LAST UPDATED: 05/26/2023

CÔTE D'IVOIRE MALARIA PROFILE

I. ABOUT

Launched in 2005, the U.S. President's Malaria Initiative (PMI) supports implementation of malaria prevention and treatment measures as well as cross-cutting interventions. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 27 countries in Sub-Saharan Africa and three programs across the Greater Mekong Subregion in Southeast Asia to control and eliminate malaria. Côte d'Ivoire began implementation as a PMI focus country in FY 2018. Please see the Côte d'Ivoire Malaria Operational Plan for more information on PMI's approach and investments.

II. CONTEXT

Table 1: General Demographics and Malaria Situation

Population	31,066,127 (National Institute of Statistic estimation from 2021 census, 2023)
Population at risk of malaria	100 percent
Malaria prevalence	26 percent (DHS[1], 2021)
Malaria incidence/1,000 population at risk	231/1,000 (Yearbook of Health Statistics, 2021)
Peak malaria transmission	July-September (northern), April-June (central east and southern)[2]

STRATIFICATION

The Côte d'Ivoire National Malaria Control Program (NMCP) conducted a stratification exercise in 2019 and 2022 with the support of PMI. The epidemiological data were combined with district level measures of entomology and insecticide resistance to conduct this 2022 stratification exercise. In the absence of resistance data in a district, data from the proximity district was considered.

[1]Demographic Health Survey 2021. Percent of children under five years of age with parasitemia by microscopy.
[2] Climate Study in Côte d'Ivoire Report by SODEXAM (Société d'Exploitation Et de Développement Aéroportuaire, Aéronautique et Météorologique)

The 2019 stratification exercise data were used to determine the type of nets (standard, piperonyl butoxide [PBO] and dual active ingredient [AI]) needed in each district for the 2021 mass distribution campaign (and routine distribution subsequently). The 2022 stratification data will be used for the 2024 mass campaign.

