The following document is an abbreviated malaria operational plan. The principles guiding development of this document—country-led, inclusive, consultative with a broad audience, and transparent —are consistent with best practices that the U.S. President's Malaria Initiative (PMI) has instituted since its inception. While an in-depth background of malaria in this country can be found in the detailed FY 2018 malaria operational plan on pmi.gov, this abbreviated document provides a high-level overview of PMI's program in this country, including key strategic updates, country data and progress updates, and a detailed list of activities to be supported with FY 2019 U.S. Government PMI funding.

This abbreviated malaria operational plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. The final funding available to support the plan outlined here is pending final FY 2019 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.

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U.S. PRESIDENT'S MALARIA INITIATIVE

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

PRESIDENT'S MALARIA INITIATIVE

GHANA

Abbreviated Malaria Operational Plan FY 2019

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ABBREVIATIONS and ACRONYMS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
CDC	Centers for Disease Control and Prevention
CWC	Child welfare clinic
DCA	Development Credit Authorities
DFID	Department for International Development
DHIMS2	District Health Information Management System II
DHS	Demographic and Health Survey
FDA	Ghana Food and Drugs Authority
FELTP	Field Epidemiology Laboratory Training Program
FY	Fiscal year
GES	Ghana Education Service
GHS	Ghana Health Service
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GMP	Good manufacturing practices
GoG	Government of Ghana
G2G	Government-to-government
IPC	Interpersonal communication
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LLIN	Long-lasting insecticide-treated mosquito net
MaVCOC	Malaria Vector Control Oversight Committee
M&E	Monitoring and evaluation
MICS	Multiple Indicator Cluster Survey
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	Malaria Operational Plan
MSP	Malaria Strategic Plan
NgenIRS	Next generation IRS
NHIS	National Health Insurance Scheme
NMCP	National Malaria Control Program
OPD	Outpatient department
OTSS	Outreach training and supportive supervision
PBO	Piperonyl butoxide
PMI	President's Malaria Initiative
RDT	Rapid diagnostic test
SBCC	Social and behavior change communication
SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine-pyrimethamine
SP+AQ	Sulfadoxine-pyrimethamine and amodiaquine
TPR	Test positivity rate
USAID	United States Agency for International Development
WHO	World Health Organization

I. INTRODUCTION

This abbreviated fiscal year (FY) 2019 Malaria Operational Plan (MOP) presents an implementation plan for Ghana, based on the strategies of the President's Malaria Initiative (PMI) and the National Malaria Control Program (NMCP) and builds on investments made by PMI and other partners to improve and expand malaria-related services. It was developed in consultation with the NMCP and with the participation of national and international partners involved in malaria prevention and control in the country. The FY 2018 MOP contains a more detailed and comprehensive description of the malaria situation in Ghana, country health system delivery structure, Ministry of Health (MoH) organization, and PMI's progress through April/May of 2017. This abbreviated MOP describes critical changes and updates to overall NMCP and PMI strategic approaches, as well as newly proposed activities under each technical area to be supported with FY 2019 funds.

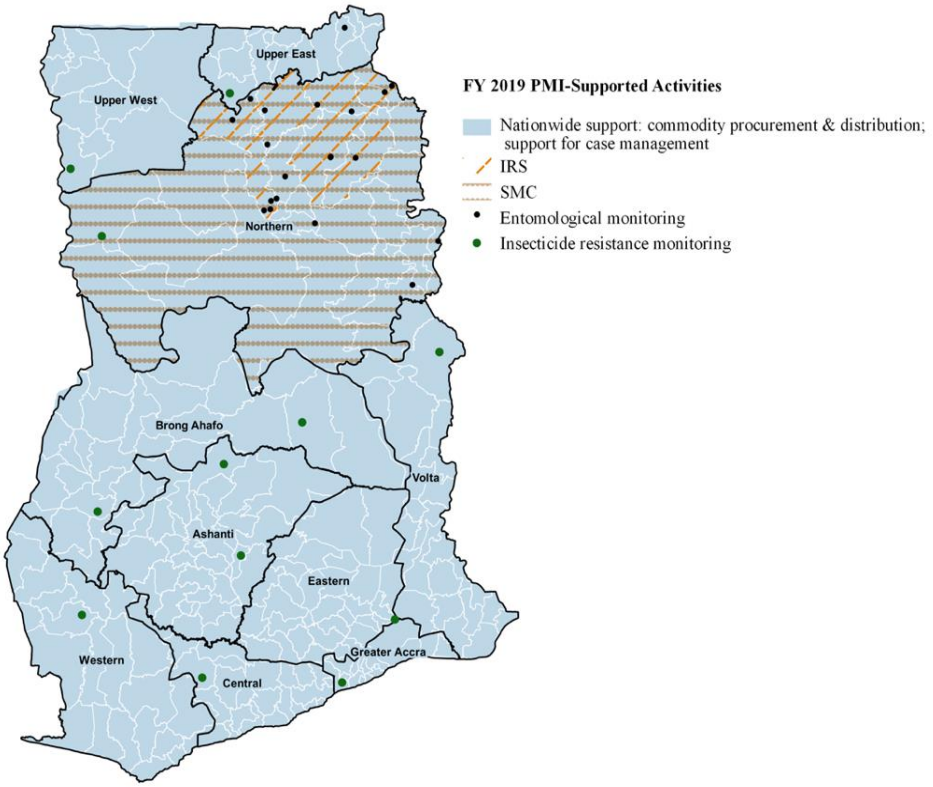
II. OVERVIEW OF PMI IN GHANA

Ghana began implementation as a PMI focus country in FY 2008. The proposed FY 2019 PMI budget for Ghana is $26 million. This FY 2019 abbreviated MOP presents an implementation plan for activities that are aligned with the Ghana National Malaria Strategic Plan (MSP) 2014 – 2020 and builds on investments made by PMI and other partners, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund), to improve and expand malaria-related services.

Nationally, PMI supports vector control, case management, malaria in pregnancy, social and behavior change communication (SBCC), and surveillance, monitoring, and evaluation (SM&E). PMI supports the procurement and distribution of malaria commodities, including antimalarial drugs, rapid diagnostic tests (RDTs), insecticides for indoor residual spraying (IRS), and long-lasting insecticide-treated mosquito nets (LLINs), for both mass campaigns and continuous distribution through schools, antenatal care (ANC), and child welfare clinics (CWC). PMI supports malaria case management and laboratory training and supportive supervision in all ten regions. PMI also supports periodic national demographic and malaria household surveys, routine surveillance, and monitoring and evaluation.

