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ZAMBIA 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 24 countries in sub-Saharan Africa and three programs across the Greater Mekong Subregion in Southeast Asia to control and eliminate malaria. Zambia began implementation as a PMI partner country in Fiscal Year (FY) 2008. Please see the latest Malaria Operational Plan for more information on PMI's approach and investments.

II. CONTEXT

While recognized internationally for its ambitious goal of malaria elimination and for having attained pre-elimination levels in Southern Province, Zambia, as a whole remains a highly endemic malaria country, with the entire population considered to be at risk of contracting malaria. According to the National Malaria Elimination Centre (NMEC), in 2021, there were over 7,050,000 reported malaria cases; malaria case incidence was estimated to be 340/1,000 population/year; prevalence in children under 5 years of age was found to be 29 percent (rapid diagnostic test (RDT)-based); and Zambian hospitals reported a total of 1,503 deaths from malaria, which is an incidence of eight inpatient deaths per 100,000 population (Health Management Information System [HMIS] 2021; Malaria Indicator Survey [MIS] 2021). Malaria transmission occurs throughout the year, with variations in transmission intensity across the country. Cases tend to peak in the late rainy season (February to May).

In Zambia, 77 percent of the total population resides in rural areas (Zambia Statistics Agency 2020), where risk of malaria infection is 4.5 times greater than in urban areas (MIS 2021). Risk is highest in the wetter, rural, impoverished provinces of Luapula, Northern, Muchinga, North Western, and Western Provinces (40–63 percent RDT-based prevalence in the 2021 MIS), and in adjacent rural areas of the Copperbelt and Eastern provinces. Risk is lowest in Lusaka Province and Southern Province (both 3.3 percent in the 2021 MIS). As captured in the national stratification scheme, at the health facility catchment areas (HFCA) level and district level, malaria incidence varies widely,

from less than 50 cases to over 500 cases per 1,000 population per year, as shown in Figure 1 and Figure 2.

Table 1: General Demographics and Malaria Situation

Population	18,926,743 (Central Statistical Office 2022 population projection, 2013)
Population at risk of malaria	100%, 18,926,743 (Central Statistical Office 2022 population projection, 2013)
Malaria prevalence	29% RDT-based (MIS 2021)
Malaria incidence/1,000 population at risk	340 (HMIS, 2021)
Peak malaria transmission	December to May

STRATIFICATION

Zambia has a well-established annual program of malaria risk stratification for each HFCA, based on case incidence from combined data from health facility and community case management. The most recent was conducted in quarter (Q) 1 of calendar year (CY) 2022. The levels of malaria transmission intensity are stratified as “high” level 4 (above 499 cases per 1,000 population/year), “moderate” level 3 (from 200 to 499 cases per 1000 population per year), “low” level 2 (from 50 to199 cases per 1,000 population/year), “very low” level 1 (from 1 to 49 cases per 1000 population/year), or “no malaria” level 0. Figure 2 depicts the national malaria stratification by district and by HFCA, including estimated proportion of the national population at each epidemiologic strata.

Based on this stratification of malaria incidence, in 2021, 19 percent of the population of Zambia lived in level 4 areas where malaria incidence is above 499/1,000; 24 percent are in the level 3 areas with 200-499 per 1,000; 23 percent in level 2 areas with 50–199 per 1,000; and 33 percent in the level 1 areas with above zero but less than 50 cases per 1,000 (HMIS/ Malaria Rapid Reporting System 2021). Ten HFCAs reported no malaria cases in 2021, meaning that only 1 percent of the population lived in malaria-free (Level 0) HFCAs in 2021. In an encouraging trend, the maps and bar chart in Figure 2 show a slow but steady decrease in the number of HFCAs and the proportion of the national population living in the level 4 epi stratum for the five-year (2017–2021) period, with the exception of 2020, which saw a spike in malaria case incidences across Zambia and throughout much of Southern and Eastern Africa.