Figure 1: Stratification Maps

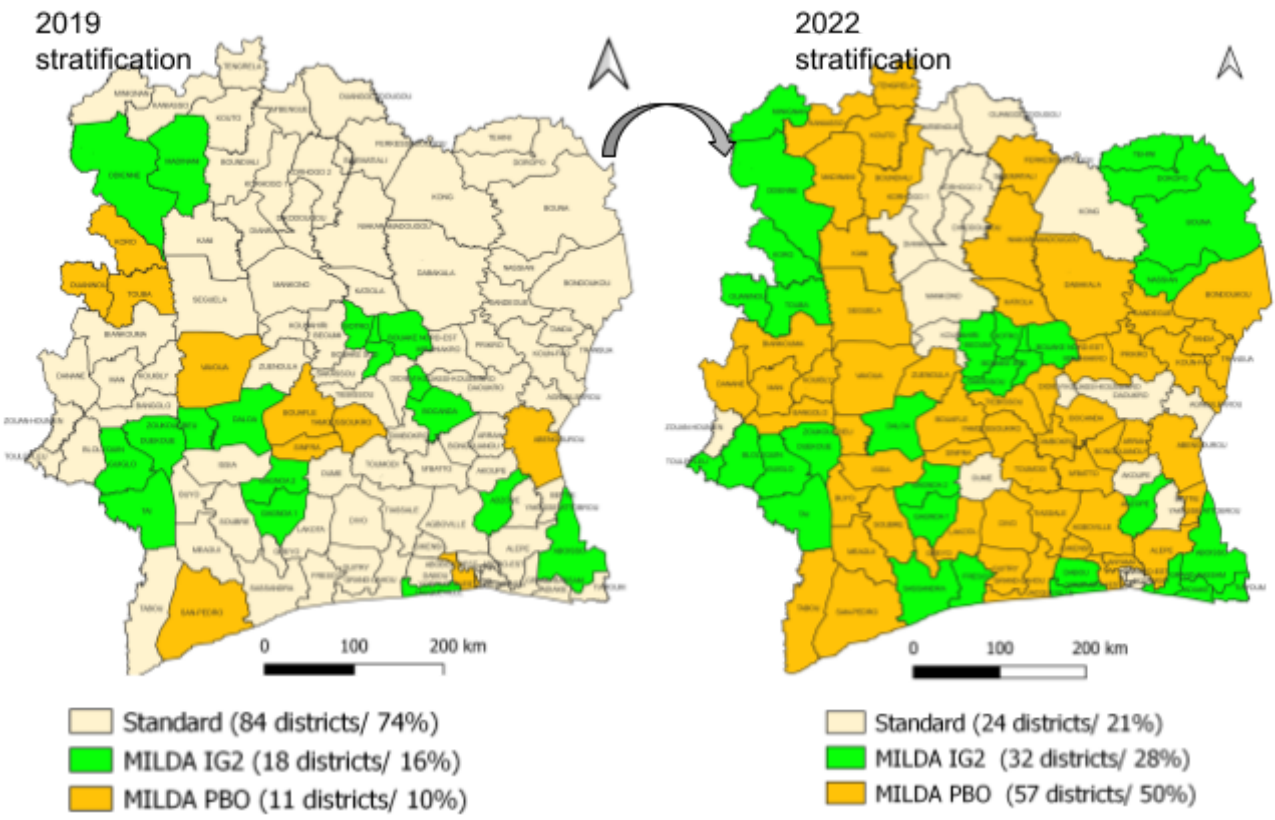


Figure 2: Prevalence Maps

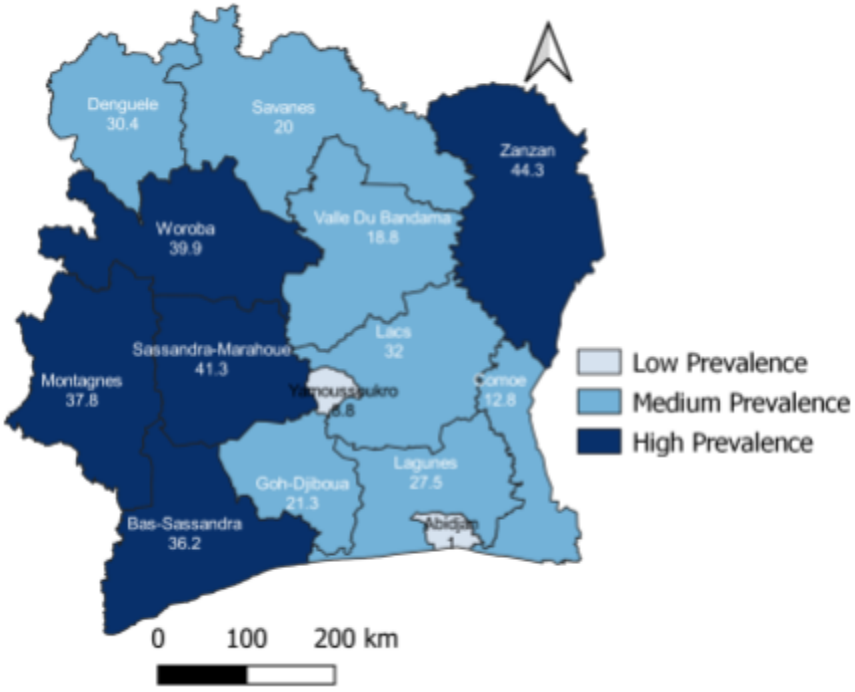


Figure 3: Incidence Maps

Figure 3a: 2020 and 2021 Malaria Incidence Maps

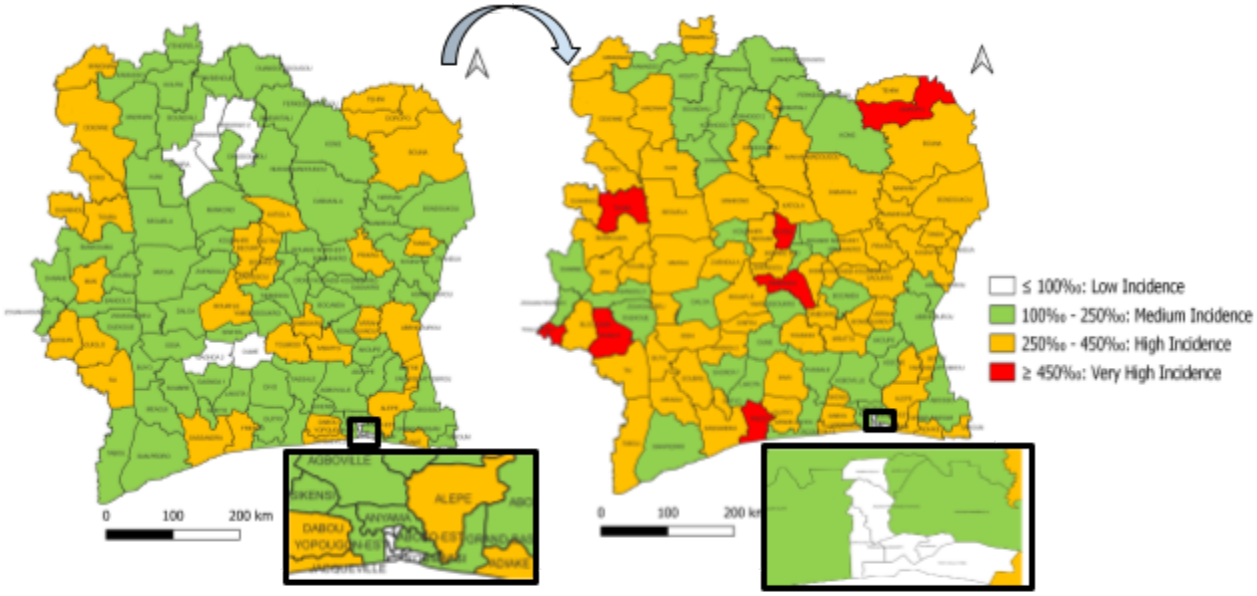


Figure 3b: 2021 Malaria Incidence distribution by