In addition to these nationwide activities, PMI supports targeted preventive interventions in the Northern region. Currently, indoor residual spraying IRS is implemented in seven districts in the Northern region with PMI support, all nine districts in Upper West Region, as well as in a sub-set of districts in Upper East (three districts), and Ashanti (one district) regions with support from the Global Fund. With support from the Department for International Development (DFID) and the Global Fund, the NMCP has been implementing seasonal malaria chemoprevention (SMC) in the Upper West and Upper East regions since 2015, and with additional support from PMI beginning in 2019, will expand SMC to eligible districts in the Northern region.

Figure 1: Geographic Distribution of FY 2019 PMI-Supported Activities



III. STRATEGY UPDATES

The FY 2019 MOP aligns with the MSP which aims to consolidate recent gains and accelerate malaria control in high transmission areas to further reduce the malaria burden by 75% and move towards establishing lower transmission areas in Ghana by 2020. PMI will continue to support proven interventions to achieve the specific objectives of this strategy.

In March 2018, Ghanaian President Nana Akufo-Addo expressed his vision of working towards "Ghana Beyond Aid" through a new agenda for job creation, prosperity, and equal opportunity as outlined in the seven-year Coordinated Programme of Economic and Social Development policies of the government, launched in April 2018. United States Agency for International Development (USAID)/Ghana and PMI/Ghana are aligned with this vision and are prioritizing transition, capacity development, and systems strengthening working with the Ghana Health Service (GHS), the NMCP, and other stakeholders. New strategy updates listed below highlight some of these transitions, integration, and focus on sustainability.

New strategy updates for the FY 2019 MOP include:

i) Expansion of SMC, which has been supported by DFID and the Global Fund and implemented by the NMCP in Upper East and Upper West regions, to include approximately 23 eligible districts in Northern region;
ii) Procurement of piperonyl butoxide (PBO) synergist LLINs for nationwide continuous school-based distribution with concurrent entomological monitoring;

iii) Full implementation of a complete rotation strategy of insecticides for IRS in eight districts in Northern region to mitigate the development of resistance in the vector population. Half of the districts will be sprayed with one class of insecticide (e.g organophosphate) and half sprayed with a different class (e.g long-lasting non-pyrethroid) and then insecticides switched between districts in subsequent years based on susceptibility and resistance monitoring;
iv) Transition from a malaria-specific to an integrated supportive supervision approach, as mandated by the GHS Director General, to improve case management;
v) Strengthen SBCC strategy and implementation based on evidence and scale-up of community-, school-, and facility-based SBCC activities using existing platforms focusing on interpersonal communication (IPC);
vi) Transition to Government of Ghana (GoG) procurement of malaria commodities with no further support from PMI to procure Artemisinin-based combination therapy (ACTs); and
vii) Increased support for NMCP and GHS implementation of activities through government-to-government (G2G) mechanisms.

IV. DATA UPDATES AND EVIDENCE OF PROGRESS

PMI has supported four national malaria household surveys: the 2008 Demographic and Health Survey (DHS), 2011 Multiple Indicator Cluster Survey (MICS) with a full malaria component, 2014 DHS, and 2016 Malaria Indicator Survey (MIS). Many were conducted during the peak malaria season, which coincides with the late rainy season from August to December, with the latter two surveys including a malaria module that included both anemia and parasitemia. The 2008 DHS serves as the baseline estimate for all PMI coverage indicators. The 2016 MIS reported significant progress in malaria indicators (Table 1), most notably, 78% uptake of intermittent preventive treatment for pregnant women (IPTp) 2, which is the highest of any PMI country in sub-Saharan Africa. In comparison to the 2014 DHS, IPTp3 also increased from 39% to 60%. During this same period, net ownership increased from 68% to 73% overall, and from 43% to 50% among pregnant women and 47% to 52% among children under 5 years old. However, the 2016 MIS highlights a gap between net ownership and use (42% of the population) that requires more exploration. Results from a qualitative LLIN barrier study with focus groups and case studies are pending. The 2016 MIS also showed a decrease in the percentage of children under 5 that were diagnosed with malaria by RDT from 36% to 27%; children under 5 years old diagnosed with malaria by microscopy also decreased, from 27% to 20% (Figure 2). A DHS is planned in 2019 which will provide follow-up estimates of all-cause under-five mortality as well as national and regional malaria parasite positivity before the end of the MSP 2014-2020.

From 2012 to 2017, according to Ghana's District Health Information Management System II (DHIMS2), reported malaria cases seen in health facility outpatient departments (OPDs) remained around 10 million per year from 2012 to 2017 (Table 2, Figure 3a). With mandatory testing, Ghana has significantly increased malaria testing of suspect cases from 39% in 2012 to 94% in 2016. Therefore, with increased laboratory testing, confirmed malaria cases have increased from 1,423,549 in 2012 to 4,886,080 in 2017; however, with improved adherence to test, treat, and track guidelines, treatment of presumed malaria cases dropped 93% from 2012 to 2017 (Table 2, Figure 3). Since 2015, the test positivity rate (TPR) has decreased with expanded testing which corroborate with DHS/MIS results (Table 1, Table 2). DHIMS2 data completeness has also improved from 53% in 2012 to 95% in 2017. Reported numbers of malaria cases in children under 5 have also increased steadily with increased access and better testing from 12% to 33% in 2017 (Table 2, Figure 3b). Most importantly, Ghana has shown significant reductions in malaria deaths which fell by 73%, from 2,275 in 2014 to 603 in 2017 (Table 2, Figure 4).

Table 1: Evolution of Key Survey-Based Malaria Indicators in Ghana from 2006 to 2016

Indicator	2006 MICS	2008 DHS	2011 MICS	2014 DHS	2016 MIS
% Households with at least one ITN	19%	42%	49%	68%	73%
% Population with access to an ITN	N/A	N/A	25%	45%	50%
% Children under five who slept under an ITN the previous night	22%	39%	39%	46%	52%
% Pregnant women who slept under an ITN the previous night	N/A	20%	33%	43%	50%
% Population that slept under an ITN the previous night	N/A	N/A	31%	37%	42%
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	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	28%	44%	64%	67%	78%
% Women who received three or more doses of IPTp during their last pregnancy in the last two years	N/A	N/A	N/A	38%	60%
Under-five mortality rate per 1,000 live births	111	80	82	60	n/a
% children under five with parasitemia (by **microscopy,** if done)	N/A	N/A	28%	26%	20%
% children under five with parasitemia (by **RDT**, if done)	N/A	N/A	48%	36%	28%

In Ghana, 73% of households own at least one ITN. Net use among pregnant women and children under five is 52% and 50%, respectively, however there are socioeconomic differences with higher use among rural as compared to urban populations. In 2018, PMI/Ghana is working with the NMCP and Global Fund to implement a universal coverage LLIN mass campaign to distribute around 15 million LLINs. Net access and use have increased with every household survey (Table 1), but the use-access ratio has not improved with increased ownership or access. PMI Ghana is working with VectorWorks to conduct qualitative behavioral research on barriers to LLIN use and results will be available in 2018. These findings will be used to tailor LLIN distribution and activities and strengthen SBCC at the community and facility level with IPC.