Incidence Maps

Figure 1: Malaria Risk Stratification at District Level for 2021

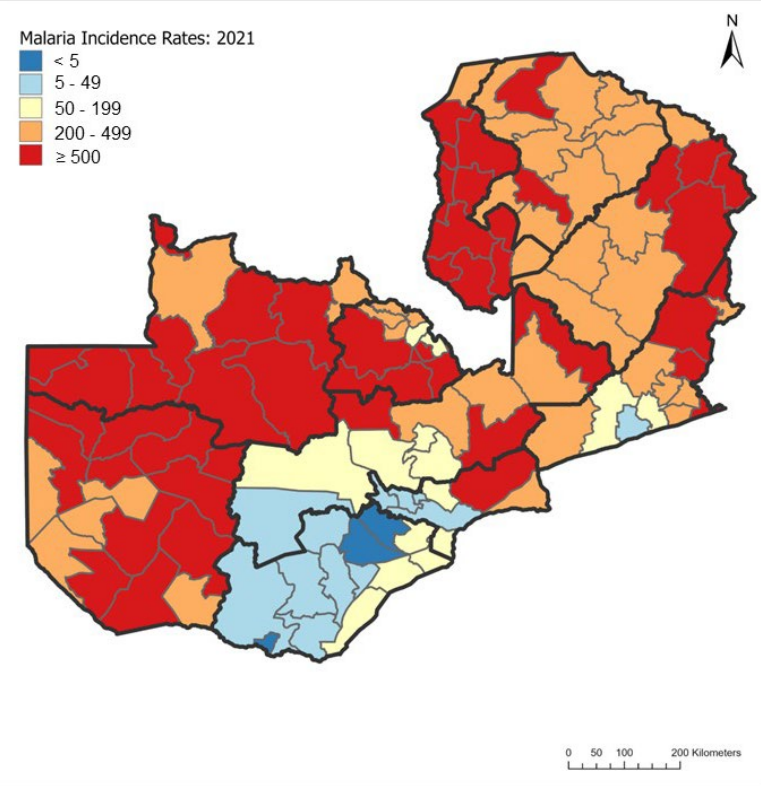
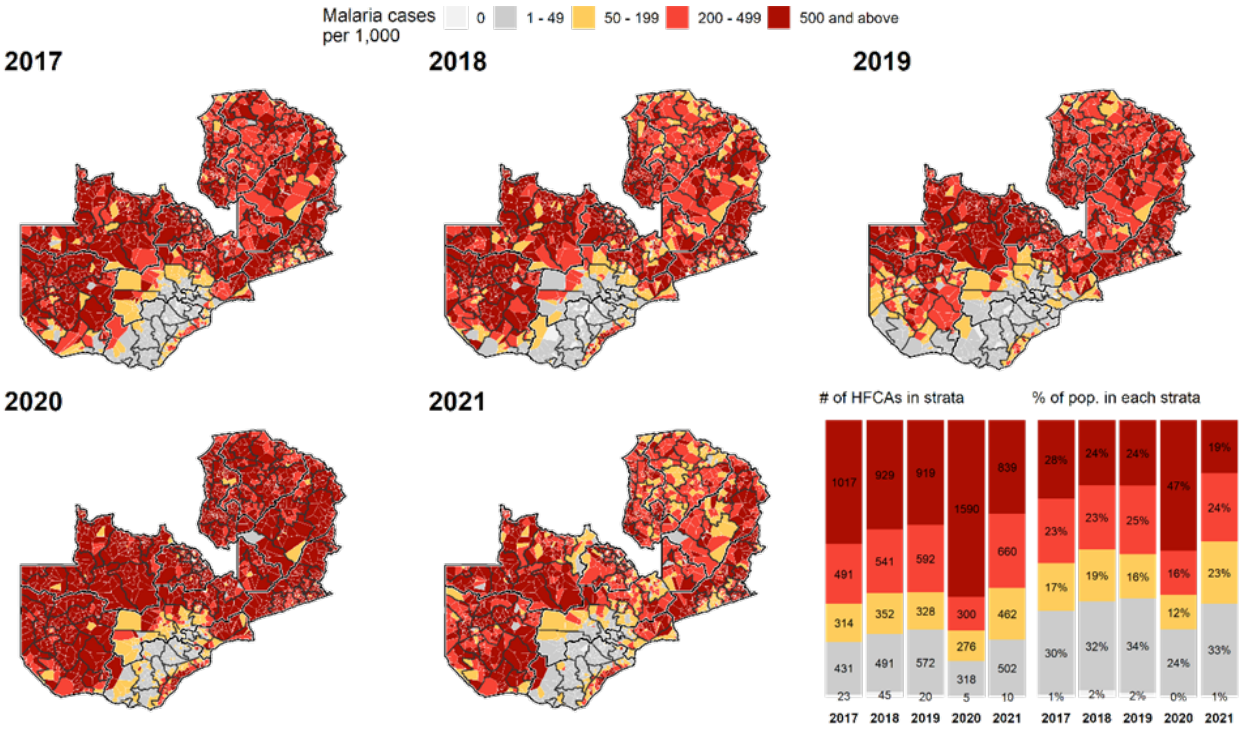


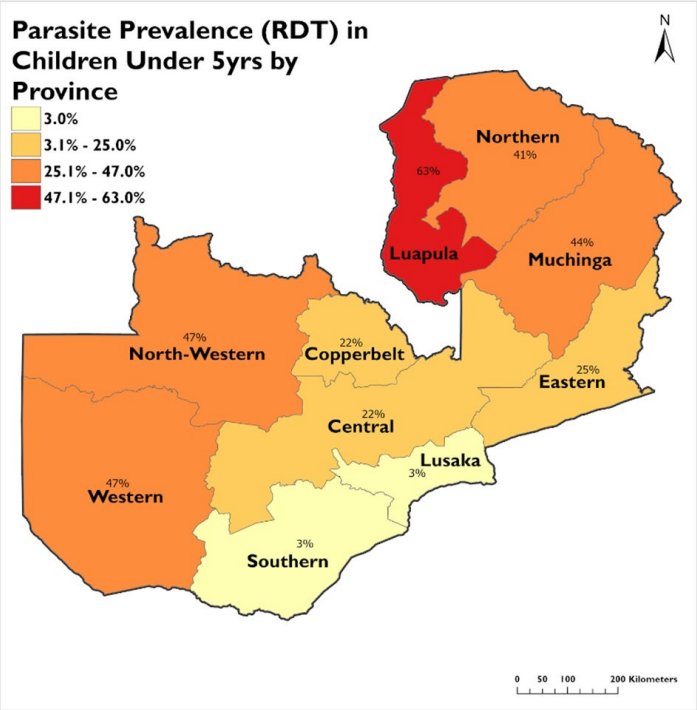
Figure 2: Malaria Risk Stratification at HFCA Level for 2017–2021



Prevalence Maps

The following maps depict the prevalence of malaria parasitemia from the 2018 and 2021 MISs. The first map shows RDT-based malaria prevalence in children under five years of age in 2021, by province. Malaria prevalence by RDT in 2021 ranged from 63 percent in Luapula Province to 3 percent in both Lusaka and Southern provinces. North Western, Western, Muchinga, and Northern provinces had a malaria prevalence of 41-47 percent; Eastern, Copperbelt, and Central provinces had a malaria prevalence of 22-25 percent.