health district for children under 5 years of age

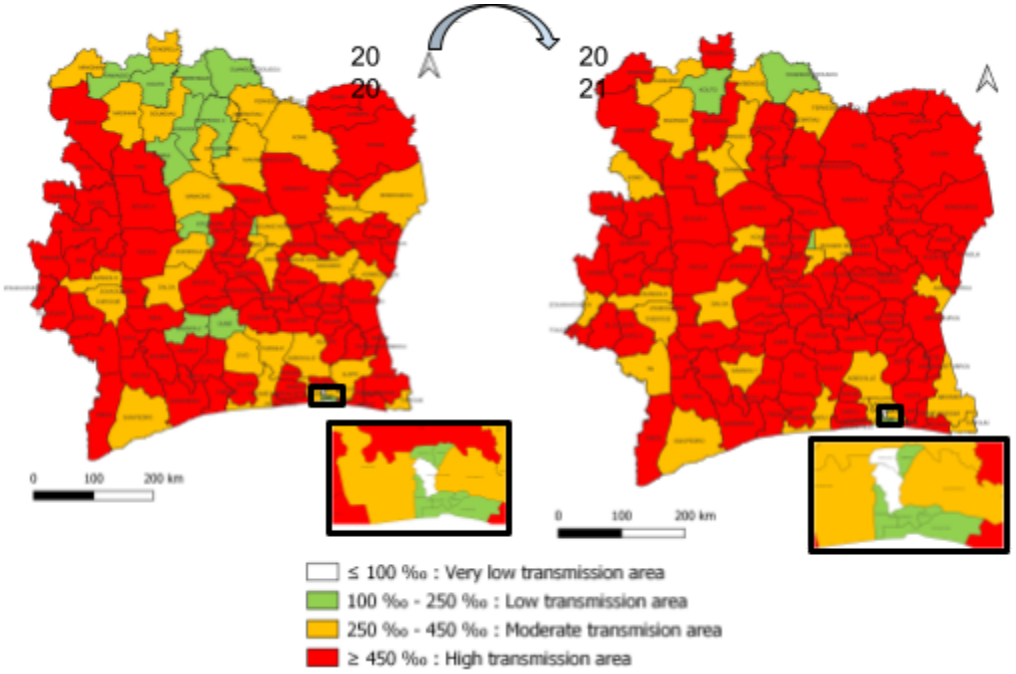


Table 2: Malaria Parasites and Vectors

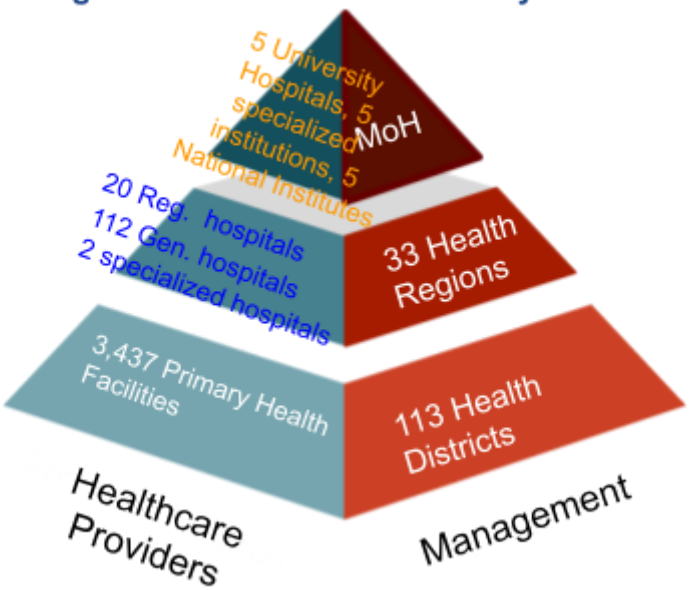
Principal Malaria Parasites	*Plasmodium falciparum*
Principal Malaria Vectors*	*Anopheles gambiae* s.l., *An. coluzzii*, and An. funestus s.l.