Figure 2: Percent of Children 6-59 months who Tested Positive for Malaria by m=Microscopy, by Region, 2011-2016

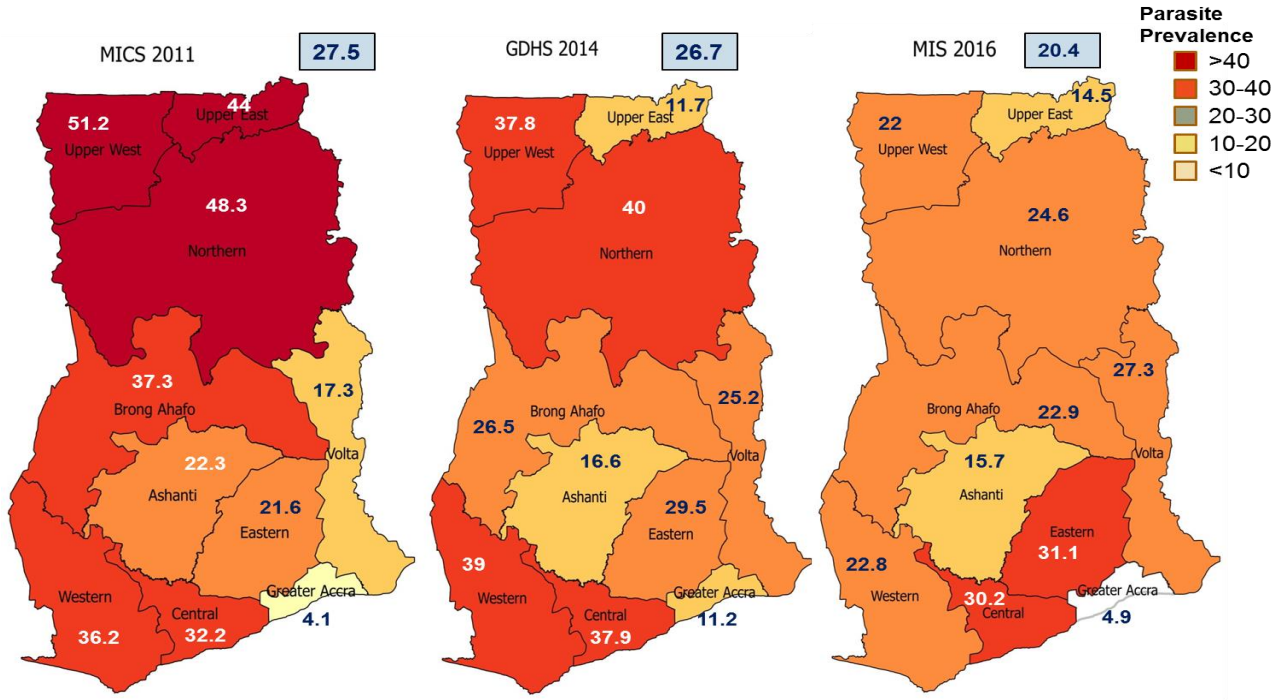
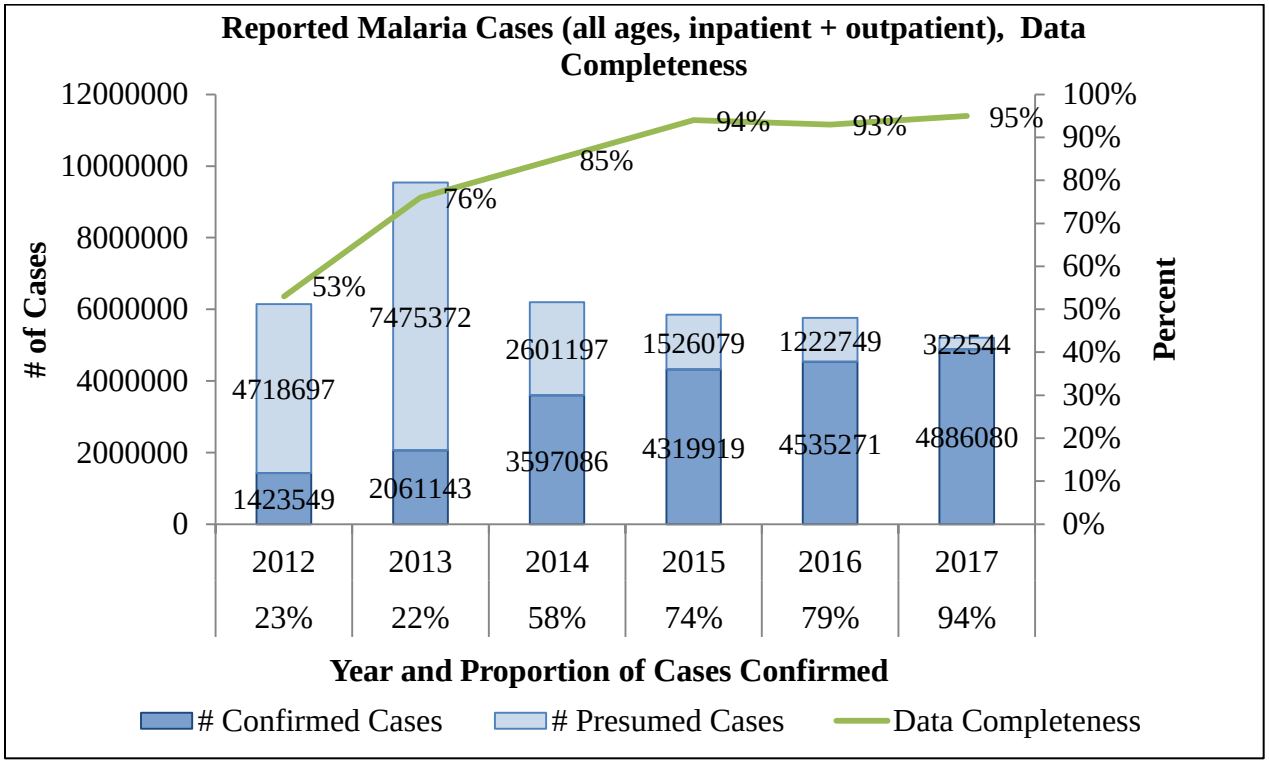


Table 2: Evolution of Key Malaria Indicators Reported through Routine Surveillance Systems in Ghana from 2012 to 2017