Figure 3A: RDT-based Prevalence in 2021: Percentage Parasite Prevalence by RDT in Children under Five Years of Age, by Province

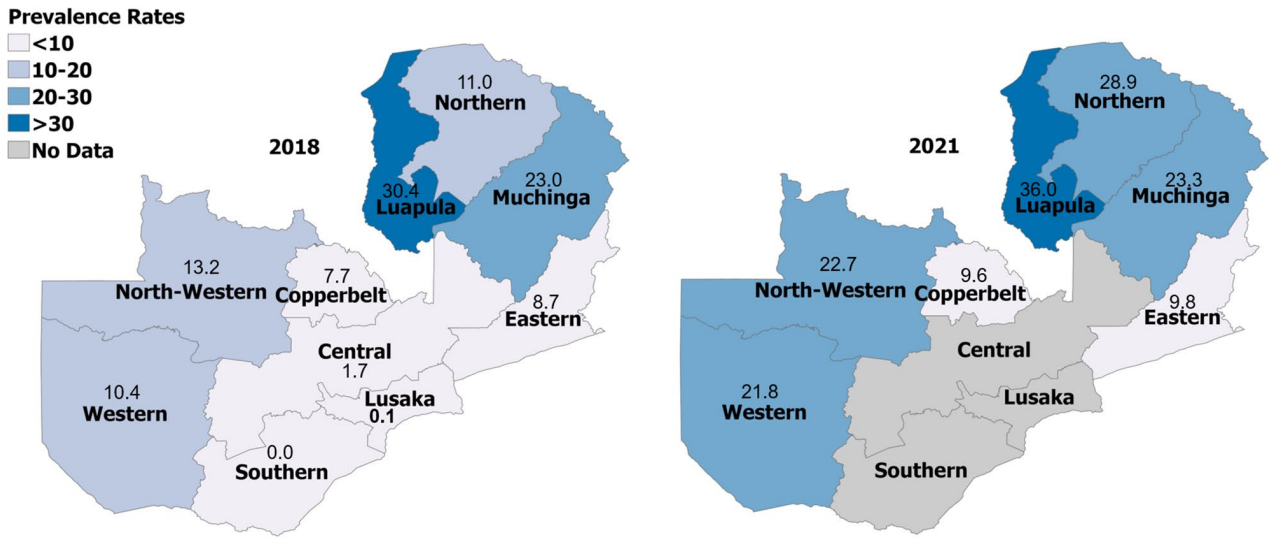


Source: Zambia 2021 MIS

Figure 3B shows a comparison of MIS 2018 and MIS 2021 microscopy-based prevalence. Malaria prevalence by microscopy increased from 13.2 to 22.7 percent in North Western Province, 10.4 to 21.8 percent in Western Province, 7.7 to 9.6 percent in Copperbelt Province, 30.4 to 36.0 percent in Luapula Province, 11.0 to 28.9 percent in Northern Province, and 8.7 to 9.8 percent in Eastern Province. During the MIS 2021, microcopy was not conducted in Southern, Lusaka, and Central provinces. However, microscopy-based prevalence for in 2018 was 1.7 in Central, 0.1 in Lusaka, and 0.0 in Southern provinces.

It is important to note that prevalence is best tracked and interpreted on a scale of decades, not in two to three year intervals; nevertheless, the 2021 MIS findings of worsened national and provincial prevalence tend to corroborate a picture of stagnating malaria indicators.

Figure 3B: Comparison of 2018 with 2021 Parasite Prevalence (by Microscopy) in Children under Five Years of age, by Province



Source: Zambia 2018 and 2021 MIS

Table 2: Malaria Parasites and Vectors

Principal Malaria Parasites	*P. falciparum* (98% of infections), *P. malariae* (<2%) , *P. ovale* (<2%) and P. vivax (<1%)
Principal Malaria Vectors*	Primary vector: *An. funestus* s.l, Secondary vectors *An. gambiae s.*l. As of 2021, pyrethroid resistance is widespread but piperonyl butoxide (PBO) partially or fully restores susceptibility; mosquitoes are fully susceptible to clothianidin and chlorfenapyr; there is a mixture of full susceptibility and suspected resistance to DDT (dichlorodiphenyltrichloroethane).

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

COUNTRY HEALTH SYSTEM

Country Health System Delivery Structure and Ministry of Health Organization

The Ministry of Health (MOH) is responsible for all health functions in Zambia, including policy, management, coordination, and service delivery. According to the National Malaria Elimination Strategic Plan (NMESP) (2022–2026), the health care system in Zambia is decentralized into three levels: hospitals, health centers, and health posts. Hospitals are further tiered into primary, secondary, and tertiary levels at district, provincial, and central levels, respectively. According to the draft National Health Strategic Plan (NHSP) (2022–2026), the health care system in Zambia includes 3,320

health facilities comprising eight specialist hospitals, six level 3 hospitals, 36 level 2 hospitals, 100 level 1 hospitals, 62 mini-hospitals, 1,720 health centers, and 1,388 health posts. Out of the 3,320 health facilities, 2,834 are government-owned, 385 private-owned, while 101 are faith-based health facilities (MOH, 2022). See Table 3 for details.

The NHSP is implemented using the sector organizational and management structures at national and subnational levels in alignment with the National Development Plans. Various partners are coordinated through the sector advisory group. Coordination is achieved by harmonized actions of the MOH, line ministries, local government, provinces, districts, cooperating partners, non-governmental organizations, public and private institutions, and local communities. The health sector coordination uses the Health in All Policy Strategic Framework as a platform for multisectoral collaboration at all levels of the health care system in Zambia. MOH functions are coordinated through structures that have been established at all levels:

- **National Level**: The MOH Headquarters in Lusaka is responsible for overall coordination and management of the health sector.
- **Provincial Level**: Provincial Health Offices (PHOs) are responsible for coordinating health service delivery in their respective provinces.
- **District Leve**l: District Health Offices (DHOs) are responsible for coordinating health service delivery at the district and community level.
- **Community Level**: At the community level, Neighborhood Health Committees have been established to facilitate linkages between communities and the health system.

DHOs are responsible for provision of services at the district and community level. Particularly, DHOs provide overall planning, coordination, and monitoring of malaria activities within their districts. Activities such as implementation of indoor residual spraying (IRS), insecticide-treated mosquito net (ITN) distribution, and malaria case management at level 1 hospitals, health centers, and in the community are implemented through DHOs. The NMEC provides technical but not operational assistance at these levels. The second- and third-level hospitals are referral or specialized hospitals. However, due to resource constraints, there is generally a variation between what the levels are supposed to provide and what they actually do provide.

Government-run health facilities, which provide the majority of health care in Zambia, offer a basic health care package of high-impact interventions, including malaria activities. All health facilities serve as diagnostic and treatment centers for malaria while hospitalization is confined to health facilities with admission space/wards. Malaria RDT

is conducted at all health facilities including in the community by community health workers (CHWs), whereas microscopy is only conducted at health facilities which have laboratories with functional microscopes. Health services included in the basic health care package are provided free-of-charge or on a cost-sharing basis, depending on the location and level of the system. In rural districts, these services are free. Below are the levels of health care facilities offered throughout the country. Malaria control interventions are delivered in all of them.

