issues in malaria surveillance and scaling up malaria case management interventions. During the last 18 months, FELTP residents finalized their thesis topics, which included:

- assessing quality of case management of severe malaria in health facilities in Northern Region
- prevalence of malaria and associated factors in artisanal mining in non-mining districts in the Upper East Region, and
- uptake of IPTp for malaria and birth outcomes among pregnant women in the Brong Ahafo Region.

The result of historic PMI investments in FELTP investments resulted in four alumni who currently work with the NMCP, including the program manager, a medical epidemiologist, a data manager, and a biomedical scientist who leads the diagnostic team.

PMI continued its partnership with the Peace Corps/Ghana "Stomping out Malaria in Africa" program to implement malaria prevention and control activities. PMI established specific partnerships in 2016 to directly engage Peace Corps Volunteers in the school-based ITN distribution communication and education activities. Peace Corps Volunteers also utilize small grants to facilitate promotion activities in their communities such as behavior change communication activities aimed at improving the use of ITNs and promote early health seeking behavior. Peace Corps is recruiting a third-year volunteer to start malaria control focused activities with PMI support.

PMI also continues to provide support to the NMCP, GHS, and GOG for both technical and management capacity building and improved malaria control systems. This includes support for participation in malaria-specific trainings and conferences, assisting NMCP with organizing meetings that are important for planning and management of malaria prevention and control activities, and supporting limited information technology investments, such as computers, laptops, internet connection at the GHS's Regional Health Directorate level to ensure timely data reporting to DHIMS2.

PMI and USAID/Ghana have supported targeted clinical audits under the NHIS. The initial rounds of clinical audits supported by PMI and USAID in 2015 revealed that certain facilities, largely in the Ashanti and Northern Regions, were inappropriately diagnosing and treating malaria. As a result, NHIS increased provider compliance by issuing punitive measures, including claw back of claims payment. NHIS targeted audits to facilities that were not providing high quality services in accordance with national guidelines. Examples of inappropriate treatment include artemether and quinine injections for treatment of uncomplicated malaria or treatment of malaria despite having a negative RDT.

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

Over the next 12-18 months, PMI will support the following HSS activities:

- Continue to support Peace Corps volunteers based in Ghana to receive small grants from PMI to engage in malaria control and prevention activities, such as community mobilization for SBC, ITN distribution, and (as needed) operational research.
- Support long-term training of individuals to build capacity at the NMCP or GHS in epidemiology, M&E, or other malaria program management functions as needed through the FELTP, which was established with USG support at the University of Ghana's School of Public Health in collaboration with the GHS.
- Continue to support activities that ensure the highest quality of care, including implementation and harmonization leadership-led quality improvement, peer reviews, supportive supervision, and clinical audits. These activities, which historically have been implemented in silos, will be coordinated and data from one activity will support and drive the implementation of others. GHS will use this feedback loop to identify challenges and make course corrections with multiple sources of support, creating a more robust and synergistic quality improvement environment.

PMI Goal

Not applicable.

Key Question 1

N.B, As there is not a specific pre-defined goal and objective for this section on other health systems strengthening, this can be an open question that is included by the MOP team. One possible example is to consider support that would address emergencies or support that engages FETP or Peace Corps programs.

Supporting Data

Not applicable.

Conclusion

Not applicable.

Key Question 2

Are there any other considerations that impact your funding allocation in this category?

Supporting Data

There are no other considerations that impact the FY 2020 funding allocation for HSS activities.

Conclusion

Not applicable.

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
	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

Activity	Metrics / Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	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
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

Activity	Metrics / Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	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
	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 5 km 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

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	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
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

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	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

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Warehousing/ Storage	Quality of infrastructure and operations at all stock holding levels (Central, Sub-central/facility) compromises ability to ensure commodities are adequately protected from damage, deterioration, and loss. Unable to locate stock by batch in central/mid-level stores/warehouses.	Quality of infrastructure and operations in at least one stock holding level (Central, Sub-central/facility) ensures that commodities are adequately protected from damage, deterioration, and loss. Paper-based inventory management system. No SOPs.	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. 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	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 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)	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. 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

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	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 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

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	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.
	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	Medicines framework exists and is sufficient to support basic regulatory functions including clinical dossier review (licensing) and marketing authorization with registration. Documented	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	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	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

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
		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	domestic financial support to enable regulatory activities - including human resources Approved supply chain strategic plan but not updated recently. Poorly implemented strategic plan	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	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).	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: 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%+

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	HMIS data quality assurance and quality control	Few standards exist for data collection, assembly, & analysis. Data quality reviews and audits are ad hoc for specific data needs. No data-quality assurance plan and national coordinating body exist.	Standards used for data collection, assembly & analysis in limited settings. Some electronic tools used for data quality review and audit. Data-quality assurance plan is available.	Standards defined and implemented for data collection, assembly, analysis, and used nationally. Data quality reviews and audits scheduled and include a remediation process to address identified issues. SM&E staff are seconded to NMCP	Data reviews and audits are integrated in strategic plans, conducted on a regular schedule. Regular meetings held by national data-quality governing body; issues identified are addressed through an established remediation process.	Continuous review and auditing through automated and manual processes, to ensure defined levels of data 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	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
			completeness remain challenges			
	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

Figure B6. 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.

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	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.
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

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	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..
	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)