	2012	2013	2014	2015	2016	2017
Total # Cases (Confirmed and Presumed) [1]	9788214	10094895	8448394	10186510	10447524	10211971
# Confirmed Cases [2]	7915	1622154	3511475	3724183	4076774	4406396
# Presumed Cases [3]	9780299	8472741	4936919	6462327	6370750	5805575
Total # <5 Cases [4]	707959	1052284	1249918	1530345	1540399	1738758
Total # Malaria Deaths [5]	2799	2985	2275	2137	1264	603
Data Completeness (%) [6]	53%	76%	85%	94%	93%	95%
Test Positivity Rate (TPR) [7]	27%	61%	30%	31%	26%	23%

1Total # cases: Total number of reported malaria cases. All ages, outpatient, inpatient, confirmed and unconfirmed cases.
2# confirmed cases: Total diagnostically confirmed cases. All ages, outpatient, inpatient.
3# presumed cases: Total clinical/presumed/unconfirmed cases. All ages, outpatient, inpatient.
4Total #<5 cases: Total number of <5 cases. Outpatient, inpatient, confirmed, and unconfirmed.
5Total # Malaria Deaths Reported: All ages, outpatient, inpatient, confirmed, and unconfirmed
6Data 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)
7Test Positivity Rate (TPR): Number of confirmed cases (#2 above)/Number patients receiving a diagnostic test for malaria (RDT or microscopy)

Figures 3a, 3b: Trends in Key Malaria Indicators Reported in Routine Surveillance Systems



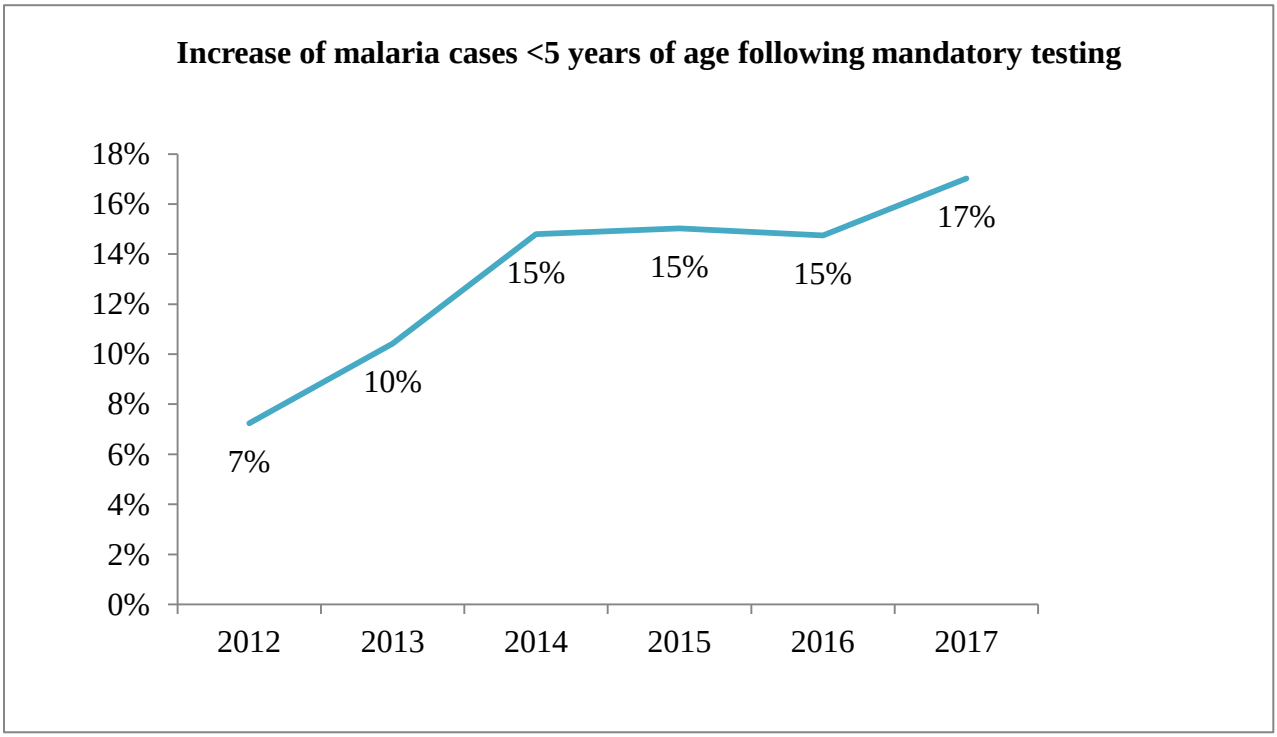
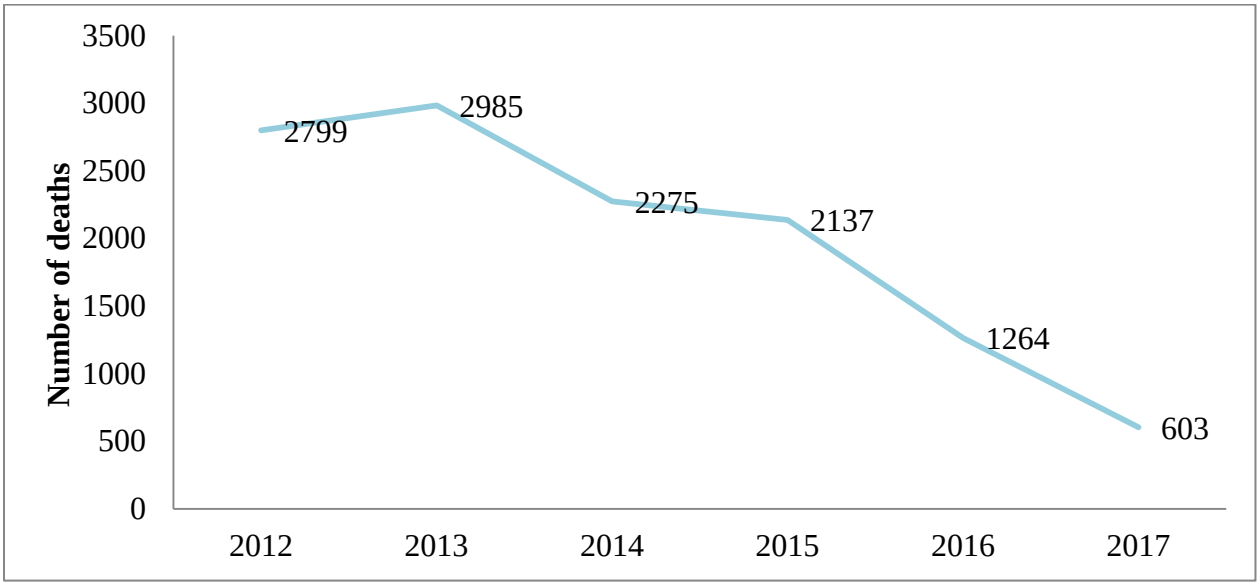