- Community
- Health posts (district level)
- Health centers (district level)
- Level 1 hospitals (district level), level 2 hospitals (provincial level), and level 3 hospitals (central level)

Table 3 shows the number of health facilities by type and provider captured in 2022.

Table 3: Summary of Health Facilities in Zambia by Level and Type

2022 Health Facilities By Level	Number of Health Facilities	% of the Total Number of Health Facilities
Level 1 Hospitals	100	3%
Level 2 Hospitals	36	1%
Level 3 Hospitals	6	<1%
Specialized Hospitals	8	<1%
Mini Hospitals	62	2%
Health Centers	1,720	51%
Health Posts	1,388	42%
Total	3,320	100%
Health Facilities By Sponsorship		
MOH	2,834	85%
Mission	101	3%
Private	385	12%
Total	3,320	100%

Source: Draft NHSP 2022-2026

Health Care Workforce (Human Resources)

According to the NMESP (2022–2026), there are strong linkages between the community and health facilities. The number of CHWs and community health assistants (CHAs) has expanded to support implementation of malaria programs at the community level. In 2010, with support from UK Department for International Development, the Government of the Republic of Zambia (GRZ) introduced a CHA program with the goal of developing a cost-effective, adequately trained, and motivated community-based health workforce to contribute to improved management of malaria, child and maternal health, and common preventable health conditions. CHAs who are expected to spend 80 percent of their time in the community carrying out disease prevention and health promotion activities and 20 percent at the health post carrying out curative services, are deployed at health posts (lowest level of formal health facilities) to bridge the gap between the community and formal health services, and are intended to cover 500 to 1,000 households. However, due to shortage of trained health care workers, CHAs tend to spend most of their time at health facilities. For malaria, CHAs are expected to diagnose malaria using RDTs, treat malaria with appropriate medication, and support malaria prevention activities, including social and behavioral change (SBC) and distribution of ITNs. Furthermore, CHAs are expected to supervise the CHWs that work in their catchment areas.

Health centers oversee health posts that are within their catchment areas. They are staffed by a clinical officer, nurse, and/or environmental health technician, and serve a catchment area of approximately 10,000 residents.

According to the MOH Human Resources department (July 2021), Zambia has 4,086 clinical officers, 2,807 medical doctors, 3,880 midwives, 21,395 nurses, 2,590 laboratory technicians, 1,624 pharmacists, and 1,610 CHAs. Training for clinicians includes information on national malaria diagnosis and treatment guidelines, intermittent preventive treatment in pregnancy (IPTp), and case management in pregnancy, as well as refresher training. According to the MOH, the national target is to train 36,000 community health workers (1 CHW per 500 persons) by CY 2025 – to date, 18,920 have been trained and 16,852 deployed to work at community level. The other 2,068 trained CHWs were already attached to health facilities (see Table 13 for details). In four PMI focus provinces, PMI has supported provinces, districts, and the National Malaria Elimination Program (NMEP) to determine the CHW need based on national guidelines (1 CHW per 500 persons), as well as gaps by district. Partners, including PMI, are now using this information to plan CHW training in order to meet identified gaps.

In January 2018, MOH introduced malaria elimination officers at district level. In addition, the newly elected administration has made commitments to invest more in

health care personnel and has proposed to recruit over 11,000 health care personnel in 2022. The program structure and management systems continue to evolve, with recent movement of the NMEC to a sub-directorate under the Directorate of Public Health. The health sector budget has a separate budget line for malaria elimination. The Program has benefited from engagements with the regional bodies such as Elimination 8 and the Southern African Development Community. Oversight is provided by national-level technical working groups while integrated reviews are undertaken at provincial and district levels.

Private Sector and Non-governmental Support

In addition to the MOH, the Churches Health Association of Zambia (CHAZ), parastatal organizations, private clinics, and traditional healers also provide health care in Zambia. CHAZ is an interdenominational umbrella organization responsible for coordinating church health services in Zambia. It has 101 health facilities, including hospitals, health centers, health posts, community-based organizations, and health training schools, most of which are staffed by GRZ health workers. Altogether, these institutions are responsible for more than 50 percent of formal health services in rural areas of Zambia and about 30 percent of health care in the country as a whole.

There are more than 380 for-profit private health facilities in Zambia, most of which are clinics attending to outpatients only and are located in urban districts. In addition, private mining companies provide preventive and curative medical services for workers and their families, as well as, in some cases, surrounding communities. Historically, several of the larger mining companies, such as Konkola and Mopani Copper Mines (Copperbelt Province), carried out IRS within and around their compounds. However, following nationalization, then reprivatization, the role of mines in IRS has greatly diminished. In Northwestern Province, relatively new large mines, notably First Quantum Minerals in Kalumbila and Solwezi, equally support IRS in their compounds and neighboring communities. The Zambia Sugar plantation in Mazuka is well recognized for its decades of impactful malaria control investments.

National Health Insurance Scheme

In 2017, the National Health Insurance Act was enacted by the Parliament of Zambia to provide financing for a national health system that would provide universal access to health care services in Zambia. Following the enactment of the National Health Insurance Act, the National Health Insurance Management Authority (NHIMA) implemented the National Health Insurance Scheme (NHIS) to facilitate access to quality insured health services for all Zambian citizens and established residents. NHIMA's mandate includes managing and administering the NHIS members' pooled funds for purposes of providing equitable access to essential health care based on the

principles of solidarity, equity, and cross-subsidization of financial and health risks. Given NHIMA is in its early stages of implementing the NHIS, PMI will continue to monitor developments, including the extent to which the Act affects Zambia's approach to malaria control and elimination.