*See Entomological Monitoring section of the MOP for more details on vector bionomics and insecticide resistance and Indoor Residual Spraying section for details on residual efficacy.

COUNTRY HEALTH SYSTEM

The health system of Côte d'Ivoire is pyramidal with an administrative element and a care element, which are interdependent (Figure 4). Each has three levels, which play specific roles in malaria control. The central level comprises the Cabinet, the General Health Directorate, 9 Central Directorates, 14 National Public Health Institutes and 24 Coordination Departments for the national health programs, including the National Malaria Control Program (NMCP). This level is responsible for defining health policy,

Figure 4: Côte d'Ivoire Health System



general coordination of the healthcare system, resource mobilization, monitoring and evaluation and operational research. In terms of care services, the central level is made up of five university hospitals, five specialized institutions, five national public institutes, and the medical emergency hospital. These provide not only treatment for severe malaria cases but also intermittent preventive treatment of malaria for pregnant women (IPTp), routine distribution of ITNs, and conduct malaria-related operational research.

The intermediate level represents 33 regional health departments, each of which covers several health districts, which oversee all private, public and community-level health services within their respective health region. The peripheral level comprises 20 regional hospitals, 112 general hospitals, and two specialized hospitals, all of which provide treatment for both uncomplicated and severe malaria cases, IPTp, and routine distribution of ITNs. The regional level hospitals serve as the first referral site for medical services that are unavailable at district level hospitals. The peripheral level consists of 113 health districts, which are responsible for all the public and private health services within the area it covers. Each health district is administered by a District Management Team [Equipe Cadre de District] led by the Departmental Director. The teams are responsible for the operational implementation of the national health policy. They monitor and supervise providers' application of malaria control guidelines and are responsible for collecting and submitting health data on malaria from the health facilities to the central level. The public sector comprises 3,437 health facilities [établissements sanitaire de premier contact (ESPC)] and a total of 1,108 private ESPC. Each ESPC is managed by a qualified health professional (i.e., a medical doctor, specialized nurse, or midwife). The ESPCs provide routine case management for uncomplicated malaria; IPTp; and routine distribution of ITNs to pregnant women during their first antenatal care visit, to children under one year of age during immunization visits, and to children between one and five years of age during health child consultations. Severe malaria cases are referred to district-level hospitals. The public sector consists of 4,951 doctors (4,480 doctors health care providers), 12,887 nurses (12,728 nurses working in health care services) and 7,134 midwives (7,096 midwives health care providers). Based on the 2021 general census of population (29,389,150) the ratio of public-sector healthcare workers to the population is as follows: 1.52 doctors per 10,000 inhabitants, 2.17 nurses per 5,000 inhabitants and 3.18 midwives per 3,000 women of childbearing age. Côte d'Ivoire currently exceeds the standard for doctors, nurses, and midwives.[3] An estimated 70.19 percent of the population lives at least 5 km from the nearest health facility. The private health sector consists of 1,108 for-profit private health centers providing a range of services including treatment of malaria.[4] The NMCP is in the process with these private health facilities, to provide a package of malaria-prevention activities that include free SP to pregnant women, ITNs during antenatal care (ANC) and to

[3] "The standards for the health human resources are: one doctor per 10,000 inhabitants; one nurse per 5,000; one midwife per 3,000 women of childbearing age."
[4] Ministere De La Sante, De L'hygiene Publique Et De La Couverture Maladie Universelle (MSHPCMU) et Direction De L'informatique Et De L'information Sanitaire (DIIS). Rapport Annuel Sur La Situation Sanitaire (Rass) 2020. (Côte d'Ivoire, Juillet 2021): https://www.snisdiis.com/wp-content/uploads/2022/03/Rapport-Annuel-sur-la-Situation-Sanitaire-RASS-2020-VF.pdf.

children under one year of age, training to improve diagnosis and treatment, and SBCC activities targeting patients and healthcare workers. Discussion is ongoing with them for their participation in the national reporting process.