Figure 4: Trends in Number of Deaths Attributed to Malaria, 2012-2017



V. NEW OR EXPANDED ACTIVITIES AND KEY CHANGES

1. Vector control

a. Entomologic monitoring and insecticide resistance management

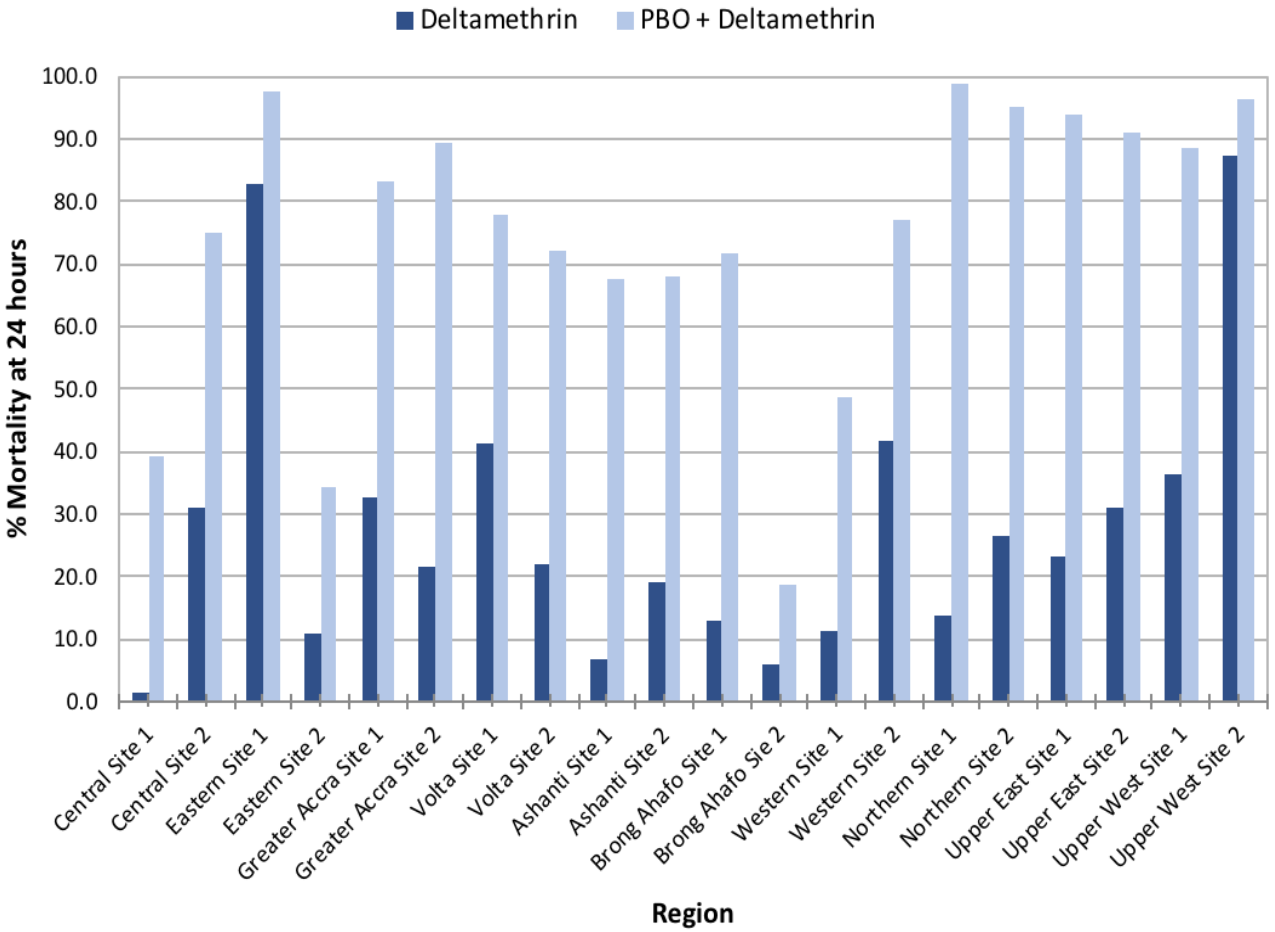
No new activities or significant changes are proposed in FY 2019.

b. Insecticide-treated nets

With FY 2019 funding, Ghana will procure 1.3 million PBO synergist LLINs, to be distributed through grades two and six of primary schools in eligible regions in May/June 2020. PBO is a synergist that inhibits mosquito metabolic oxidases, elevated levels of which confer resistance to pyrethroids, thereby restoring susceptibility to these insecticides. Ghana has high levels of pyrethroid resistance nationwide that have become fixed among mosquito vector populations. It has been documented that PBO reverses deltamethrin resistance of mosquito vectors in Ghana (Figure 5); therefore, PBO synergist LLINs will be procured and targeted to non-IRS districts in all ten regions. PMI Ghana along with the Global Fund will continue to support the National Insecticide Resistance Monitoring Partnership (NIMROP) to ensure continued monitoring of insecticide resistance and PBO synergy in all ten regions. PMI/Ghana is focused on using innovations in malaria control where appropriate, and will procure and distribute next generation combination LLINs with FY 2019 funding (e.g., Interceptor G2 nets) in addition to or as an alternative to PBO synergist LLINs if they become available. With the implementation of PBO LLINs though continuous school-based distribution, PMI/Ghana will continue entomological monitoring of insecticide resistance, including synergist assays and genotyping for molecular markers of insecticide resistance.

PMI/Ghana acknowledges the increased costs associated with procuring PBO synergist LLINs and will work with the NMCP and the Global Fund to respond to any LLIN gaps as they arise. Ghana has procured over 15 million LLINs for the 2018 mass campaign and any excess LLINs will be targeted for ANC/EPI channels at health facilities in the regions or districts where gaps are identified. PMI/Ghana has had significant savings as a result of decreases in commodity prices, particularly for RDTs and standard pyrethroid LLINs, which can be used to procure additional LLINs if needed.

