This FY 2021 Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with national malaria control programs and other partners. Funding available to support outlined plans is pending final FY 2021 appropriation. Any updates will be reflected in revised postings.

U.S. PRESIDENT'S MALARIA INITIATIVE

Ghana

Malaria Operational Plan FY 2021

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 (2019 annual report to Congress) through investments totaling just over $333 million through FY 2019.

The proposed PMI fiscal year (FY) 2021 planning budget for Ghana is $27 million. This Malaria Operational Plan (MOP) summary outlines planned PMI activities in Ghana for FY 2021. See accompanying **FY 2021 Budget Tables** (Tables 1 and 2) for activities and budget amounts, available on pmi.gov. 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. See **Annex A: Gap Analysis Tables** for information on commodities.

To accelerate the journey to self-reliance, PMI developed a programmatic inventory to assess the strengths and persistent challenges of the Ghana program. See **Annex B: Program Inventory**. The activities proposed in this MOP are tailored to draw on strengths and foster improvements.

Since the FY 2020 MOP was developed, the following new data, updated policy and/or strategic priorities relevant for the FY 2021 MOP have become available:

1. **2019 Malaria Indicator Survey (MIS).** The Key Indicator Report for the 2019 Ghana MIS has been published and can be accessed at the DHS Program website. The main results (comparing 2019 to 2016) are as follows:
    - Nationwide malaria prevalence in children under five years of age (microscopy) has significantly decreased from 21 percent in 2016 to 14 percent in 2019.
    - Malaria prevalence for children under five years of age based on microscopy decreased in most regions, with prevalence in Greater Accra notably down to 2.4 percent. However, prevalence in Western region increased from 24 percent to 27 percent.

- Malaria prevalence for children under five years of age decreased significantly in northern Ghana from 22 percent to 10.5 percent. This included decreases in Upper West (15 percent to 9.8 percent), Upper East, and Northern (25 percent to 13 percent) regions.
- Prevention coverage indicators (insecticide-treated mosquito net [ITN] ownership, access, use) stayed stable or had marginal gains. Intermittent preventive treatment for pregnant women (IPTp) coverage increased slightly, with IPTp-2 increasing from 78 percent to 80.2 percent, and IPTp-3 increasing from 60 percent to 61 percent.

2. **Expansion of seasonal malaria chemoprevention (SMC).** Since 2016, the NMCP has implemented SMC in eligible regions in Northern Ghana starting in Upper West and Upper East regions with Global Fund support, and expanding to the Northern, North East, and Savannah regions in 2019 with support from PMI. In 2021, the NMCP will expand SMC to Oti region to achieve coverage of all SMC-eligible regions in Ghana. Beginning in 2021, PMI will increase procurement of SMC commodities to meet 100 percent of the need for Northern, North East, and Savannah regions and will also increase support for implementation to include these regions and Oti.

3. **Development of the new Malaria Strategic Plan (NMSP) 2021 - 2025.** The NMCP, PMI Ghana, and other key malaria stakeholders are in the process of developing the new Ghana malaria strategic plan, 2021 to 2025. In 2019, before designing the new strategic plan, the NMCP facilitated the review and update of different malaria control manuals and guidelines for case management, malaria in pregnancy (MIP), social and behavior change (SBC), and vector control with a wide range of malaria stakeholders. This process also included a malaria performance review (MPR), stratification, and updated malaria commodity gap analyses. The NMSP 2021-2025 is a key component for the new Global Fund grant and the FY 2021 MOP.

For more information about the malaria situation, malaria control progress, and intervention-specific data in Ghana, please refer to the FY 2020 MOPs available on pmi.gov.

Annex A. Gap Analysis Tables

Insecticide-treated Net (ITN) Gap Analysis			
Calendar Year	**2020**	**2021**	**2022**
Total targeted population (point mass distribution) [1]	0	26,551,172	0
Continuous Distribution Needs			
Channel #1: ANC [2]	1,073,223	1,107,131	1,135,622
Channel #2: EPI [2]	1,136,354	1,172,256	1,202,423
Channel #3: Schools [3]	1,404,536	0	1,453,323
Channel #4: Special distribution to senior. high school boarding students [4]	446,366	0	0
Channel #5: Estimated number of HIV and TB clients to be given ITNs	0	230,000	260,000
Estimated total need for continuous channels	4,060,478	2,509,387	4,051,368
Mass Campaign Distribution Needs			
2021 mass distribution campaign(s)	0	16,225,716	0
Estimated total need for campaigns	0	16,225,716	0
Total ITN Need: Routine and Campaign	**4,060,478**	**18,735,103**	**4,051,368**
Partner Contributions			
ITNs carried over from previous year	710,348	710,348	708,020
ITNs from MOH	446,366	636,697	0
ITNs from Global Fund	2,314,112	13,566,079	2,551,368
ITN's from other donors (AMF)	0	0	0
ITNs planned with PMI funding [5]	1,300,000	4,530,000	1,500,000
Total ITNs Available	**4,770,826**	**19,443,123**	**4,759,388**
Total ITN Surplus (Gap)	**710,348**	**708,020**	**708,020**

[1] ITN mass distribution campaign will only be in 2021. Targeted population does not include highly urbanized areas (approximately 12.7% of the total population) and IRS districts.

[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 85% (Ref: 2014 GDHS). EPI distribution is through child welfare clinics (CWC) targeting children under five years of age 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] Quantities are for special distribution to senior high school boarding students which will occur in the year (2020). This is a direct GoG commitment. Procurement numbers (for 2021 and 2022) are yet to be confirmed. The actual figures will therefore be inserted into the table once a firm commitment to procure for this channel is reached by GoG.