Supply Chain and Pharmaceutical Management System

Procurement, storage, and distribution of pharmaceutical products or commodities is centralized with some regional hubs in Eastern, Southern, Western, and Copperbelt provinces. The Zambia Medicines and Medical Supplies Agency (ZAMMSA) is the main entity managing the procurement, storage, and distribution of medical supplies and other logistics on behalf of the MOH. CHAZ, under a Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) grant, provides a complementary procurement and distribution system for malaria medications and supplies in Eastern, Southern, and North Western provinces. At the national level, PMI supports the procurement and distribution of malaria commodities including essential medicines (artemisinin-based combination therapies [ACTs], injectable artesunate and sulfadoxine-pyrimethamine [SPs]) to all the provinces. The new NMESP (2022–2026) proposes to outsource to external partners as need arises.

Health Management Information System

An HMIS serves as a data base to generate routine information for service and disease indicators that are used to inform programming as well as policy decisions. The District Health Information Software 2 (DHIS2) has been rolled out to all districts as part of technological adaptation. Systems are in place to collate and collect data through periodic surveys in collaboration with the Zambia Statistics Agency. Data for the country's public health sector supply chain, including commodity procurement, warehousing, and storage, is managed through an electronic logistics management information system (eLMIS). The eLMIS serves as one of the key platforms for processing and tracking commodity orders to ensure that they are distributed from the central medical warehouse to each of the country's pharmacy stores and health facilities in the districts. The platform also facilitates informed decisions about commodity supply, consumption, and stock availability by enabling users to access real-time data.

PMI coordinates and collaborates with the NMEP and several partners, including Gates/Malaria Control and Evaluation Partnership in Africa (MACEPA), the Global Fund, the World Health Organization (WHO), and the President's Emergency Plan for AIDS Relief (PEPFAR) DHIS2 programs, in providing technical assistance and resources in data system strengthening. Zambia exhibits a strong culture of data tracking and disease mapping at all levels, which PMI strives to support.

PMI aims to strengthen routine malaria data collection at the community, health facility, district, provincial, and national level. The routine surveillance systems in Zambia were described in the PMI Zambia FY 2022 Malaria Operational Plan. Briefly, these are the HMIS, which captures and reports on health facility data on a monthly basis, and the parallel Malaria Rapid Reporting System, which captures health facility data on a weekly basis as well as CHW data on a monthly basis. Both run on the DHIS2 data base system, and the NMEP is moving toward integration of the two, such that health care workers will enter all malaria data through the Malaria Rapid Reporting System.

OTHER CONTEXTUAL INFORMATION

The ambitious goal of the previous National Malaria Elimination Strategy (2017–2021) — to eliminate malaria nationwide by 2021 — was not met. To explain the relative stagnation of many malaria burden indicators, the routine End-term Malaria Program Review (2021), conducted with NMEP partners and led by WHO, highlighted low rates of implementation of planned activities. The major issues identified included inadequate funding and late disbursement of funds for commodity procurements, insufficient resources for high quality case management and surveillance, poor vector control coverage with the “mosaic” approach for ITN and IRS coverage, disruptions due to the COVID-19 pandemic in 2020–2021, and human resource gaps within the MOH. Opportunities in the wake of the peaceful, democratic transition of 2021 include increased government commitment to investing in the health workforce and supplies and a shared recognition of the need to strengthen financial management systems, expand domestic and external sources of funding, and strengthen the NMEP capacity at all levels. Additional details can be found in the “Key Challenges and Contextual Factors” section of the FY 2023 Malaria Operational Plan.

III. NMEP STRATEGIC PLAN

Zambia has recently released its new, five-year National Malaria Elimination Strategic Plan for 2022 through 2026. The NMESP 2022–2026 builds on progress made and lessons learned in implementing the NMESP 2017–2021, and is grounded in the End-term Malaria Program Review, which was undertaken in 2021 and 2022. The End-term Malaria Program Review was conducted in accordance with the WHO guidance on conducting malaria program reviews (WHO, 2019) and included thematic desk reviews, data analysis, and field visits, culminating in stakeholder consultations at national and subnational levels. Whereas the previous NMESP set full national elimination as its goal, the ambition of the new strategy is to “reduce malaria related morbidity and mortality nationally while pursuing subnational malaria elimination.”

The goals of the new strategic plan may be summarized as follows:

- To reduce malaria infection, disease, and death in Zambia, primarily by lowering the burden in high-transmission settings.
- To eliminate malaria in low-transmission settings, increasing the proportion of the population living in malaria-free HFCAs.
- To prevent the reintroduction of malaria transmission in malaria-free HFCAs.

The overall targets set by the new NMESP are as follows:

- Reduce malaria incidence from 340 cases per 1,000 population in 2021 to 201 cases per 1,000 population by 2026 (aiming for a decrease of 10 percent per year).
- Reduce malaria deaths from 8 deaths per 100,000 population in 2021 to 4.7 deaths per 100,000 population by 2026 (aiming for a decrease of 10 percent per year).
- Increase malaria-free HFCAs from 10 in 2021 to 250 in 2026.

To reach these targets, malaria control interventions will be implemented according to a stratified approach. Recognizing the importance of following through on annual work plans at all levels, the NMESP calls for increasing the implementation rate of planned interventions from 72 percent in 2021 to 95 percent by 2026.

Table 4: Intervention Package/Activities in the NMESP 2022–2026

Epi Stratum	Indicator	Intervention Package/Activities
0-4	Any incidence or prevalence	**Everywhere in Zambia – Standard package of interventions** • Uninterrupted availability and rational use of malaria commodities in health facilities and communities • Quality case management at health facility and community levels • ITN continuous distribution • ITN mass campaigns, except for Lusaka City • Maintained and scaled-up community case management • Entomologic surveillance • Enhanced epidemiologic surveillance • Strengthened quality assurance activities and mentorship
0	0 cases, No local transmission	**Areas with no malaria – Maintenance of malaria-free zone** *Standard package of interventions, as above, plus:* • Malaria case investigation (1,3,7 approach) • Reactive case detection • Primaquine administration • Responsive IRS in eligible HFCAs • Larval source management in select urban sites

