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U.S. PRESIDENT'S MALARIA INITIATIVE

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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

CAMBODIA

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 Cambodia to end malaria. PMI has been a proud partner of Cambodia since 2012, helping to decrease *Plasmodium falciparum* malaria cases by 73 percent and deaths to zero by 2019 through investments totaling almost \$49 million.

The proposed PMI fiscal year (FY) 2021 planning budget for Cambodia is \$9 million. This Malaria Operational Plan (MOP) summary outlines planned PMI activities in Cambodia 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 Center for Parasitology, Entomology and Malaria Control (CNM) 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 Cambodia 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 Cambodia 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. Malaria Elimination Action Framework-2 (MEAF2)

The MEAF2 has been developed by CNM with support from the World Health Organization (WHO), Clinton Health Access Initiative (CHAI), and other technical partners, including PMI. After the Malaria Program Review in July 2019, CNM conducted multiple national consultations with provincial and district health staff, donors, and implementing partners from August 2019 to February 2020 to identify key programmatic areas toward malaria control and elimination.

The resulting MEAF2 document, which is based on guidance from the WHO Strategy for Malaria Elimination in the Greater Mekong Subregion (2015–2030) and is aligned with the principles of the WHO Global Technical Strategy for malaria 2016–2030, details three primary objectives which include:

- Objective 1: Early detection, and effective and safe treatment of 100 percent of cases, and provision of effective personal protection to at least 90 percent of the high-risk population
- Objective 2: Intensify focal interventions to interrupt transmission in endemic locations with highest risk (including mobile migrant population/forest goers) to eliminate *Plasmodium falciparum* by 2023 and *Plasmodium vivax* by 2025
- Objective 3: Investigate, clear, document, and follow up 100 percent of cases and foci to interrupt transmission and prevent re-establishment

In addition to these objectives, and to ensure sustainability of the MEAF2 outcomes, CNM also detailed the need to develop an enabling environment to strengthen “program leadership to maintain effective program management and coordination at central and provincial levels and harness innovation and research.”

MOP FY 2021 programmatic activities will align with the objectives detailed in the MEAF2 and will contribute towards the PMI goal of eliminating malaria in the Greater Mekong Subregion.

2. Intensification Plan Phase 2 (IP2)

Due to an increase in malaria cases between 2017 and 2018, CNM developed an intensification plan to prevent outbreaks and reduce malaria transmission in the seven highest burden provinces: Kampong Speu, Kratie, Mondulhiri, Preah Vihear, Pursat, Ratanakiri, and Steung Treng. The intensification plan catchment area included 30 health centers (HC) across 10 operational districts (OD) in seven provinces that accounted for over 80 percent of the country’s case load.

The intensification plan resulted in a 73 percent reduction in *P. falciparum* and mixed cases nationwide in 2019 compared to the same period in 2018. Furthermore, malaria testing at health facilities (HF) and in the community increased 2.5-fold (30,732 tests in 2018 to 78,770 tests in 2019), of which 84.5 percent were conducted by mobile malaria workers (MMWs) and village malaria workers (VMW) in targeted areas to improve testing among mobile migrant populations (MMPs).

Beginning in October 2019, CNM introduced a second phase of the intensification plan (IP2), extending it an additional 15 months to December 2020 to target and mitigate the malaria burden among forest goers and other hard-to-reach populations. These activities fall under Objective 2 of the MEAF-2 (above). IP2 expanded the target area from 30 high burden health centers to 37 health centers. IP2 activities are currently ongoing.

3. Transitioning all Operational Districts to malaria elimination

Prior to MOP FY 2020, some ODs were considered elimination districts, while others were transitional districts. In elimination-targeted ODs, all confirmed cases are subject to an epidemiological investigation. All cases are classified to identify the likely source of infection (e.g. village of residence; same catchment area, but not the same village, etc.). However, the high *P. falciparum* burden in transitional districts made individual case investigation impossible given limited human resources. Early in calendar year 2020, CNM transitioned all ODs with ongoing *P. falciparum* transmission to “elimination” to include case investigation and classification, in addition to foci investigation. For PMI-supported areas, two ODs in Pursat (Kravanh and Krakor) have recently been transitioned to elimination for *P. falciparum*. As *P. vivax* takes a more prominent role and constitutes a higher percentage of cases, this poses challenges of country-wide case and foci investigation, but currently CNM is focusing these activities on *P. falciparum* and mixed cases.