The community sector helps to support the public sector. The Government of Côte d'Ivoire is working to reinforce community case management for home-based case management in children under five years of age, which is primarily led by NGOs. In early 2023, the country validated the revised national community health strategy, with the aim of reinforcing the community health system. Community health workers (ASC, *Agents de Santé Communautaire*) are not salaried but are paid a standard monthly stipend mostly funded by partners.

Table 3: Roles of the three levels of the health system

	Management	Healthcare Providers
Central Level	● Formulate policy, develop strategic plans, set priorities ● Formulate budget, allocate resources ● Regulate, set standards, formulate guidelines ● Monitor performance and adherence to the planning cycle ● Mobilize resources ● Coordinate with all (internal and external) partners ● Provide technical support to the county level ● Build capacity of the county level ● Oversee national health referral services ● Train health staff (both pre- and in-service), ensure that curricula and training institutions are in place	● All health structures provide a second resort function for cases that cannot be taken care of at secondary level. ● Possess a technical capacity for diagnosis, treatment, training, and research. ● Includes (but not limited to): five University Hospital Centers, National Institute of Public Hygiene, National Public Health Laboratory, National Institute of Public Health, Abidjan Heart Institute, Raoul Follereau Institute, the Alassane Ouattara National Center of Oncology and Radiotherapy, the Emergency Medical Service, and the National Center for Prevention and Treatment for Renal Insufficiency. The health care providers include the private health sector too.
Secondary Level	The secondary level comprises 33 health regions and: ● Provide leadership and stewardship for overall health districts ● Provide strategic and operational planning, monitoring, and evaluation of health services in the region ● Provide a linkage with the national ministry responsible for health ● Mobilize resources for region health services ● Establish mechanisms for the referral function within and between the regions, and between the different levels of the health system in line with the sector referral strategy ● Supervise regional health services	● All public healthcare facilities provide a function of first resort for cases that cannot be taken care of at primary level. ● Possess technical capacity for diagnosis and treatment. ● 112 General Hospitals and 20 Regional Hospital Centers = 20 facilities in total.

Primary Level	The peripheral level comprises 113 health districts which coordinate the health activities within their area. They provide operational and logistical support to the health services. The health district is the operational unit of the health system. They: ● Develop and implement facility health plans ● Coordinate reporting and data quality improvement activities ● Supervise and control the implementation of facility health plans (monitoring and evaluation) ● Train and develop capacity of staff (on-the-job training) ● Maintain quality control and adherence to guidelines	● Gateway to the health system. ● Comprises all health facilities which provide first contact functions: curative, preventive, educational and promotional services. ● 2,490 public health facilities and 947 private health facilities serving health catchments. Community-based activities are implemented in the primary public health facilities.

Note: The standards for the health human resources are: One doctor per 10,000 inhabitants; One nurse per 5,000; One midwife per 3,000 women of childbearing age.
Source: 2021 Health Statistics Yearbook.

OTHER CONTEXTUAL INFORMATION

There is no other contextual information.

III. NMCP STRATEGIC PLAN

The NSP for Malaria Control covers 2021-2025 and was released in April 2020. The NSP 2021–2025 objectives align with the World Health Organization's (WHO) Global Technical Strategy and PMI's Strategy, provided below:

- By the end of 2025, reduce malaria mortality rates by at least 75 percent compared to 2015
- By the end of 2025, reduce the incidence of malaria by at least 75 percent compared to 2015
- By the end of 2025, strengthen and maintain the program's management, coordination, and partnership capacities to achieve performance at all levels.

This NSP 2021-2025 is supported by the Social and Behavior Change Communication activities which have the following objectives:

- At least 90 percent of the population is aware of national malaria prevention measures by 2025.
- At least 90 percent of the population have a good knowledge of the signs of malaria by 2025.
- At least 80 percent of the population are practicing malaria prevention correctly by 2025
- At least 80 percent of the population sleep under a Long-Lasting Insecticidal Net (LLIN)

by 2025.

- At least 80 percent of children under 5 years old sleep under an LLIN by 2025.
- At least 80 percent of pregnant women sleep under an LLIN by 2025.
- At least 80 percent of disaster-affected populations benefit from specific malaria prevention measures (LLINs, IPT for pregnant women and IPT) by 2025.
- At least 85 percent of household heads in target areas have adhered to indoor residual spraying.
- At least 60 percent of households in target districts conduct a monthly sanitation campaign by 2025.