[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 senior high school boarding students. Quantity for CY 2022 will primarily be funded with MOP FY 2021 funds and some carryover commodity pipeline.

Sulfadoxine-Pyrimethamine (SP) Gap Analysis			
Calendar Year	**2020**	**2021**	**2022**
Total population	31,565,378	32,354,512	33,163,376
SP Needs			
Expected pregnancies per year	1,262,615	1,294,180	1,326,535
Expectant registrants for ANC [1]	1,073,223	1,100,053	1,127,555
IPTp1 Visits	858,578	880,043	902,044
IPTp2 Visits	837,114	880,043	902,044
IPTp3 Visits	657,886	729,335	803,947
IPTp4 Visits	383,141	447,722	515,293
IPTp5 Visits	276,891	338,816	403,665
Total SP Need (in treatments) [2]	**3,013,610**	**3,275,959**	**3,526,991**
Partner Contributions			
SP carried over from previous years	674,971	3,592,459	3,967,059
SP from Government [3]	3,595,400	2,680,559	2,997,374
SP from Global Fund [4]	2,335,698	0	0
SP from other donors	0	0	0
SP planned with PMI funding	0	970,000	970,000
Total SP Available	**6,606,069**	**7,243,018**	**7,934,433**
Total SP Surplus (Gap) [5]	**3,592,459**	**3,967,059**	**4,407,442**

[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. This also indicates the proportion of pregnant women who are likely to register to attend ANC visits (ANC1-ANC5), and of this number, the IPTp visits provides a breakdown of individual visits based on NMCP's targets (% ages) as outlined in the table below.

TARGET ANC VISITS (Receiving IPTp)	2020	2021	2022
% of preg. women expected to attend ANC1 at 13 weeks or greater	80.0%	80.0%	80.0%
% of preg. women expected to attend ANC2	78.0%	80.0%	80.0%
% of preg. women expected to attend ANC3	61.3%	66.3%	71.3%
% of preg. women expected to attend ANC4	35.7%	40.7%	45.7%
% of preg. women expected to attend ANC5	25.8%	30.8%	35.8%

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

[3] Commodities placed under GoG procurement for 2020 are yet to be ordered. Bid evaluation process currently ongoing. Scheduled dates for this procurements could only be established during award of contracts. Given the current COVID-19 situation, and based on previous experiences with GoG procurements, the lead time for this procurement is likely to be delayed.

[4] GF intends to apply funds to procure SP under 2020 (to compensate for any unlikely event of GoG procurement delays).

[5] Surpluses noted with comments as for ACTs. GoG procurement of about 3.5 million in 2020. However, a GF procurement of 2.3 million planned to proactively compensate for any unanticipated delays with the GoG procurements. Procurement to be strictly monitored and recommendations for reprogramming of GF commitments made when necessary.

Rapid Diagnostic Test (RDT) Gap Analysis			
Calendar Year	**2020**	**2021**	**2022**
RDT Needs			
Total projected suspected malaria cases to be tested in the public sector [1]	14,086,860	15,181,409	16,361,005
Country target for diagnostic coverage [2]	97.0%	97.0%	97.0%
Total number of projected suspected malaria cases to be tested in the public health facilities	13,664,254	14,725,967	15,870,174
% of suspected cases to be tested by RDT	85.0%	85.0%	85.0%
Number of suspected cases tested with an RDT	11,614,616	12,517,072	13,489,648
Total RDT needed for routine services	11,614,616	12,517,072	13,489,648
% RDT allocations for: outreach, research, training and QA	10%	10%	10%
# of RDTs allocated to outreach, research, training and QA	1,161,462	1,251,707	1,348,965
Total RDT needs for public sector health facilities	12,776,078	13,768,779	14,838,613
Total RDT needs for private sector health facilities [3]	464,585	500,683	539,586
Total RDT Needs for ALL (Public and Private) Sector Health Facilities	**13,240,662**	**14,269,462**	**15,378,199**
Partner Contributions (to PMI target population if not entire area at risk)			
RDTs carried over from previous year	6,821,550	3,301,799	1,647,760
RDTs from Government	0	0	0
RDTs from Global Fund	9,720,911	10,115,423	11,298,258
RDTs from other donors	0	0	0
RDTs planned with PMI funding	0	2,500,000	2,500,000
Total RDTs Available	**16,542,461**	**15,917,222**	**15,446,018**
Total RDT Surplus (Gap)	**3,301,799**	**1,647,760**	**67,819**

[1]The quantification team reached a consensus to use the service based forecast for the 2020 national quantification, as the demographic forecast had historically produced a much higher estimate. The starting point was to use suspected malaria cases (from 2015-2019) and subsequently adjusted for reporting rate (for the individual years, 2015-2019). Also, adjusted for the non-reporting by the major teaching hospital at 5%. The quantification team observed no particular trend in the net increase / decrease of suspected malaria cases for the historical years (2015-2019). Therefore, in order to cater for the skewness observed in the net change, it was agreed that the median (7.8%) of this change in suspected cases (6.12%, -9.88%, 11.40%, 9.43%) be applied across all projected years (2020-2023). Hence, the suspected cases are likely to increase by 7.8%.

[2] Country target for diagnostic coverage.

[3] It was estimated that between 2020 to 2022 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 setor will be improved over the years of the forecast. Projected RDT supplies to the private sector accounts for about 4% of the total RDT needs, and this proportion is likely to be maintained accross projected years (2021-2022).