4. Scale-up of *P. vivax* radical cure using primaquine

With the recent achievements toward the elimination of *P. falciparum* over the last five years, *P. vivax* cases now account for a greater proportion of the total number of malaria cases in Cambodia. Data from 2019 shows that *P. vivax* now accounts for 85 percent of the total number of malaria cases, up from 50 percent in 2015.

Patients with *P. vivax* cannot be fully cured with artesunate-mefloquine (ASMQ) due to the presence of hypnozoites in the liver. Therefore, treatment with primaquine or tafenoquine is required to achieve “radical cure” of these dormant liver forms. However, these medications can cause hemolytic anemia especially among those with glucose-6-phosphate dehydrogenase enzyme (G6PD) deficiency. As such, CNM recommends first testing patients using a lateral flow point of care (POC) qualitative G6PD assay prior to initiating 14-day primaquine treatment. Currently, CNM is scaling up POC G6PD testing and 14-day primaquine treatment (radical cure) for eligible adult males with *P. vivax*; four provinces have started piloting radical cure in Q4 2019.

Although a smaller percentage of women are affected by severe G6PD deficiency than men, interpretation of test results for women is generally more complicated due to the effects of heterozygosity (G6PD is an X-linked trait) and the range of intermediate enzyme activity levels that can result. To be able to expand primaquine treatment, CNM is procuring quantitative POC G6PD assays produced by SD Biosensor (which report numeric values of G6PD activity per gram of measured hemoglobin) to determine which female patients with *P. vivax* may be able to safely complete a 14-day course of primaquine. CNM anticipates these assays (obtained with Global Fund resources) will be available in late 2020 and plans to aggressively scale-up radical cure for *P. vivax* nationally in early 2021.

5. Global Fund's transition from RAI2e to RAI3e

Global Fund is a major donor of malaria control and elimination activities in Cambodia. The current round of support is included through the second phase of its Regional Artemisinin-resistance Initiative-Elimination (RAI2e). The \$243 million regional grant to accelerate malaria elimination in the Greater Mekong Region ends in 2020 (2018-2020). Cambodia's country component has been about \$43 million for malaria activities. Currently, the Global Fund is developing the third phase of this initiative (RAI3e), with about \$41 million for malaria in Cambodia; RAI3e will start in January 2021. While this does not directly affect policies in the immediate term, there is an expectation that the transition may cause some disruption in service and commodity availability. This needs to be followed closely, particularly since there is a mass campaign for bed net distribution planned in 2021, in addition to the roll-out of radical cure of *P. vivax*, as well as foci investigation.

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

Annex A. Gap Analysis Tables

Insecticide-treated Mosquito Net (ITN) Gap Analysis			
Calendar Year	2020	2021	2022
Total targeted population eligible for ITN ¹	3,117,028	3,154,433	3,192,286
Continuous Distribution Needs			
Channel #1: ANC ²	0	0	0
Channel #2: EPI ³	0	0	0
Channel #3: Village malaria workers (VMW)	153,511	153,511	153,511
Channel #4: MOE and MAFF (distribution to MMP)	0	0	0
<i>Estimated total need for continuous channels</i>	<i>153,511</i>	<i>153,511</i>	<i>153,511</i>
Mass Campaign Distribution Needs			
Population for distribution mass campaign ⁴	1,008,342	2,146,091	0
ITN need for mass campaign (1 ITN per 1.8 population)	560,190	1,192,273	0
<i>Estimated total need for campaigns</i>	<i>560,190</i>	<i>1,192,273</i>	<i>0</i>
Total ITN Need for Routine and Campaign	713,701	1,345,784	153,511
Partner Contributions			
ITNs carried over from previous year *	357,881	0	0
ITNs from Government	0	0	0
ITNs from Global Fund **	0	942,048	107,458
ITNs from other donors	0	0	0
ITNs planned with PMI funding***	250,000	403,735	46,053
Total ITNs Available	607,881	1,345,784	153,511
Total ITN Surplus (Gap)	-105,820	0	0

¹ The targeted population eligible for ITNs in 2019 is 3,069,754 (source: stratification categories [risk, high risk and API>20]) with population growth at 1.54% from 2019 to 2020, therefore, the population eligible for ITNs in 2020 is 3,069,754 x (1+0.0154) = 3,170,286. According to MEAP2, the population growth at 1.2% per year (Ministry of Planning Report: General Population Census 2019: Provisional Population Totals) is used for calculating population growth beyond 2020.