IV. KEY MALARIA DATA

EVOLUTION OF KEY SURVEY BASED MALARIA INDICATORS

Table 4: Key Survey Indicators

Indicator	2012 DHS	2016 MICS	2021 DHS
% of Households with at least one ITN	67.0	75.8	72.1
% of Households with at least one ITN for every two people	31.7	47.3	51.2
% of Population with access to an ITN	49.0	27.1	65.0
% of Population that slept under an ITN the previous night	33	50.5	51.8
% of Children under five years of age who slept under an ITN the previous night	37.2	59.7	58.5
% of Pregnant women who slept under an ITN the previous night	40.2	53.4	64.2
% of Children under five years of age with a fever in the last two weeks for whom advice or treatment was sought	42.8	45.2	59.1
% of Children under five years of age with a fever in the last two weeks who had a finger or heel stick	11.0	18.1	38.4
% of Children receiving an ACT among children under five years of age with a fever in the last two weeks who received any antimalarial drug	17.5	11.5	65.0
% of Women who attended 4 ANC visits during their last pregnancy	44.2	51.3	57.0
% of Women who received three or more doses of IPTp during their last pregnancy in the last two years	20	22.6	34.6
Mortality rate among children under five years of age per 1,000 live births	108	96.0	74.0
% of Children under five years of age with parasitemia by microscopy	18.0	37.1	26.0
% of Children under five years of age with parasitemia by RDT	41.5	47.7	37.3

Sources: Demographic and Health Survey; Multiple Indicator Cluster Survey; Malaria Indicator Survey.
ACT: artemisinin-based combination therapy; ANC: antenatal care; ITN: insecticide-treated mosquito net.

Figure 5. ITN Use:Access Ratio Map

Figure 5 shows ITN use: access ratios by region. The highest ITN use: access ratio is in Montagnes with more than 1 and the lowest was in Zanzan with 0.6 - 0.8. The ratio is obtained by dividing use by access and it provides data on the behavioral gap for net use rather than a gap due to non availability.

Table 5: Evolution of Key Malaria Indicators Reported through Routine Surveillance Systems

Indicator	2018	2019	2020	2021	2022
# of All-cause patient consultations	13,119,014	14,043,455	13,676,261	14,387,357	14,117,783
# of Suspect malaria cases[1]	7,147,273	8,283,048	7,434,699	8,619,788	8,731,427
# of Patients receiving diagnostic test for malaria[2]	6,189,216	7,601,761	5,848,660	8,002,401	8,492,235
Total # of malaria cases[3]	4,780,174	4,811,546	4,808,565	6,771,474	8,365,983
# of Confirmed cases[4]	4,777,031	5,935,011	4,586,397	6,452,502	6,965,165
# of Presumed cases[5]	NA	NA	NA	271,800	140,962
% Malaria cases confirmed[6]	100%	124%	95.4%	95.3%	82%

Test positivity rate[7]	77.2%	78%	78.4%	80.6%	82%
Total # of malaria cases among children under five years of age[8]	2,196,077	2,484,607	1,882,484	2,611,390	3,969,338
% Cases in children under five years of age[9]	45.9%	51.6%	39.2%	38.6%	47.5%
# of Severe cases[10]	75,555	106,927	103,946	58,460	69,205
# of Malaria deaths[11]	3,133	1,641	1,315	1,276	1,534
# of Facilities reporting[12]	2,415	2,623	2,710	2,743	3,005
% of Data completeness[13]	96%	99.3%	100%	99%	100%

Source: DHIS 2
[1] Number of patients presenting with signs or symptoms possibly due to malaria ('suspect malaria cases' are defined as the presence of fever);
[2] RDT or microscopy, all ages, outpatient and inpatient;
[3] Total reported malaria cases; all ages, outpatient and inpatient, confirmed and unconfirmed cases;
[4] Diagnostically confirmed; all ages, outpatient and inpatient;
[5] Clinical/presumed/unconfirmed; all ages, outpatient and inpatient;
[6] # confirmed cases divided by total # cases;
[7] Confirmed cases divided by # patients receiving a diagnostic test for malaria (RDT or microscopy);
[8] Outpatient and inpatient, confirmed and unconfirmed;
[9] Total # of cases among children under five years of age divided by total # of cases;
[10] Severe Malaria Cases are reported in HMIS as a patient tested positive with one or more signs of clinical or laboratory severity disturbances of consciousness including reactive coma (i- prostration; ii-Repeated seizures (> 2 episodes/24h); iii-Respiratory distress; iv- Hypoglycemia, Anemia.
[11] All ages, outpatient, inpatient, confirmed, and unconfirmed;
[12] Total # of health facilities reporting data into the HMIS/DHIS2 system that year;
[13] # monthly reports from health facilities divided by # health facility reports expected (average for the calendar year)