Epi Stratum	Indicator	Intervention Package/Activities
1	1–49 cases/1,000 population, <1% parasite prevalence	**Areas with very low malaria transmission** *Standard package of interventions, as above, plus:* ● Malaria case investigation (1,3,7 approach) ● Reactive case detection ● Targeted mass drug administration ● Primaquine administration ● Responsive IRS in eligible HFCAs ● Larval source management in select urban sites
2	50-199 cases/1,000 population; 0.5%-5% parasite prevalence	**Areas with low malaria transmission** *Standard package of interventions, as above, plus:* ● Reactive case detection ● Targeted mass drug administration ● Primaquine administration (annual incidence <125/1000 population, the lower half of level 2) ● Targeted, schedule IRS campaigns in eligible districts
3	200-499 cases/1,000 population; 5-<15% parasite prevalence	**Areas with moderate malaria transmission** *Standard package of interventions, as above, plus:* ● Targeted, scheduled IRS campaign in eligible districts
4	>/=500 cases/1,000 population; >15% parasite prevalence	**Areas with high malaria transmission** *Standard package of interventions, as above, plus:* ● Targeted IRS in eligible districts

Source: NMEP, condensed and adapted

A significant feature of the new strategic plan is that it represents a paradigm shift from the previous NMESP (2016–2022), in that it no longer sets a goal of eliminating malaria everywhere in the country within the five-year period (all 3,000+ HFCAs to reach level 0 by 2021). Rather, the new NMESP lays out a three-pronged approach, whereby resources will be directed according to realistic, yet ambitious goals, which are linked to transmission setting (described below). While emphasizing that scale-up of conventional interventions to reach high population coverage rates is the cornerstone, the new NMESP also incorporates innovative features, such as a more narrowly defined role for larval source management; more aggressive roll-out of tools for malaria elimination, such as single low-dose primaquine and malaria case-based investigation and rapid response (the so-called 1,3,7 approach); and active interest in exploring options for adopting new technologies, such as malaria vaccine(s), attractive targeted sugar baits, and others.

The following passages from the NMESP describe the strategic thinking, which underlies the targeting of interventions in Zambia:

Tactical approach 1: Lower the burden in high-transmission settings (levels 2–4):

Despite visible progress in reducing the malaria burden across Zambia, malaria transmission is still high or moderately high in most (levels 2-4). In these settings, specific recommended actions include:

- Achieve and maintain effective coverage with malaria curative and preventive services.
- Improve the quality and timeliness of information systems for decision-making to further reduce malaria transmission.
- Reduce the malaria burden to a sufficiently low level to enable implementation of parasite-clearance strategies.

Tactical approach 2: Eliminate malaria in low-transmission settings (level 1):

In settings with very low transmission rates (level 1), or where recent progress has markedly reduced transmission, priority should be given to progressing to full elimination. In these settings, specific recommended actions include:

- Interrupt malaria transmission.
- Report and respond to all confirmed cases and prevent continued transmission.
- Determine the underlying causes of residual transmission.
- Maintain and document malaria elimination.

Tactical approach 3 Prevent the reintroduction of malaria transmission (level 0):

HFCAs, districts, and provinces that have become malaria-free (level 0) must implement measures to prevent the reintroduction of malaria. In these settings, specific recommended actions include:

- Notify all confirmed cases of malaria.
- Detect any possible reintroduction of malaria transmission.
- Determine the underlying causes of resumed malaria transmission.
- Apply rapid curative and preventive measures

IV. KEY MALARIA DATA

The following tables highlight Zambia's trends in malaria intervention coverages (e.g., ITN usage) as well as malaria burden (e.g., incidence, prevalence), at both national and provincial levels. To track vector control access, it is useful to ask whether households either owned an ITN, had received IRS in the past 12 months, or both. This combined indicator from MISs tells a story of steady progress 2008 to 2018, followed by a reversal in 2021. Between 2018 and 2021, IRS coverage increased only modestly (from 35 to 39 percent) and was not enough to compensate for the drop-off in ITN access (from 80 to 53 percent); this resulted from the operationally challenging "subdistrict mosaic" strategy that was deployed in the 2020-2021 IRS and ITN campaigns. In tracking malaria in pregnancy service delivery, we see that 60 percent of survey respondents reported access to three or more doses of IPTp3 from 2015 onwards, but in 2021 there was a 30-point drop in ITN use. The MIS trends in case management show fairly consistent health-seeking behaviors in young children (e.g., >60 percent seek care for fevers and >50 percent are tested), leaving room for improvement. CHWs diagnosed 11 to 12 percent of malaria cases in 2019–2021, a figure which had been expected to increase commensurate with scaled-up training and deployment but was undermined by community-level stockouts of ACTs and RDTs in most provinces. In general, the PMI focus provinces performed better than the national average on coverage indicators.

The indicators of malaria burden show that Zambia in general, including the PMI focus provinces, has not been immune from the recent stagnation, which has characterized most of tropical sub-Saharan Africa. Malaria prevalence — which is meaningfully tracked across decades, not year-to-year — showed no overall improvement since 2008. Because PMI targets high-burden areas, RDT-based prevalence in PMI focus provinces is higher than the national average (29.3 percent in 2021), notably in Luapula (36 percent), and Northern Province (29 percent). From 2017 through 2021, Zambia's routine surveillance data showed overall stagnation in the incidence of total cases, severe cases, and malaria deaths. Increases in the absolute number of total cases and severe cases may be attributed in part to increased community case management activity. Yet it is clear that the year 2020 was a concerning outlier, as in much of Eastern and Southern Africa, with approximately 30 percent increase in year-on-year cases and deaths, but in 2021, the indicators had reversed close to the 2017–2019 baseline. In more encouraging findings, child mortality has steadily declined in recent decades, and Eastern Province, the focus of PMI's most intensive investments, has seen a more than 50 percent decline in severe malaria cases since 2018, when community case management was scaled up.