² No ITNs are distributed through ANC. Pregnant women and newborns are covered through continuous distribution by VMWs.

³ No ITNs are distributed through EPI.

⁴ In 2020, the mass campaign distribution is targeted for 4 provinces with total population of 1,008,342: Kampong Speu (222,320), Preah Vihear (249,801), Stung Treng (169,750), and Kratie (366,471). [source: CNM].

* The carryover in 2020 is from stock on hand reported for 301,472 supported by GF procured by UNOPS, and 56,409 supported by PMI procured by GHSC-PSM. The SOH is planned for the 4 provinces mass campaign in 2020.

** It is assumed that the Global Fund funding request for 2021-2023 will cover 70% of total needs.

*** CNM requested PMI's contribution of 250,000 ITNs in 2020. The order will be placed later in the year and it is likely to arrive in 2021. 2021-2022: CNM proposed 30% contribution of the total needs from PMI. The quantities of 250,000 procured in 2020 and expected to deliver in 2021 is also added to 2021 ITNs planned with PMI funding.

Rapid Diagnostic Test (RDT) Gap Analysis			
Calendar Year	2020	2021	2022
RDT endemic need			
Population at risk for malaria (endemic) ¹	9,373,840	9,486,326	9,600,162
Population growth rate ²		1.2%	1.2%
Annual blood examination rate (ABER) ³	6%	7%	8%
Total RDT Endemic Need ⁴	562,430	664,043	768,013
RDT Stock Base Need			
Minimum stock base in non-endemic operational districts (ODs) ⁵	14,300	13,175	13,175
Number of non-endemic HFs	572	527	527
Stock base for non-endemic HF	25	25	25
Stock base in endemic ODs ⁶	37,600	37,600	37,600
Number of new VMWs	376	376	376
Stock base for each new VMW	100	100	100
Total RDT for Stock Base for Non-endemic and Endemic Ods	51,900	50,775	50,775
RDT Buffer Stock Need			
6 months of stock at central	281,215	332,021	384,006
3 months of stock at districts	140,608	166,011	192,003
1 month of stock at health centers	46,869	55,337	64,001
Total RDT for Buffer Stock	468,692	553,369	640,011
Total RDT Need for the Whole Country	1,083,022	1,268,187	1,458,799
Partner Contributions			
RDTs carried over from previous year*	439,725	748,436	671,264
RDTs from Government	0	0	0
RDTs from Global Fund**	1,156,200	887,731	1,021,159
RDTs from other donors	0	0	0
RDTs planned with PMI funding***	50,000	0	0
Total RDTs Available	1,645,925	1,636,167	1,692,424
Total RDT Surplus (Gap)	562,903	367,980	233,625

¹ CNM Malaria Information System (MIS) surveillance population in 2020 is 9,373,840.

² Ministry of Planning Report: General Population Census 2019: Provisional Population Totals.

³ Cambodia Malaria Elimination Action Framework 2021-2025.

⁴ This is calculated by multiplying the population at risk by the target ABER.

⁵ There are 572 non-endemic HFs, each HF keeps 25 RDTs (CNM revised guidance to be issued in 2020).

⁶ There are 376 new village malaria workers, each one keeps 100 RDTs (CNM guidance issued 27 September 2018).

* The carryover in 2020 is from stock on hand reported by Central Medicine Store in December 2019. The carryover in 2021 and 2022 include 70% buffer stock and the stock base at the VMWs.

** Total procurement quantity funded by GF in 2020 is 1,156,200 tests: 296,250 tests arrived in March 2020, 308,700 tests will have arrived in June 2020, and 551,250 tests will have arrived in Oct 2020 (source: UNOPS). It is assumed that the Global Fund funding request for 2021-2023 will cover 70% of total needs.

*** With PMI funding, GHSC-PSM procured 50,000 RDT tests for URC-CMEP in 2020 and in pipeline, the expected delivery date is May 2020.