Artemisinin-based Combination Therapy (ACT) Gap Analysis			
Calendar Year	**2020**	**2021**	**2022**
ACT Needs			
Total country population	31,565,378	32,354,512	33,163,376
Population at risk for malaria	31,565,378	32,354,512	33,163,376
PMI-targeted at-risk population [1]	31,565,378	32,354,512	33,163,376
Total projected number of malaria cases [2]	6,451,414	6,528,186	6,605,871
Total ACT Needs [3]	**5,440,348**	**5,505,089**	**5,570,599**
Partner Contributions (to PMI target population if not entire area at risk) [1]			
ACTs carried over from previous year	2,265,228	7,161,783	7,075,088
ACTs from Government [4]	4,766,065	0	0
ACTs from Global Fund [5]	5,570,838	5,418,394	5,482,873
ACTs from other donors	0	0	0
ACTs planned with PMI funding	0	0	0
Total ACTs Available	**12,602,131**	**12,580,177**	**12,557,961**
Total ACT Surplus (Gap) [6]	**7,161,783**	**7,075,088**	**6,987,362**

[1] Ref: 2010 population census and applying 2.5% intercensal growth rate for each year.
[2] Forecasts were based on historical service data (source: DHIMS) and application of national assumptions taking into consideration NMCP targets and adjusted for reporting rate. 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. Note: These figures represent total malaria cases to source treatment from the public sector. Therefore these figues are less 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 about 80% contribution towards needs requiring funding by the GoG. Procurements planned for CY 2020 are currently at the stage of bid evaluation process. Scheduled dates for this procurement could only be established during award of contracts. Given the current COVID-19 situation, and the uncertainties surrounding GOG procurements, the lead time for this procurement is likely to be delayed.
[5] Orders under GF procurements for 2020 (includes commitments for 2020 + about half of the total forecast need for 2021) were carefully planned to compensate for the uncertainties surrounding GoG procurements and long procurement lead times.
[6] Relatively high surpluses are recorded for ACTs, RDTs and SP, and a few points of note: For 2020, there is a GoG commitment of about 4.7 million treatments in addition to the GF procurement of 5.5 mil treatments. This is a proactive approach to safeguard against any unanticipated delays with the GoG procurement to ensure there are adequate stocks, and that excess in 2020 spills over in each year. Therefore it is recommended that the numbers be maintained, whiles strictly monitoring the GoG procurements. If the GoG procurement delivers within the anticipated time, as planned, then in subsequent supply plan updates, it will be recommended for NMCP to discuss with GF for a possible reprogramming of GF 2021 commitment for ACTs to other commodities with identified gaps.

Seasonal Malaria Chemoprevention (SMC) Gap Analysis			
Calendar Year	**2020**	**2021**	**2022**
SMC Drug (SP+AQ) Needs			
Total population	31,565,378	32,354,513	33,163,375
Population of SMC target area [1] - Upper East (UE), Upper West (UW), Northern Region (NR), & (Oti starting in CY21)	5,412,346	6,250,245	6,399,390
Number of children under five years of age in SMC target area [2] (UE+UW+NR)+Oti	1,082,469	1,250,049	1,279,878
Number of SP+AQ required per cycle	1,082,469	1,250,049	1,279,878
Number of SMC cycles per year	4	4	4
Total number of SP+AQ needs (UE+UW+NR)+Oti	4,329,877	5,000,196	5,119,512
Total SP+AQ Needs	**4,329,877**	**5,000,196**	**5,119,512**
SP+AQ Needs in NR (area targeted for PMI commodity contribution)	**2,437,570**	**2,716,542**	**2,795,322**
Partner Contributions (to population area targeted for PMI commodity contribution)			
SP+AQ carried over from previous year	287,649	287,567	287,567
SP+AQ from Government	537,488	0	0
SP+AQ from Global Fund	0	0	0
SP+AQ from other donors	0	0	0
SP+AQ planned with PMI funding [3]	1,900,000	2,716,542	2,795,322
Total SP+AQ Available (for NR only)	**2,725,137**	**3,004,108**	**3,082,888**
Total SP+AQ Surplus (Gap) [4]	**287,567**	**287,567**	**287,567**

[1] Previously named Northern Region (NR) is now comprised of three new regions named Northern, North East, and Savannah. Oti region will be newly targeted for SMC starting in the CY21 treatment campaign.
[2] Geographic coverage: 19.2% of the total population are children aged 3-59 months.
[3] PMI contribution for CY 2020 is ~80% of total needs. PMI contribution for CY 2021 is 100% of total needs.
[4] This surplus is a result of SOH brought forward from 2019 and the same reflecting through projected years. This surplus is expected to remain as a buffer for efficient program planning and implementation.

Injectable Artesunate Gap Analysis			
Calendar Year	**2020**	**2021**	**2022**
Artesunate Injection Needs			
Total country population	31,565,378	32,354,512	33,163,376
Population at risk for malaria	31,565,378	32,354,512	33,163,376
PMI-targeted at-risk population [1]	31,565,378	32,354,512	33,163,376
Total projected number of malaria cases [2]	6,451,414	6,528,186	6,605,871
Total malaria cases that will require treatment from the public sector [3]	5,354,674	5,418,394	5,482,873
Total severe malaria cases [4]	214,187	216,736	219,315
Total severe malaria cases that will require artesunate injection [5]	209,903	212,401	214,929
Artesunate Injection Breakdown [6]			
Artesunate injection 30mg vials needed	83,961	84,960	85,971
Artesunate injection 60mg vials needed	302,261	305,858	309,497
Artesunate injection 120mg vials needed	453,391	458,786	464,246
Total Artesunate Injection Needs - Forecasts	**839,613**	**849,604**	**859,715**
Partner Contributions			
Artesunate injection carried over from previous year	928,318	660,796	411,192
Artesunate injection from Government	0	300,000	300,000
Artesunate injection from Global Fund	572,091	0	0
Artesunate injection from other donors	0	0	0
Artesunate injection planned with PMI funding	0	300,000	150,000
Total Artesunate Injection Available	**1,500,409**	**1,260,796**	**861,192**
Total Artesunate injection Surplus (Gap)	**660,796**	**411,192**	**1,477**

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

[2] Forecasts were based on historical service data (source: DHIMS) and application of national assumptions taking into consideration NMCP targets and adjusted for reporting rate. 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: 2020 quantification spreadsheet.