EVOLUTION OF KEY SURVEY-BASED MALARIA INDICATORS

Table 5: Key Survey Indicators, 2008-2021, National Level*

Indicator	2008	2015	2018	2021
% Households with at least one ITN	62	74	80	53
% Households with at least one ITN for every two people	N/A	N/A	44	29
% Population with access to an ITN	N/A	65	67	53
% Population that slept under an ITN the previous night	N/A	N/A	64	39
% Children <5 years of age who slept under an ITN the previous night	41	58	69	46
% Pregnant women who slept under an ITN the previous night	43	N/A	71	41
% Households sprayed within the previous 12 months	15	29	35	39
% Households with at least one insecticide-treated net or indoor residual spraying	68	81	84	71
% Households with at least one insecticide-treated net per two persons or indoor residual spraying	11	36	55	59
% Women who attended 4+ antenatal care (ANC) visits during their last pregnancy*	60	56	64	NA
% Women who received three or more doses of IPTp during their last pregnancy in the last two years	N/A	61	67	68
% Children <5 years of age with a fever in the last two weeks for whom advice or treatment was sought	N/A	N/A	61	63
% Children <5 years of age with a fever in the last two weeks who received a finger or heel stick (for presumed diagnostic testing)	17	36	55	59
Among febrile children who received any antimalarial drugs, the proportion who receiving an ACT	30	92	96	97
Children <5 years of age mortality rate per 1,000 live births	119**	75*	61*	N/A

Indicator	2008	2015	2018	2021
% Children <5 years of age with parasitemia by microscopy	10	17	9	N/A***
% Children <5 of age with parasitemia by RDT	N/A***	31	16	29

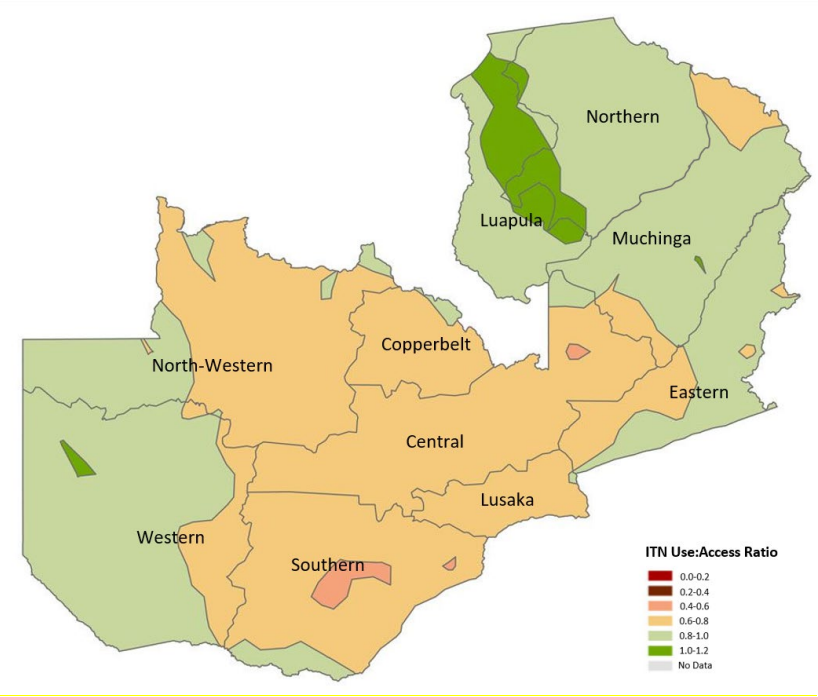
* All figures are from the MIS, except for mortality, which is from Demographic and Health Survey (DHS). (Since there was no DHS conducted in 2008 and 2015, results from DHS 2007 and DHS 2013–2014 have been used as estimates for children <5 years of age mortality rate per 1,000 live births in 2008 and 2015, respectively).
** DHS data for Zambia is available for the years 1992, 1996, 2001-02, 2007, 2013-14, and 2018. Therefore, for 4+ ANC visits in 2008, we have used DHS 2007 results as the proxy. Similarly, for 2015, we have used DHS 2013-14 results as the proxy.
***The 2021 MIS did not collect microscopy samples in Central, Southern, and Lusaka provinces: therefore, no national microscopy-based prevalence is available. The 2008 MIS did not collect RDT samples.

Table 6: Key Survey Indicators, 2018-2021, PMI Focus Provinces

	Luapula		Northern		Muchinga		Eastern	
Indicators*	2018	2021	2018	2021	2018	2021	2018	2021
% Households with at least one ITN	88	47	91	57	89	65	92	43
% Children <5 years of age who slept under an ITN the previous night	80	35	78	56	87	58	82	36
% Households sprayed within the previous 12 months	64	66	65	41	45	43	54	61
% Households with at least one ITN or IRS	95	81	96	76	92	87	95	78
% Women who received two or more doses IPTp	72	86	89	94	77	83	84	73
% Children <5 years of age with parasitemia by microscopy	30	36	13	29	23	23	9	10

*Indicators related to children with fever omitted due to inadequate sample size at provincial level

Figure 4. Zambia ITN Use:Access Ratio Map



Source: DHS 2018

Note: The ITN use:access ratio provides data on the behavioral gap for net use in the country, rather than a gap because not enough nets are available. This indicator is calculated based on the number of ITNs in the household and the number of household members. ITN ownership is defined as the proportion of households that own at least one ITN, while ITN access is the proportion of the population with access to an ITN within their household. ITN use is the proportion of the population that slept under an ITN the night before the survey. Use:Access ratio is calculated by dividing use by access.