Table 6: Disaggregated Community-Level Data

Indicator	2019	2020	2021	2022
# Patients receiving diagnostic test for malaria from a CHW	527,457	478,769	875,733	1,415,506
# of malaria cases reported by CHWs[1]	388,184	356,663	828,216	1,180,426
% of CHW reported cases (among total cases)[2]	8%	7.4%	12.2%	14.1%

[1] Includes all ages, confirmed and unconfirmed
[2] Total # malaria cases reported by CHWs/Total # malaria cases in previous table

V. Other Implementation Information

Table 7: Results of Durability Monitoring

Site/Net Type	Survey and Time Since Distribution (months)	Attrition to Wear and Tear (%)	Nets in Serviceable Condition (%)	Optimal Insecticidal Effectiveness in Bioassay (%)
Abengourou/PermaNet 3.0	5.6	0.0%	99.6%	N/A
Aboisso/Interceptor G2	5.6	0.3%	98.4%	N/A

Table 8: Summary of Completed Therapeutic Efficacy Studies

Year	Site	Treatment arm(s)	Efficacy (PCR-corrected adequate clinical and parasitological result) for each drug at each site (per-protocol analysis)
2017[1]	Abengourou	AL	98.2%
2017[1]	Abengourou	ASAQ	100%
2017[1]	Abidjan	AL	94.8%
2017[1]	Abidjan	ASAQ	100%
2017[1]	Korhogo	AL	100%
2017[1]	Korhogo	ASAQ	100%
2017[1]	Man	AL	100%
2017[1]	Man	ASAQ	98.3%
2017[1]	San Pedro	AL	100%
2017[1]	San Pedro	ASAQ	100%
2017[1]	Yamoussoukro	AL	100%
2017[1]	Yamoussoukro	ASAQ	98.0%
2019[1]	Abidjan	AL	Day 28 efficacy not available
2019[1]	Abidjan	ASAQ	Day 28 efficacy not available
2019[1]	Bouna	AL	Day 28 efficacy not available
2019[1]	Bouna	ASAQ	Day 28 efficacy not available
2019[1]	Bouake	AL	Day 28 efficacy not available
2019[1]	Bouake	ASAQ	Day 28 efficacy not available
2019[1]	Daloa	AL	Day 28 efficacy not available
2019[1]	Daloa	ASAQ	Day 28 efficacy not available
2019[1]	Odienne	AL	Day 28 efficacy not available
2019[1]	Odienne	ASAQ	Day 28 efficacy not available
2019[1]	Aboisso	AL	Day 28 efficacy not available
2019[1]	Aboisso	ASAQ	Day 28 efficacy not available
2019[1]	San Pedro	AL	Day 28 efficacy not available

2019[1]	San Pedro	ASAQ	Day 28 efficacy not available
2019[1]	Man	AL	Day 28 efficacy not available
2019[1]	Man	ASAQ	Day 28 efficacy not available
2019[1]	Korhogo	AL	Day 28 efficacy not available
2019[1]	Korhogo	ASAQ	Day 28 efficacy not available
2019[1]	Yamoussoukro	AL	Day 28 efficacy not available
2019[1]	Yamoussoukro	ASAQ	Day 28 efficacy not available
2019[1]	Abengourou	AL	Day 28 efficacy not available
2019[1]	Abengourou	ASAQ	Day 28 efficacy not available
2019[1]	Adzope	AL	Day 28 efficacy not available
2019[1]	Adzope	ASAQ	Day 28 efficacy not available
2021[2]	D'aboisso	AL	97.7%
2021[2]	Aboisso	ASAQ	97.7%
2021[2]	Abengourou	AL	97.7%
2021[2]	Abengourou	ASAQ	100%
2021[2]	Bouake	AL	97.7%
2021[2]	Bouake	ASAQ	100%
2021[2]	San-Pedro	AL	94.3%
2021[2]	San-Pedro	ASAQ	97.7%

Per protocol estimates are reported.
AL = artemether-lumefantrine; ASAQ = artesunate-amodiaquine; PCR = polymerase chain reaction.
[1]Global Fund supported TES.
[2] PMI preliminary study report.