Artemisinin-based Combination Therapy (ACT) Gap Analysis			
Calendar Year	2020	2021	2022
ACT Needs			
Total population ¹	15,471,951	15,657,614	15,845,506
Population growth rate ¹	1.2%	1.2%	1.2%
Annual parasite index (API) targets ²	0.98	0.58	0.35
Total cases (<i>Pf</i> , <i>Pv</i> , Mix)	15,163	9,081	5,546
Number ACT Needs	15,163	9,081	5,546
ACT Stock Base Need			
Minimum stock base in non-endemic ODs ³	1,716	1,581	1,581
Number of non-endemic HFs	572	527	527
Stock base for non-endemic HF	3	3	3
Stock base in endemic ODs ⁴	3,760	3,760	3,760
Number of new VMWs	376	376	376
Stock base for each new VMW	10	10	10
Total ACT for Stock Base	5,476	5,341	5,341
ACT Buffer Stock Need			
6 months of stock at central	7,581	4,541	5,443
3 months of stock at districts	3,791	2,270	1,386
1 month of stock at health centers	1,264	757	462
Total ACT for Buffer Stock	12,635	7,568	7,292
ACT Need for the Whole Country	33,274	21,990	18,179
Partner Contributions (to PMI target population if not entire area at risk)			
ACTs carried over from previous year*	37,939	133,999	97,111
ACTs from Government	0	0	0
ACTs from Global Fund**	170,366	15,393	12,725
ACTs from other donors	0	0	0
ACTs planned with PMI funding	0	0	0
Total ACTs Available	208,305	149,392	109,836
Total ACT Surplus (Gap)	175,031	127,401	91,657

¹ Ministry of Planning Report: General Population Census 2019: Provisional Population Totals.

² Cambodia Malaria Elimination Action Framework 2021-2025. There is an expectation that API will be reduced by approximately 40% each year, as the country moves towards elimination.

³ There are 572 non-endemic HFs, each HF keeps 25 RDTs (CNM revised guidance to be issued in 2020).

⁴ There are 376 new village malaria workers, each one keeps 100 RDTs (CNM guidance issued 27 September 2018).

* The carryover in 2020 is from stock on hand reported by Central Medicine Store in December 2019. The carryover in 2021 and 2022 include 70% buffer stock and the stock base at the VMWs.

** Total procurement quantities funded by GF in 2020 is 170,366 treatment courses: 61,886 arrived in March 2020 and 108,480 will have arrived in April 2020 (source: UNOPS). It is assumed that the Global Fund funding request for 2021-2023 will cover at least 70% of total needs.

Primaquine (PQ) 7.5mg Gap Analysis			
Calendar Year	2020	2021	2022
PQ7.5 Need			
Total population ¹	15,471,951	15,657,614	15,845,506
Population growth rate ¹	1.2%	1.2%	1.2%
Annual parasite index (API) ²	0.98	0.58	0.35
Total cases (<i>Pf</i> , <i>Pv</i> , Mix)	15,163	9,081	5,546
PQ7.5 Need for Radical Cure			
Cases (<i>Pv</i> + Mix) ³	13,012	7,794	4,760
G6PD normal	92%	92%	92%
< 20 kg	0	0	0
20 – 30 kg	8,380	5,019	3,065
30 – 45 kg	16,760	10,038	6,130
45 – 60 kg	417,325	249,952	152,643
> 60 kg	33,520	20,076	12,261
Total PQ7.5 Need for Radical Cure	475,986	285,086	174,099
PQ7.5 Need for Single Low Dose			
Cases <i>Pf</i>	2,150	1,288	786
<20 kg	0	0	0
20-49	215	129	79
>50 kg	3,784	2,266	1,384
Total PQ7.5 need for single low dose	2,150	1,288	786
Total PQ7.5 Need for Whole Country	478,136	286,374	174,886
PQ7.5 Buffer Stock Need			
6 months of stock at central	239,068	143,187	87,443
3 months of stock at districts	119,534	71,594	43,721
1 month of stock at health centers	39,845	23,865	14,574
Total PQ7.5 for Buffer Stock	398,446	238,645	145,738
Total PQ7.5 Need for Whole Country	876,582	525,019	320,624
Partner Contributions			
PQ7.5 carried over from previous year*	357,600	0	0
PQ7.5 from Global Fund**	0	0	0
PQ7.5 planned with PMI funding	0	0	0
Total PQ7.5 Available	357,600	0	0
Total PQ7.5 Surplus (Gap)	-518,982	-525,019	-320,624

¹ Ministry of Planning Report: General Population Census 2019: Provisional Population Totals.

² Cambodia Malaria Elimination Action Framework 2021-2025. There is an expectation that API will be reduced by approximately 40% each year, as the country moves towards elimination.

³ % of cases (*Pv* + Mix) is calculated based MIS data 2019: cases *Pv* + Mix (26,981+458) / total cases (31,971) = 85.82% (source: MIS)

* The carry-over in 2020 is from stock on hand reported by Central Medicine Store in December 2019.