Figure 5. Percentage Mortalities of *Anopheles gambiae* s.l. Exposed to Deltamethrin Alone and in Combination with PBO by Region, 2017



c. Indoor residual spraying

In 2017, Ghana began benefiting from the UNITAID-funded Next generation IRS (NGenIRS) project. This market intervention project includes a short-term co-payment to accelerate the price reduction of long-lasting insecticides. Beginning with the tenth spray round in 2017, the price reduction enabled PMI to expand coverage of IRS from five to seven districts in the Northern region. With the inclusion of the new insecticide clothianidin in the NGenIRS project, PMI/Ghana initiated the process of a pilot spraying the insecticide in one district (Mamprugu Moaduri) in the 2018 spray season. The results of the pilot and subsequent spray campaigns will be reviewed by Malaria Vector Control Oversight Committee (MaVCOC) and NMCP, and by 2020, PMI/Ghana plans to fully implement a complete rotation strategy of insecticides for IRS in the Northern region in order to mitigate the development of resistance in local vector populations.

On November 16, 2017, the GoG completed a re-demarcation (re-zoning) that created 38 new districts to deepen governance at the local level. This re-demarcation (re-zoning) of new districts affected one IRS district, Bunkurugu Yunyoo. The two re-demarcated districts are now Bunkpurugu District and Yunyoo District. As such, in FY 2019, IRS will be implemented in eight districts, namely West Mamprusi, East Mamprusi, Mamprugu Moaduri, Kumbungu, Karaga, Gushiegu, Bunkpurugu, and Yunyoo.

2. Malaria in pregnancy

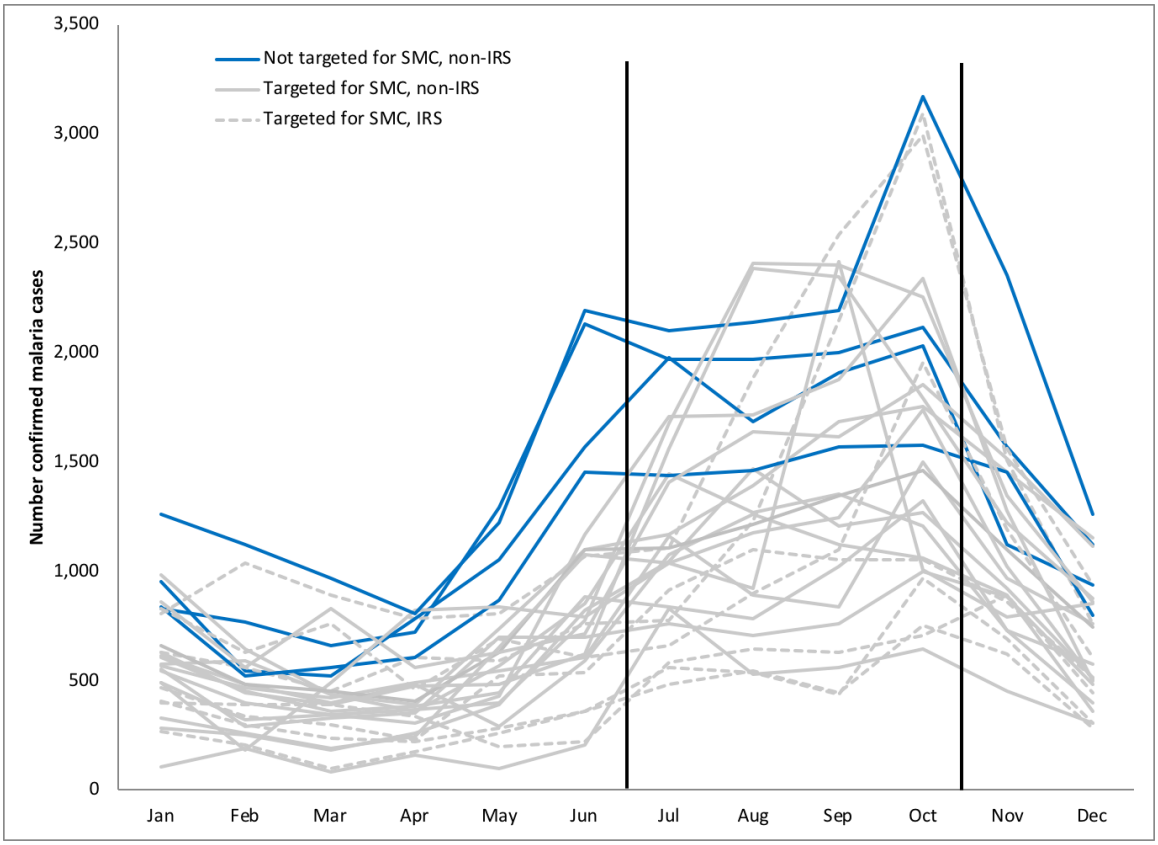
Malaria in pregnancy (MIP) activities have not changed and the reduction is due to transitioning to a new partner (which had delayed implementation in 2018) and support for case management from Global Fund. From previous PMI/Ghana support, MIP training, as part of an overall malaria case management package, has been improved, standardized, and scaled up. The NMCP and PMI will continue to conduct these trainings. PMI/Ghana and the NMCP has also worked hard on implementing supportive supervision which has improved malaria indicators and the GHS has mandated transitioning to "integrated" supportive supervision. PMI/Ghana is working to ensure that malaria components of supportive supervision such as malaria case management and MIP are maintained. ANC LLINs are usually supported by Global Fund although excess PMI Ghana LLINs from the mass campaign will be funneled into ANC/EPI at the health facility.

3. Drug-based prevention

Seasonal malaria chemoprevention

World Health Organization (WHO) currently recommends the adoption of SMC in areas with exclusively seasonal transmission (ranging about four months). SMC is the administration of treatment doses of sulfadoxine-pyrethamine and amodiaquine (SP+AQ), a longer acting antimalarial combination therapy, to children between 3 and 59 months of age at monthly intervals during the malaria transmission season, up to a maximum of four doses. Since 2015, the NMCP, with support from DFID and the Global Fund, has been implementing SMC in the Upper West and Upper East regions from June through September. Beginning in 2019, the NMCP plans to expand SMC to include approximately 23 eligible districts (including all PMI-supported IRS districts) in the Northern region, where peak transmission occurs from July through October (Figure 6). Beginning with the 2019 SMC season, PMI will use FY 2017 commodity procurement pipeline funds to support the procurement of SP+AQ and use FY 2018 funds to provide implementation support and monitoring to cover 50% of the eligible population in the Northern region. The GoG will cover the remaining 50% in the region. With FY 2019 funds, PMI will continue to support SMC in Northern region. PMI/Ghana will work with the NMCP and partners to update case management treatment guidelines to prioritize artemether-lumefantrine (AL) (non AQ) treatment in SMC districts.