[4] Historically, country has used 4% of all malaria cases to be severe, however, at the recent quantification in 2020 data was refined to justify a 6.6% for severe malaria contribution (this included contributions from public, CHAG, some private sector facilities), and this is what is captured in the NMCP's concept to the GF. For PMI planning purposes however, 4% contribution of severe malaria cases has been adopted to empirically exclude contribution from CHAG and the private facilities). NMCP to be updated accordingly on this, and will be reviewed at the next quantification review.

[5] 98% of severe malaria cases will require treatment with artesunate injection

[6] Estimates were guided by dosage regimen from the Malaria Case Management guideline based on assumed weight breakdown for expected cases.

Rectal Artesunate Suppository (RAS) Gap Analysis			
Calendar Year	**2020**	**2021**	**2022**
Rectal Artesunate Needs			
Total country population	31,565,378	32,354,512	33,163,376
Population at risk for malaria	31,565,378	32,354,512	33,163,376
PMI-targeted at-risk population [1]	31,565,378	32,354,512	33,163,376
Total projected number of malaria cases [2]	6,451,414	6,528,186	6,605,871
Total malaria cases that will require treatment from the public sector [3]	5,354,674	5,418,394	5,482,873
Total severe malaria cases [4]	214,187	216,736	219,315
Total malaria cases that will require pre-referral from lower level facilities [5]	10,709	10,837	10,966
Rectal Artesunate Suppository (RAS) Needs (100mg) [6]	**16,599**	**16,797**	**16,997**
Partner Contributions			
RAS planned with PMI funding [7]	0	30,000	30,000
Total RAS Available	**0**	**30,000**	**30,000**
Total RAS Surplus (Gap)	**-16,599**	**13,203**	**13,003**

[1] Ref: 2010 population census and applying 2.5% intercensal growth rate for each year.
[2] Forecasts were based on historical service data (source: DHIMS) and application of national assumptions taking into consideration NMCP targets.
[3] 2020 quantification forecast spreadsheet.
[4] This represents 6.63% of total malaria cases requiring treatment from the public sector.
[5] 5% of severe malaria will be pre-referred from lower level facilities.
[6] Forecasts were based on the fact that 70% of the referred cases (e.g. in B9) are likely to fall within the given weight bands for children under 6 years of age with the following breakdown: 10% (up to 8kg) , 35% (9-19kg), 25% (20-29kg). Applying the standard dosage regimen (10mg/kg b.wt) for each weight bands (and using the upper wt limit in calculations): A child weighing up to 8kg will require approximately one of RAS 100MG (ie 10mg/kg x 8 = 80mg RAS; A child weighing between 9 -19kg will require 2 (RAS 100mg); and so on. The number of RAS 100mg needs prior to referral (either 1, 2 or 3) were then multiplied by the number of cases for each weight bands to get the total number of RAS needs for all the weight bands.
[7] Given the longer procurement lead time for RAS (about 36 weeks) it will be unlikely to initiate procurement to be delivered in 2020, hence, PMI will apply the FY 19 funds to initiate procurement process for the 30,000 but to be delivered in 2021.

Annex B. Program Inventory

Figure B1. Category: Vector Control							
Activity	**Metrics/Criteria**	**Relative Continuum**					**Estimate Level**
		1	**2**	**3**	**4**	**5**	
Vector Control	Coverage with vector control intervention(s) with appropriate insecticide(s) given country's insecticide resistance profile	No coverage of malaria endemic areas with a vector control intervention	1-25% of the geographic area of malaria endemic regions covered	26-50% of the geographic area of malaria endemic regions covered	51-75% of the geographic area of malaria endemic regions covered	>75% of the geographic area of malaria endemic regions covered	3
Entomological Monitoring	Insecticide resistance monitoring	No monitoring	Limited monitoring conducted ad hoc	Annual monitoring conducted in limited number of sites, not covering all administrative units; occasional monitoring of molecular mechanisms	Annual monitoring conducted in a greater number of sites with some collaboration with other partners; routine monitoring of some resistance mechanisms	Regular high-quality monitoring in multiple sites per administrative unit considering molecular mechanisms and bioassay data and collaborating with other partners and NMCP	3
Entomological Monitoring	Insectary	No functioning insectaries	Insectary present, but frequent ruptures in rearing and contamination of strains; frequent challenges in meeting needs	Insectary present with full-time staff; some capacity for strain verification; some challenges to get enough mosquitoes and occasional contamination	One or more insectary present; regular verification; rare challenges to get enough mosquitoes; some capacity for strain verification	Highly functioning insectaries with verification of strains, capacity for rearing wild strains, and quality controls in place	5