** Primaquine 7.5mg from Global Fund in 2020 is based on quantification for country-wide radical cure roll out. the 2021 and 2022 is TBD but at least 70% of total commodities are expected to be funded by GF.

Glucose-6-Phosphate Dehydrogenase Enzyme (G6PD) Gap Analysis			
Calendar Year	2020	2021	2022
G6PD Needs			
Total population ¹	15,471,951	15,657,614	15,845,506
Population growth rate ¹	1.2%	1.2%	1.2%
Annual parasite index (API) ²	0.98	0.58	0.35
Total cases (<i>Pf</i> , <i>Pv</i> , Mix)	15,163	9,081	5,546
Cases (<i>Pv</i> + Mix) ³	13,012	7,794	4,760
Cases (<i>Pv</i> + Mix) > 20kg ⁴	12,752	7,638	4,664
Estimated G6PD Tests Need	12,752	7,638	4,664
G6PD Buffer Stock Need			
3 months of stock at central	3,188	1,909	1,166
1 month of stock at health centers	1,063	636	389
Total G6PD for Buffer Stock	4,251	2,546	1,555
Total G6PD Need for Whole Country	17,003	10,184	6,219
Partner Contributions			
G6PD carried over from previous year*	0	2,343	1,284
G6PD from Government	0	0	0
G6PD from Global Fund**	16,100	7,129	4,353
G6PD from other donors	0	0	0
G6PD planned with PMI funding	0	0	0
Total G6PD Available	16,100	9,472	5,637
Total G6PD Surplus (Gap)	-903	-712	-582

¹ Ministry of Planning Report: General Population Census 2019: Provisional Population Totals.

² Cambodia Malaria Elimination Action Framework 2021-2025. There is an expectation that API will be reduced by approximately 40% each year, as the country moves towards elimination.

³ % of cases (*Pv* + Mix) is calculated based MIS data 2019: cases *Pv* + Mix (26,981+458) / total cases (31,971) = 85.82% (source: MIS)

⁴ 98% of all cases reported in 2019 is above 20kg (source: MIS).

* *The carryover in 2020 is from stock on hand reported by Central Medicine Store in December 2019. The carryover in 2021 and 2022 include 70% buffer stock.*

** *G6PD from Global Fund in 2020 is based on quantification for country-wide radical cure roll out. It is assumed that the Global Fund funding request for 2021-2023 will cover at least 70% of total needs.*

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	5
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	4
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	2
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	2
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	2
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	4
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	4

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	5
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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	5
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	5
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	2

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	5
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	5
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	
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	3
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	3

MIP	Tracking ANC contacts in the HMIS	Tracking	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	2
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	2
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	1

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	4

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	3

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	4
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	2

<p>Routine Distribution and Resupply</p>	<p>No routine requisition and resupply schedule between stock holding levels</p>	<p>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</p>	<p>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</p>	<p>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</p>	<p>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</p>	<p>4</p>
<p>Health Commodity Regulations and Policy</p>	<p>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</p>	<p>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</p>	<p>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</p>	<p>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</p>	<p>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</p>	<p>4</p>

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
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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

<p>Data, Surveillance, Monitoring & Evaluation</p>	<p>HMIS data quality assurance and quality control</p>	<p>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</p>	<p>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</p>	<p>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</p>	<p>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</p>	<p>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</p>	<p>3</p>
<p>Data, Surveillance, Monitoring & Evaluation</p>	<p>Reporting Systems</p>	<p>Data collection tools not standardized and procedures inconsistently followed; unstructured data collection and storage; no NMCP access to HMIS malaria data</p>	<p>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</p>	<p>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</p>	<p>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</p>	<p>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</p>	<p>5</p>

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	5
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	5
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 federal-wide assurance approval, but no previous PMI in-country OR/PE engagement	Processes in place for research and IRB review with federal-wide 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	4
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	4
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	2

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	4

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	4
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	2
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	4
Elimination	Scope of activities implemented (e.g. active case detection, PQ for <i>Pf</i> , 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	4

Elimination	Surveillance system readiness to track all cases	Monthly, aggregate data	Case-based reporting initiated	Real-time, case-based reporting inclusive of all sectors and levels in target areas	Real-time, case-based reporting and response activities implemented	Real-time, case-based reporting and response activities implemented with data open/shared	4
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	3
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)	3

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)	5