Figure 6. Seasonal Malaria Chemoprevention (SMC) eligible districts, Northern Region, Four year average OPD Confirmed Malaria Cases by month-, 2014 – 2017



4. Case management

PMI's primary strategy for improving malaria case management (diagnosis and treatment) and IPTp is clinical and laboratory outreach training and supportive supervision (OTSS). OTSS is designed to provide routine long-term, ongoing support for strengthening malaria case management in health facilities by identifying weaknesses that require improvement and providing support to clinicians and laboratory staff. OTSS consists of two rounds per year of scheduled supervisory visits to health facilities and, if applicable, their laboratories, where a standardized checklist is used to assess key issues including relevant infrastructure and personnel factors such as staffing, level of training, and performance in malaria case management. Clinical OTSS focuses on malaria case management provided through the facility's OPD, including an assessment of RDT use. Laboratory OTSS is only conducted in health facility laboratories and, though generally focused on microscopy, it also assesses correct and consistent use of RDTs in the laboratory setting. Clinical and laboratory OTSS teams are comprised of different cadres of health professionals and, currently, their visits do not necessarily coincide. PMI plans to integrate laboratory and clinical OTSS in 2018.

Given limited resources, time, and staffing, national, regional, and district teams have limited capacity to conduct disease specific supervision and have ultimately requested an overall integrated approach. Currently, disease programs are hesitant to transition to a fully integrated approach due to concerns that accomplishments achieved with their programs will fade without this focus; however, integration has been mandated by the GHS Director General and will ensure accountability and sustainability over the long term. Therefore, PMI has worked with the different divisions and units of the GHS (Institutional

Care Division, Family Health Division, Clinical Laboratories Unit, and Policy, Planning, Monitoring and Evaluation Division) to develop and implement an integrated supportive supervision approach with an integrated checklist that ensures malaria specific indicators be included in the checklist. PMI will also work with the NMCP and other stakeholders to conduct annual supportive supervision assessments over two years, beginning in 2019, to provide evidence to the disease program managers that the integrated approach fulfills their requirements. The transition to integrated supportive supervision is reminiscent of early DHIMS2 implementation where disease programs fought to keep their own vertical data systems. However, through advocacy, system strengthening, assessments and time, DHIMS2 has since been fully adopted nationwide. Integrated supportive supervision will also receive additional funding through other programs i.e. reproductive health, family planning, nutrition, and maternal and child health.

5. Cross-cutting and other health systems strengthening

a. Pharmaceutical management

To align with the government's vision of "Ghana Beyond Aid", the GoG is currently transitioning to procure all malaria commodities and plans to procure all ACT needs for the country without donor support beginning in 2020. PMI will continue to provide technical support and will actively participate in commodity quantification and procurement planning to ensure uninterrupted availability of ACTs along with other malaria commodities at the health facilities. PMI is also supporting the Ghana Food and Drugs Authority (FDA) to ensure quality malaria commodities (ACTs, SP, etc.) through post-market surveillance, and working with local manufacturers to apply and obtain WHO prequalification status, with one on track to submit a dossier for WHO prequalification approval in 2019. From 2012 to 2017, the Ghana FDA has identified counterfeit antimalarials and successfully recalled them, with the percent failure decreasing from 7.7% in 2012 to 2.8% in 2018, down to 1.4% in 2018 (Table 4). The NMCP is currently working on an ACT procurement and management plan, as requested by the Global Fund, to inform the GoG and malaria control partners about transition benchmarks from now until 2020, when the government will take full charge for ACTs needs. In the context of sustainability and transition, PMI will provide support to the private Ghanaian pharmaceutical sector to produce quality ACTs by strengthening good manufacturing practices (GMP). PMI will also support local transport solutions for last mile distribution with the supply chain. This support will be provided through USAID Development Credit Authorities (DCAs) with Ghanaian banks who will provide insured loans on these pre-conditions.

In regards to ACT and RDT forecasting, the quantification process currently uses reliable service data (from DHIMS2) as well as data of issued commodities from regional medical stores (RMSs) which currently serve as proxy for consumption data, which is the optimum. The country quantification process requires that the assumptions to the quantification are reviewed every six months which affords the opportunity to revise the forecasts based on new information and available current data. Importantly, Ghana supply plans are also updated on a quarterly basis to ensure that commodities are available optimally.

Regarding the implementation of Ghana's electronic logistical management information system (eLMIS), the development process is progressing well, though there were a few delays. eLMIS will go live at the central and regional levels by April 2019 and it is envisaged that full utilization of the eLMIS at service delivery points will be in late 2019 and early 2020. With full roll out, it will be expected that reliable actual consumption data will be obtained and used for a more robust quantification. Therefore, by the time this abbreviated MOP is implemented, eLMIS will be providing reliable consumption data.

Table 4: Ghana FDA Post-market Surveillance of Antimalarials, 2012 – 2017

Year	Antimalarials	
	# sampled and tested	# failures (% failure)
2012	259	20 (7.7)
2013	235	9 (3.8)
2014	129	5 (3.8)
2015	251	7 (2.8)
2018	418	6 (1.4)

b. Social and behavior change communication

Ghana has made significant progress in achievement of malaria-related behavioral objectives; however, significant behavioral challenges remain. For example, a secondary analysis of 2016 MIS data indicates that the national LLIN use to access ratio (LLIN use given access) is 0.63, with regional variation from 0.34 (Greater Accra) to 0.72 (Brong Ahafo and Upper East). To explore these challenges, PMI Ghana will propose reprogramming FY 2018 funds to support the implementation of the Malaria Behavior Survey. Additionally, PMI/Ghana supported qualitative research exploring the net use:access gap (conducted by the VectorWorks project) with FY 2016 funds. The field work has been completed and the final results were disseminated in June 2018. Findings from both the Malaria Behavior Survey, qualitative net use study, and other qualitative data, will inform the response to this challenge. Simultaneously, the country team is communicating with the headquarters PMI SBCC and Vector Control teams to identify and line up appropriate technical assistance.

In FY 2019, PMI will support the NMCP and GHS Health Promotion Department and Ghana Education Service (GES) School Health Education Program to scale-up community-, school-, and facility-based SBCC activities. The primary focus of these activities will be IPC activities utilizing existing community-, school-, and facility-based structures, such as, *durbars*, health outreach and education activities, and Child Welfare Clinics (CWCs), activities conducted by facility-based community health nurses and community health officers in the community; school health and education programs and parent teachers associations in schools; and malaria-specific and integrated outreach training and supportive supervision, provider counseling, health education in facilities. This organized, coordinated effort to implement complementary community-, school-, and facility-based SBCC activities is a deviation from previous and FY 2018 PMI-supported SBCC activities. The purpose of this activity is to strengthen the individual and institutional capacity of facility-based providers (community health officers and community health nurses) at primary CHPS compounds to plan, execute, and monitor community-based SBCC activities. Despite the fact that community health officers and community health nurses regularly conduct community-based activities (both service provision and SBCC), they are considered facility-based providers. This activity will strengthen the capacity of these individuals and institutions to identify SBCC needs, develop and tailor SBCC activities, and monitor SBCC activities. PMI's support for these organized, coordinated SBCC activities will focus on strengthening the capacity of GHS and GES staff to plan, execute, and monitor evidence-based, theory-informed SBCC activities using existing platforms, as described above. PMI support will capacitate national, regional, district, and facility-based GHS and GES staff to plan and implement SBCC activities that move beyond generation of knowledge and awareness, to SBCC activities that target identified barriers to the practice of key malaria-related behaviors. In addition to the aforementioned IPC activities, PMI will support national, regional, and community mass media activities.