Entomological Monitoring	Data-based vector control decision-making	No consideration of entomological data	Limited data review; reliance on outdated data; uncoordinated data analysis with limited collaboration with partners	Irregular and incomplete data review 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 for vector control decisions	5
Entomological Monitoring	Vector bionomics monitoring or research	No longitudinal monitoring or research done in country	Limited longitudinal monitoring and research done in country	Regular vector bionomics monitoring and vector control research done in country, but weaker role in decision-making	Regular vector bionomics and vector control research done in country but insufficient to respond to all major needs of the national program	Regular monitoring driven by program priorities alongside research done in country to provide timely data on the best malaria vector control	4
Entomological Monitoring	Institutionalization of funding	No resources	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	3
ITNs	Consistent distribution channels, in accordance with national strategy	Infrequent campaigns; no continuous distribution	Regular campaigns; no continuous distribution	Regular campaigns; inconsistent continuous distribution	Regular campaigns; at least one well-managed continuous distribution channel	Regular, well-executed campaigns; well-managed continuous distribution channels	5
ITNs	Regular supervision of routine ITN distribution (e.g. HFs, schools, communities)	No regular supervision	0-25% of sites regularly supervised	26-50% of sites regularly supervised	51-75% of sites regularly supervised	>75% of sites regularly supervised	3

ITNs	ITN distribution reporting capabilities	ITNs distributed not reported into LMIS (or other system)	Some ITNs distributed reported routinely	Some ITNs distributed reported routinely but cannot be disaggregated by channel	ITNs distributed reported routinely and disaggregated by channel	All ITNs distributed captured routinely, disaggregated, and reported electronically	4
IRS	Host country government's IRS implementation capacity	N/A, no host country government implemented spray campaign	Very limited capacity to implement minor aspects of spray campaign	Capacity to implement some aspects of spray campaign	Capacity to implement most aspects of spray campaign	Implements spray campaign independently	1
IRS	Institutionalization of funding	N/A, no IRS conducted in country	No host country government funding, only supported by external sources	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	2
IRS	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	1
IRS	Host country government and local institution IRS monitoring capacity: IRS quality/residual efficacy	N/A, no IRS conducted in country	No capacity (i.e. no staff hired or trained)	Limited ability to monitor IRS (i.e. staff hired, but need training and rely heavily on external assistance)	Occasional ability to monitor IRS (i.e. staff hired and trained, limited reliance on external assistance)	Independent monitoring for IRS quality/residual efficacy (i.e. fully trained staff without need for external assistance)	3
IRS	Host country government IRS monitoring capacity: environmental compliance	N/A, no IRS conducted in country	No capacity	Limited ability to monitor EC (i.e. staff hired, but need training and rely heavily on external assistance)	Occasional ability to monitor EC (i.e. staff hired and trained, limited reliance on external assistance)	Independent EC monitoring	3

Figure B2. Category: Case Management							
Activity	**Metrics/Criteria**	**Relative Continuum**					**Estimate Level**
		1	**2**	**3**	**4**	**5**	
Community-Based	Coverage of CHWs trained in and providing CM (geographic or numerical target)	No CHWs conducting CM	0-25% of national target met	26-50% of national target met	51-75% of national target met	76-100% of national target met	5
Community-Based	Regular supervision of CHWs in CM as per national QA/QC guidelines	No CHWs regularly supervised in CM	0-25% of CHWs regularly supervised in CM	26-50% of CHWs regularly supervised in CM	51-75% of CHWs regularly supervised in CM	76-100% of CHWs regularly supervised in CM	4
Community-Based	CHW reporting	CHW-managed cases not reported into HMIS	Some CHW-managed cases routinely reported into HMIS	Cases routinely reported into HMIS but not disaggregated from facility-reported cases	Cases routinely reported into HMIS and can be disaggregated from facility-reported cases	All CHW case data routinely captured and reported electronically	4
Community-Based	Institutionalization of funding (salaries and/or other support)	No resources	Only supported by external partners, no host country government funding	Some host country government funding	>50% funded by host country government	Fully funded by host country government	4
Facility-Based	Access to care (within 5 km of a health facility or as per national definition)	0-20% of population has access	21-40% of population has access	41-60% of population has access	61-80% of population has access	>80% of population has access	4
Facility-Based	Regular supervision of public facilities in CM	No regular supervision in CM	1-25% of facilities regularly supervised in CM	26-50% of facilities regularly supervised in CM	51-75% of facilities regularly supervised in CM	>75% of facilities regularly supervised in CM	4

Facility-Based	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	5

Figure B3. Category: Drug-Based Prevention							
Activity	**Metrics/Criteria**	**Relative Continuum**					**Estimate Level**
		1	**2**	**3**	**4**	**5**	
SMC	Geographic scope	No eligible districts receiving SMC		50% eligible districts receiving SMC		All eligible districts receiving SMC	5
SMC	Coverage in target areas (eligible children age 3-59 months who completed 4 rounds of SMC)	<60%	60-69%	70-79%	80-89%	90%+	4
SMC	Institutionalization of funding	No resources	Only supported by external partners, no host country government funding	Some host country government funding	>50% funded by host country government	Fully funded by host country government	3
MIP	National MIP policy	No policy	Policy exists but is not comprehensive (does not cover all aspects of MIP: ITN, CM, and if applicable IPTp)	Comprehensive policy exists, but not all WHO recommendations included	Policy meets current WHO recommended MIP prevention	Comprehensive, WHO-aligned policy is actively implemented	5