VI. Key Policies

Table 9: Policies in Côte d'Ivoire

National Strategic Plan (April 2020)
National SM&E Plan (2021)
National Digital Health Strategy (ongoing)
National Social Behavior Change/Communication Strategy (2020)
National Supply Chain Strategy/Master Plan (2019)
National Vector Control Strategy and/or Integrated Vector Management Plan (2016)

Malaria Case Management Policy (2022) **National Community Health Strategy** (2023)	
What is/are the first-line treatment(s) for uncomplicated *P. falciparum* malaria*?	Artesunate-amodiaquine Artemether-lumefantrine Dihydroartemisinin-piperaquine Artesunate-pyronaridine
What is/are the second-line treatment(s) for uncomplicated *P. falciparum* malaria*?	Oral quinine
Ethiopia, Madagascar, and GMS countries with significant *P. vivax* malaria (i.e., Zone 2 countries): What is/are the first-line treatment(s) for uncomplicated *P. vivax* malaria?	NA
What is the first-line treatment for severe malaria?	Injectable artesunate
In pregnancy, what is the current first-line treatment for uncomplicated *P. falciparum* malaria in the first trimester?	Oral quinine
Given the WHO policy change to recommend AL as treatment for uncomplicated malaria in the first trimester, does the MOH plan to update the policy on treatment of MIP in the first trimester? And if so, what is the status of this policy change and implementation of the new policy?	Yes; advocacy is ongoing, and the NMP does plan to update the malaria case management guidelines accordingly.
In pregnancy, what is/are the first-line treatment(s) for uncomplicated *P. falciparum* malaria in the second and third trimesters?	Quinine Artesunate-amodiaquine Artemether-lumefantrine Dihydroartemisinin-piperaquine Artesunate-pyronaridine
Ethiopia, Madagascar, and GMS countries with significant *P. vivax* malaria (i.e., Zone 2 countries): What is/are the first-line treatment(s) for *P. vivax* malaria during pregnancy?	NA
In pregnancy, what is the first-line treatment for severe malaria?	Injectable quinine Injectable artésunate Injectable artemether
Is pre-referral treatment of severe disease recommended at peripheral health facilities? If so, with what drug(s)?	Yes with quinine
Is pre-referral treatment of severe disease with rectal artesunate recommended for community health workers?	Yes with rectal artesunate
Community Health Policy (2023)	
What is the # of CHWs currently providing iCCM?	12,663[5]
What is the country's target for the number of CHWs providing iCCM?	25,075
What percent of the country's target is met?	51 percent

[5] Source: DSC: CHW distribution per region and district.

Does the country have a policy that enables the routine, regular payment of salaries/stipends for CHWs?	No (although in practice there is a standard stipend paid it is not a salary and is not official government policy)
Do CHWs have the authority to test and treat all ages for malaria?	Yes
Prevention of Malaria in Pregnancy Policy (2018)	
At what gestational age is the first dose of IPTp-SP to be given to pregnant women according to the national guidelines for malaria and MCH?	Q2
Do the national ANC guidelines reflect the WHO 2016 recommendation of 8 ANC scheduled contacts (plus one additional contact for early initiation of IPTp at 13-16 weeks)? If not, how many ANC contacts are recommended?	No; four contacts are recommended, and the country is prioritizing reaching four ANC contacts before moving to 8 contacts.
What is the status of training ANC providers on the WHO recommended 8+ contacts?	Not applicable (see above)
Have HMIS/DHIS2 and ANC registers been updated to include 8+ contacts?	No (see above)
Are ANC/IPTp data collected as single months where the January 2022 data represent the number of doses administered in January 2022, or cohort data, representing the cumulative data from pregnancies which began 6 months prior?	The ANC/IPTp data are collected as a single month.
Is ANC/IPTp provided by facility staff conducting ANC outreach to communities?	Yes
Can CHWs deliver IPTp and if so, which specific cadres and beginning with which dose? How many districts are targeted for c-IPTp implementation?	No N/A

ANC: antenatal care; CHW: community health worker; HMIS: health management information system; iCCM: integrated community case management; IPTp: intermittent preventive treatment during pregnancy; MCH: maternal and child health.

VII. PARTNER LANDSCAPE

Table 10: Partner Landscape

Partner	Key technical interventions	Geographic coverage	Funding amount or in-kind contribution	Timeframe
Global Fund	Vector Control, case management, prevention, procurement of national needs for SP, training and supportive supervision	68 of 113 health districts	$23,000,000	Current grant covers 01/01/2021 to 12/31/2023
UNICEF	Vector Control, case management, prevention, procurement of national needs for SP, training and supportive supervision	68 of 113 health districts	Data not available	Current grant covers

SP: sulfadoxine-pyrimethamine.