In addition to supporting school-, facility-, and community-based SBCC activities, PMI/Ghana intends to support national and regional mass-media SBCC activities with FY 2019 funds. The difference is that all SBCC activities (from FY 2019 onwards) will be based on systematically collected, rigorous quantitative and qualitative data. Currently, activities are based on small-scale qualitative studies; it is not clear when the last knowledge, attitudes, and practices study was conducted.

From a service communication perspective, the purpose of the activity will be to strengthen the capacity of providers to conduct service communication with patients, addressing barriers identified through the implementation of the Malaria Behavior Survey (with FY 2018 funds). From a provider behavior change perspective, the purpose of the activity will be to address barriers to the practice of provider behaviors. There has been no rigorous research on provider behaviors, however, there is growing qualitative and quantitative evidence from ongoing outreach training and supportive supervision that provider attitudes and bias, particularly around use of and adherence to RDTs, is an issue.

PMI-supported SBCC activities will focus on increasing correct and consistent nets use, ANC attendance, IPTp uptake, adherence to national MIP guidelines, prompt care-seeking, adherence to national malaria case management guidelines, and adherence to SMC regimens. PMI/Ghana's plan is to reprogram FY 2018 funds to support the implementation of the Malaria Behavior Survey and develop a small scale intervention pilot to explore opportunities to strengthen the capacity of existing government platforms and cadres to conduct malaria-related SBCC activities. Activities supported with FY 2019 funds will be informed by the findings of the pilot, current and ongoing qualitative research, and the Malaria Behavior Survey. Following the implementation of the Malaria Behavior Survey, FY 2018 funds will also be reprogrammed to support the revision of the national malaria SBCC strategy based on qualitative and quantitative findings. All PMI-supported SBCC activities will target identified barriers to the practice of key malaria-related behaviors. Activities supported with FY 2019 funds will incorporate data from the PMI-supported qualitative study exploring net use (FY 2017) and Malaria Behavior Survey (FY 2018) and findings from the PMI-supported SBCC pilot activity (FY 2018).

c. Surveillance, monitoring, and evaluation

Ghana is progressing in malaria control and strengthening DHIMS2 is conveying its benefits. The next step is to stratify and use the data to guide and improve programmatic decisions. Lessons learned included routine monthly data quality audits, data review meetings, and district and regional peer review data meetings. Subdistrict and district monitoring and evaluation (M&E) officers are being held responsible for their data quality and they are asked questions on trends (either downwards or upwards) - they are "owning" their own data. The key is to continue to make this routine and decentralize data quality, analysis and response. This funding will afford the opportunity to continue in this approach which is showing dividends (i.e. decreasing malaria deaths from alleged to actual by 70% in the North due to death audits, data reviews, and case management audits).

In FY 2019, PMI will continue to strengthen Ghana’s routine health information systems for malaria M&E through continued training and supportive supervision of regional, district, and health facility data management staff. PMI will support GHS to convene nationwide routine data quality with district-level data verification and validation meetings; quarterly data review, analysis, and action; and data quality audits to strengthen data management and use for programmatic decision-making at the district level by engaging the District Health Management Team. PMI will also support technical assistance to improve data quality and ensure development and use of sub-district and facility-specific dashboards on DHIMS2, and to improve data quality using supportive supervision feedback by Regional Health Management Teams in coordination with GHS Policy, Planning, Monitoring, and Evaluation to inform

existing quarterly review and improve analysis and use of data to improve program implementation through evidence-based decision making (Table 5).

In FY 2019, PMI will also support NMCP staff to conduct secondary analyses of data from household surveys and health management information systems (2019 DHS, 2016 MIS, and DHIMS2) to triangulate and externally validate recent trends of malaria burden sub-nationally Ghana (Table 5).

Table 5. Surveillance, Monitoring, and Evaluation Data Sources

Data Source	Survey Activities	Year								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
Household surveys	Demographic Health Survey (DHS)			X					X	
	Malaria Indicator Survey (MIS)					X				
	Multiple Indicator Cluster Survey (MICS)						X*	X*		
	EPI survey									
Health Facility surveys	Service Provision Assessment (SPA)									
	Service Availability Readiness Assessment (SARA)									
Malaria Surveillance and Routine System Support	Support to parallel malaria surveillance system		X	X*	X*	X*	X*	X*	X*	X*
	Support to HMIS	X	X	X	X	X	X	X	X	X
	Support to OTSS	X	X	X	X	X	X	X	X	X
Other Surveys	EUV	X	X	X	X	X	X	X	X	X
	Anemia and Parasitemia monitoring (Northern Region)		X	X						
	LLIN durability monitoring							X	X	X
	Malaria Impact Evaluation							X		

*Not PMI-funded

d. Operational research

No new activities or significant changes are proposed in FY 2019.

e. Other health systems strengthening

PMI supports a broad array of cross-cutting health system strengthening activities, such as training health workers, supply chain management, health information systems strengthening, drug quality monitoring, and NCMP capacity building. As of 2017, approximately 45% of the population is covered under the National Health Insurance Scheme (NHIS). PMI also prioritized support for strengthening procurement and supply chain, while also building capacity for quality assurance and supportive supervision, with a goal of sustainable and equitable health systems. Over the past year, PMI has continued to support the Field Epidemiology Laboratory Training Program (FELTP), fund small grants to Peace Corps Volunteers to facilitate malaria promotion activities in their communities and strengthen the National Health Insurance Agency to build the capacity of private sector providers in under-served areas to access financing and information on standards of quality for malaria services.

Based on the FY 2019 guidance, PMI Ghana will support the FELTP Frontline through our partners as the frontline cadre are all service delivery providers. Based on budget estimates from CDC/Ghana, PMI/Ghana can support a cohort of 30 FELTP malaria residents from the districts. PMI Ghana will also support two residents for two years for the FELTP advanced program through the University of Ghana School of Public Health.

6. Staffing and administration

PMI/Ghana supports staffing and administration that follow PMI policy as articulated in the FY 2018 MOP.