MIP	Country policy adoption/adaptation of 2016 WHO ANC guidelines	No policy	Country has started discussions for adopting guidelines but still implements FANC	Country has policy with 2016 guidelines but no provision for early delivery of IPTp	Country policy is aligned with 2016 guidelines and has provision for delivery of IPTp at 13-16 weeks	Country policy is aligned with 2016 guidelines, has a provision for delivery of IPTp at 13-16 weeks, and is implemented at facility level	5
MIP	Tracking ANC contacts in the HMIS	Not tracked	First ANC visits tracked in the HMIS	1-3 ANC visits tracked in the HMIS	Up to 4 ANC visits tracked in the HMIS	All ANC visits in line with 2016 guidelines tracked in HMIS	5
MIP	National MIP working group established and coordinating effectively	No working group	Working group formed and meets ad hoc, TORs established	Working group engages in regular coordination but lacks mechanisms to ensure integration across technical areas	Working group coordinates at national level only with malaria and maternal health with limited mechanisms to ensure integration across technical areas	Working group coordinates regularly at national and sub-national level with malaria and maternal health and ensures integration across technical areas	4
MIP	Supportive MIP supervision in health facilities	No regular supervision	1-25% of facilities regularly supervised	26-50% of facilities regularly supervised	51-75% of facilities regularly supervised	>75% of facilities regularly supervised	4
MIP	Routine SP resistance monitoring via biomarkers	No SP resistance monitoring	SP resistance monitoring done in the last 6-10 years	SP resistance monitoring done in the last 4-5 years	SP resistance monitoring done in the last 3 years	SP resistance monitoring done in the last 3 years and results published or being published	2

Figure B4. Category: Supply Chain						
Metrics/Criteria	**Relative Continuum**					**Estimate Level**
	1	**2**	**3**	**4**	**5**	
Forecasting and Procurement Planning	Forecasts created ad hoc with no corresponding supply plans developed	Forecasts and supply plans overly reliant on assumptions or outdated/limited data, developed annually, and not necessarily used to inform initial procurements	Forecasts and supply plans incorporating service and/or consumption data are updated semi-annually and inform ongoing procurement actions	With donor support forecasts and supply plans incorporate near real-time services, consumption data, and seasonality; quarterly updates with corresponding changes made to procurement actions	Independent forecasts incorporating near real-time service, consumption data, and seasonality are updated quarterly; supply plans are updated monthly to inform ongoing procurement actions	3
Storage	Quantity and quality of infrastructure, as well as operations at all stock holding levels (central, sub-central/facility), compromise ability to ensure commodities, including ITNs, are adequately protected from damage, deterioration, and loss	Quantity and quality of infrastructure, as well as operations in at least one stock holding level ensure that commodities, including ITNs, are adequately protected from damage, deterioration and loss	Quantity and quality of infrastructure, as well as operations in at least two stock holding levels ensures that commodities, including ITNs are adequately protected from damage, deterioration and loss	With donor support, host country can scale infrastructure requirements, including for routine and campaign ITNs, via outsourced warehousing and ensure quality of infrastructure and operations at all stock holding levels, even those provided through the private sector, adequately protect commodities from damage, deterioration and loss	With very limited or no donor support, host country can scale infrastructure requirements, including for routine and campaign ITNs, via outsourced warehousing and ensure quality of infrastructure and operations at all stock holding levels, even those provided through the private sector, adequately protect commodities from damage, deterioration and loss	4

Inventory Management	SOPs for inventory management non-existent, outdated or unable to be routinely adhered to	Updated SOPs for paper-based inventory management system in place but discrepancies between virtual and actual stock figures are common	SOPs for paper-based inventory management system at lower levels and use of a electronic inventory management at central level (WMS) maintain inventory count accuracy but data on expiration or lot/batch insufficiently tracked	Inventory data, incorporating multiple commodity attributes (quantity, expiration, lot/batch) is digitized in at least two stock holding levels with inventory records considered to be reliable	All inventory data attributes digitized at all stock holding levels with near real-time stock visibility, validated for accuracy, available across all stock holding points	4
Logistics Management Information System	No LMIS available for aggregating, analyzing, validating and displaying logistics data from lower levels of the logistics system	Paper-based LMIS that aggregates and displays logistics data from lower levels of the logistics system is available and used primarily to inform facility level resupply; poor LMIS reporting completeness and timeliness	Paper-based LMIS that aggregates and displays logistics data from lower levels of the logistics system used to inform facility level resupply, produce metrics for performance monitoring, and process improvement initiatives; adequate LMIS reporting completeness and timeliness	LMIS with digitized facility-level inventory and consumption data visible across some supply chain levels used to inform resupply, performance monitoring, process improvement initiatives and strategic planning; good LMIS reporting completeness and timeliness	LMIS with digitized facility-level inventory and consumption data visible across all supply chain levels is operational and integrated with other MIS platforms; excellent LMIS reporting completeness and timeliness	3

Transportation Management	Higher level resupply points irregularly allocate resources for resupplying lower level facilities; lower level facilities often required to provide own transport to retrieve commodities from resupply points; ITN distribution unorganized and inadequately resourced	System exists for transportation from higher to lower stock holding levels but is irregularly executed due to limited planning, lack of funding or incapacitated vehicles; significant donor-supplied transport resources including for ITN distribution	Transportation consistently undertaken per schedule, capacity exists to use third-party transporters, routes are regularized, proofs of delivery reviewed and reconciled; significant donor-supplied transport resources including ITN distribution	Transportation planning regularized and optimized with third-party transport used often, tracking of vehicles via regular check-ins or GPS, paper proofs of delivery reviewed and reconciled, key performance indicators tracked; some donor funding for transportation resources	Transportation scheduling and routing optimized, third-party transporter use regularized, GPS vehicle tracking, electronic proofs of delivery reviewed and reconciled, key performance indicators tracked and 3PL assignments/lanes allocated based on best value; no donor funding	4
Routine Distribution and Resupply	No routine requisition and resupply schedule between stock holding levels	Routine requisition and resupply between at least two stock holding levels according to a schedule but not well informed by consistently accurate demand and inventory figures	Routine resupply between all stock holding levels, informed by adequate demand and inventory accuracy, conducted according to a schedule, validated by malaria program personnel and routinely monitored	Donor-supported routine resupply between all stock holding levels, informed by accurate, near real-time demand signals and validated by malaria program staff, done according to a schedule and routinely monitored	Routine resupply between all stock holding levels, informed by accurate, timely and near real-time demand signals, done with limited or no donor support according to a schedule shared with all levels; malaria program management has visibility into planning, execution and results	4

Health Commodity Regulations and Policy	Legal basis for a medicine (and other health commodity) regulatory agency to function is absent or inappropriate; formal organizational structure for in-country stakeholders and relevant agencies with delegated authority absent or inadequate (e.g., up-to-date organogram of MOH); human and financial capacity to enable regulation weak or absent	Medicines framework exists and is sufficient to support basic regulatory functions including clinical dossier review (licensing) and marketing authorization with registration; documented domestic financial support to enable regulatory activities, including HR	All SDP levels have policies that address STG, quality assurance and HR; 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	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	MOH leads strategic functions such as policy formulation, quality assurance and oversight of policy implementation funds; ability to ensure product quality, automated drug registration, clear/transparent importation process, robust post-market surveillance system, and track and trace regulations developed or in process of implementation	4
Supply Chain Strategy and Governance	Human, organizational and financial capacity to develop or execute a supply chain strategic plan incorporating malaria SC specifics absent or inadequate	Human, organizational and financial capacity sufficient to develop and execute portions of a supply chain strategic plan incorporating malaria SC specifics	Approved, up-to-date supply chain strategic plan (with clear roles and responsibilities for all SC levels, stakeholder mapping, costs); includes risk mitigation and workforce development plans	Approved, up-to-date supply chain strategic plan (with clear roles and responsibilities for all SC levels, stakeholder mapping, costs); implementation of workforce development and risk mitigation plans with significant donor support	Human, organizational and financial capacity to execute and maintain a supply chain strategic plan incorporating malaria SC specifics present and maintained with minimum donor support	4

Figure B5. Category: Strategic Information							
Activity	**Metrics/Criteria**	**Relative Continuum**					**Estimate Level**
		1	**2**	**3**	**4**	**5**	
Data, Surveillance, Monitoring & Evaluation	Overall HMIS reporting rate (CY 2019)	<60%	60-69%	70-79%	80-89%	90%+	5
Data, Surveillance, Monitoring & Evaluation	Element-specific reporting rate: "Confirmed malaria cases among children under age 5" (CY 2019)	<60%	60-69%	70-79%	80-89%	90%+	5
Data, Surveillance, Monitoring & Evaluation	HMIS data quality assurance and quality control	Few standards exist for data collection, assembly, and analysis; ad hoc data quality reviews and audits for specific needs; no data-quality assurance plan and national coordinating body exist	Standards used for data collection, assembly and analysis in limited settings; some electronic tools used for data quality review and audit; data-quality assurance plan available	Standards defined and implemented nationally for data collection, assembly, analysis; data quality reviews and audits scheduled and include remediation process for identified issues; SM&E staff seconded to NMCP	Data reviews and audits integrated in strategic plans and conducted on a regular schedule; national data-quality governing body meets regularly; issues identified addressed via established remediation process	Continual review and audit (automated and manual) to ensure defined levels of data quality; data quality metrics used for ongoing improvement; national governing body and key stakeholders review data-quality assurance plan periodically	5

Data, Surveillance, Monitoring & Evaluation	Reporting Systems	Data collection tools not standardized and procedures inconsistently followed; unstructured data collection and storage; no NMCP access to HMIS malaria data	Data systems support longitudinal health data (clinical, surveillance, M&E) in limited settings; data available for centrally mandated reporting; parallel malaria reporting system may exist	Most platforms/applications ensure data availability at all levels for decision support and M&E for authorized users; no parallel malaria reporting system; NMCP has access to HMIS malaria data	Data systems ensure reliable and appropriate access to data at all levels for authorized users; reporting requirement changes accommodated with minimal disruption to data availability; data systems support secondary data use; NMCP has access	Data availability monitored for continual improvements and to meet emerging health sector needs; reporting available from private facilities and community-level providers and can be disaggregated	5
Data, Surveillance, Monitoring & Evaluation	Data collection	Data not collected at community level (CHWs) and irregular or inaccurate at rural and more central health facilities; system is entirely paper based, but registers may be absent	Collection well managed at health facility level, but incomplete at community level; most collection and aggregation is paper based; registers generally available; timeliness and completeness remain challenges	Collection well managed at health facility and community level; most collection is paper based, aggregation is electronic; registers available; timeliness and completeness >80%, feedback to collectors limited	Collection at all levels; collection is electronic and sometimes paper based, aggregation is electronic; registers hold all program critical data; timeliness and completeness >80%, feedback to collectors standardized	Data collection occurs at all levels and is transmitted in real time with timely feedback to collectors and users of data; data checks exist at point of collection; electronic transmission is the norm, including to data collectors	4

Data, Surveillance, Monitoring & Evaluation	Data use	Activities (analysis, interpretation, visualization) to ensure data use are rarely implemented	Limited data use activities are implemented (bulletin developed but analysis and interpretation for decision- making needs strengthening)	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 own high-quality dashboard to facilitate data use and informed decision-making is evident at all levels frequently	3
Operations Research and Program Evaluation	PMI in-country OR/PE experience	No previous PMI OR/PE experience in country	PMI team has prepared concept notes but has not completed protocols or conducted OR/PE	PMI team has completed protocols and received approval for OR/PE; studies in planning, underway, or recently completed	PMI team and/or other country partners have completed a OR/PE study and prepared and shared reports	Multiple OR/PE studies completed that address malaria program implementation bottlenecks; publication and sharing of results, with involvement from MOH co-investigators	5
Operations Research and Program Evaluation	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 federalwide assurance approval, but no previous PMI in-country OR/PE engagement	Processes in place for research and IRB review with federalwide assurance approval with previous PMI in-country OR/PE engagement	Full complement of research review, approval, and oversight processes including data safety and monitoring boards; systems for results sharing	5

Operations Research and Program Evaluation	In-country partnerships for OR/PE	No in-country partners (academic, NGO, or other) with OR/PE experience	1-2 in-country partners with OR/PE experience, but no malaria-specific experience	3+ in-country partners with OR/PE experience; 1+ with some malaria expertise; no current PMI OR/PE work	3+ in-country partners with OR/PE experience; 1+ with malaria expertise; current or recent PMI OR/PE work	Multiple in-country partners with malaria experience in PMI OR/PE, including completed past work and reporting on malaria OR/PE	5
Operations Research and Program Evaluation	MOH capacity for conceptualizing problems needing scientific evaluation	No experience	Some but limited experience in identifying programmatic problems and prioritization	Experience with identifying program problems and prioritizing OR/PE	Experience with identifying problems needing OR/PE and developing study approaches with partners	Extensive experience with identification, prioritization, proposal development and conducting OR/PE	5

Figure B6. Category: Support Systems							
Activity	**Metrics/Criteria**	**Relative Continuum**					**Estimate Level**
		1	**2**	**3**	**4**	**5**	
SBC	National malaria SBC strategy to guide design and implementation of malaria SBC activities	No strategy	Strategy exists, but is low quality and missing key elements from the RBM SBC Working Group National Malaria SBC Strategy Template	High-quality strategy exists, but no evidence it has been used to guide design or implementation	High-quality strategy exists and is sometimes used to guide design and implementation of SBC activities	High-quality strategy exists and is used routinely to guide design and implementation of SBC activities	5

SBC	SBC technical working group	No group	Group exists in theory, but has not been operationalized or institutionalized	Group exists and meets routinely, but lacks clear pathways for coordination	Group exists and has effective pathways for coordination, but generally only coordinates at the national level	Group engages effectively in regular coordination at national and sub-national level	4
SBC	Formative assessments	No assessment of any kind conducted in last five years	No assessment of any kind conducted in last three years	Assessment conducted in last three years, but with significant quality issues	High-quality assessment conducted in the past three years, but results not widely disseminated	High-quality assessment conducted in the past three years and results widely disseminated	5
SBC	SBC interventions (targeted and tailored based on available behavioral, demographic, and epidemiological data)	No evidence available data used to inform intervention design	Available evidence referenced in intervention design; results do not typically inform final design, resulting in broad and unfocused SBC interventions	Available evidence generally used to loosely target SBC interventions to specific populations, but interventions not tailored to address behavioral determinants of those populations	Available evidence used to loosely target SBC interventions to specific populations and interventions somewhat tailored to address behavioral determinants of those populations	Available evidence used to target SBC interventions to specific populations and interventions well tailored to address behavioral determinants of those populations	5
SBC	Capacity to support implementation of SBC activities	Generally weak at central and peripheral levels	Generally strong at the central level with sufficient expertise and resources to deliver high-quality SBC interventions	Generally strong at central and provincial levels with sufficient expertise and resources to deliver high-quality SBC interventions	Generally strong at the central, provincial, and district levels with sufficient expertise and resources to deliver high-quality SBC interventions	Generally strong at the central, provincial, district, and community levels with sufficient expertise and resources to deliver high-quality SBC interventions	4

Elimination	Elimination strategy and planning	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 in target areas	Elimination activities implemented in target areas	1
Elimination	Scope of activities implemented (e.g. active case detection, PQ for Pf, foci investigation and response)	No elimination activities initiated	Elimination activities conducted in <25% of districts	Elimination activities conducted in 25-50% of districts	Elimination activities conducted in >50% of districts	Elimination or prevention of reintroduction activities conducted in all districts	1
Additional Health Systems Strengthening	Staffing	No staff	Manager and a few technical staff; not all intervention areas 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; limited plans and opportunities for training	Fully staffed with relevant training and experience; complete plan for professional development	4
Additional Health Systems Strengthening	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 insufficient 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 mostly sufficient	Office space fully adequate for current staff and technical needs (lab, insectary, meeting space, etc.) and some growth and well positioned in MOH; transport fully available for needs, including trucks and 4-wheel drive vehicles as needed (all maintained and managed)	4

Additional Health Systems Strengthening	Internet connectivity	No internet	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	3
Additional Health Systems Strengthening	NMCP placement in MOH	NMCP exists but barely visible in MOH structure	NMCP visible in the MOH structure but NMCP manager reports to supervisor who is low in the MOH system	NMCP visible and manager reports to high-level leader in MOH (e.g., Director of Public Health or Permanent Secretary for Health)	NMCP highly visible and reports at a high level in MOH and has some access to other ministry leadership (e.g., education, agriculture)	NMCP highly visible in MOH and all other relevant ministries with ready access to country leadership (e.g., president/prime minister and parliament)	2