Table 7: Evolution of Key Malaria Indicators Reported through Routine Surveillance Systems – National Level

Indicator	2017	2018	2019	2020	2021
# All-cause patient consultations*	22,638,983	22,263,675	21,898,725	22,178,645	21,232,230
# Suspect malaria cases[1]	N/A	10,153,278	11,111,203	12,887,766	11,530,064
# Patients receiving diagnostic test for malaria[2]	N/A	9,931,775	10,899,123	12,307,765	11,139,963
Total # malaria cases[3]	6,293,996	5,519,065	6,014,351	8,605,166	7,009,306
# Confirmed cases[4]	5,670,720	5,297,562	5,802,271	8,025,165	6,619,205
# Presumed cases[5]	623,276	221,503	212,080	580,001	390,101
% Malaria cases confirmed[6]	90%	96%	96%	93%	94%
Test positivity rate (TPR)[7]	N/A	53%	53%	65%	59%
Total # children <5 years of age malaria cases[8]	2,038,940	1,648,773	1,663,635	2,225,600	1,642,298
% Cases in children <5 years of age[9]	33%	31%	31%	29%	27%
Total # severe cases[10]	70,026	66,164	66,022	82,717	70,055
Total # malaria deaths[11]	1,405	1,224	1,342	1,972	1,503
# Facilities reporting[12]	N/A	N/A	N/A	N/A	N/A
% Data completeness[13]	92%	92%	98%	97%	93%

Data is sourced from the NMEC instance of DHIS2, which integrates facility data from the HMIS data with community-level data the Malaria Rapid Reporting System.

Notes: *Outpatient department first attendance as captured in the HMIS. 1 Number of patients presenting with signs or symptoms possibly due to malaria (state how 'suspect malaria cases' are defined here (e.g. fever, all tested for malaria, etc.); 2 RDT or microscopy, all ages, outpatient and inpatient. 3 Total reported malaria cases; all ages, outpatient and inpatient, confirmed and unconfirmed cases; combines health facility and community cases (i.e. from HMIS and MRR). 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 # children <5 years of age cases divided by total # of cases; 10 Severe cases as defined by WHO definition, are reported to HMIS. 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 8: Disaggregated Community-Level Data

Indicator	2019	2020	2021
# Patients receiving diagnostic test for malaria from a CHW	1,453,721	1,727,374	1,727,903
Total # of malaria cases reported by CHWs[1]	647,979	954,301	830,596
% of CHW reported cases (among total malaria cases)[2]	11%	11%	12%

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

Table 9: Evolution of Key Malaria Indicators Reported through Routine Surveillance Systems – PMI Provinces

	Luapula		Northern		Muchinga		Eastern	
Indicators*	2018	2021	2018	2021	2018	2021	2018	2021
Total # malaria cases	959,832	1,263,756	715,068	893,114	340,351	475,988	530,374	690,803
Total # case children < five years of age	285,446	308,094	310,229	333,571	113,312	146,288	189,344	237,174
Test Positivity Rate (TPR)	39%	45%	60%	64%	54%	58%	60%	63%
Total # severe cases	12,870	11,959	7,572	7,821	6,485	9,397	12,835	5,763
Total # malaria cases	715,068	892,331	530,374	840,562	418,181	600,716	881,999	1,125,536
Total # malaria deaths	308	404	192	185	66	125	175	122

Source: NMEP, combining HMIS and Malaria Rapid Reporting System data
Note: The year 2018 was chosen for comparison with 2021 because 2018 was also an MIS survey year, and because 2018 was roughly representative of the 2017–2019 baseline, recognizing that 2020 was an outlier.

Table 10: Key Elimination Indicators

The NMESP 2017-2021 was highly ambitious, as mentioned, targeting in principle 100 percent of HFCAs for elimination by 2021. Performance was far more modest, with 10 HFCAs reaching elimination status by 2021. With the new NMESP 2022-26, 250 of Zambia's 3,231 HFCAs are targeted for elimination by 2026. This is reflected in the table below

Indicator	2021 baseline	2026 target
Total # of Health Facility Catchment Areas (HFCAs)	3,320	3,320 (subject to revision)
# of HFCAs designated for elimination	10 HFCAs	260 HFCAs
% of HFCAs pursuing elimination	0.3%	7.8%
Annual Parasite Index (API)	0%	<1%
Test Positivity Rate (TPR)	0%	<1%
Proportion of cases investigated (if applicable, otherwise delete)	100%	100%
Proportion of foci classified (if applicable, otherwise delete)	100%	100%

V. OTHER IMPLEMENTATION INFORMATION

Table 11: 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 (%)
Katete District / Olyset	24 months	33%	23%	> 80%
Lundazi District / PermaNet 2.0	24 months	10%	46%	> 80%

Source: Program for the Advancement of Malaria Outcomes Durability Monitoring of LLIN in Zambia: 24 Months Report, October 2020.

Table 12: 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
2014-2015[1]	Nchelenge	AL	99%

AL, ASAQ, and DP have therapeutic efficacies above the 90 percent World Health Organization recommended threshold and are well-tolerated in Zambia.

1 Ippolito MM, Pringle JC, Siame M, Katowa B, Aydemir O, Oluoch PO, Huang L, Aweeka FT, Bailey JA, Juliano JJ, Meschnick SR, Shapiro TA, Moss WJ, Thuma PE. Therapeutic Efficacy of Artemether-Lumefantrine for Uncomplicated Falciparum Malaria in Northern Zambia. *American Journal of Tropical Medicine and Hygiene*. 2020; 00(0). doi: 10.4269/ajtmh.20-0852

VI. KEY POLICIES

Table 13: Policies in Zambia

Note: The policy and related documents provided in the below table are aligned to both the previous (2017-2021) and current (2022-2026) five-year cycles of the Zambia National Health Strategic Plan (ZNHSP).

(2022–20216)

Zambia National Malaria Elimination Strategic Plan (2022–2026)	
Zambia Malaria Programme Review (2021)	
Zambia National Health Strategic Plan (2017–2021)	
Mid-Term Review of the National Malaria Elimination Strategic Plan (2017–2021)	
National Health Strategic Plan Monitoring and Evaluation Framework (2017–2021)	
Ministry of Health eHealth Strategy	
National Communication Strategy for Malaria Elimination (2017–2021)	
Malaria Operational Plan (2020–2021)	
End Malaria Council Communication Framework (2019–2021)	
National Community Health Strategy (2019–2021)	
Health Sector Supply Chain Strategy and Implementation Plan (2019–2021)	
Zambia National Malaria Indicator Survey (2021)	
What is/are the first-line treatment(s) for uncomplicated *P. falciparum* malaria*?	In all settings: Artemether-lumefantrine (AL) In elimination settings: Single low-dose primaquine*
What is/are the second-line treatment(s) for uncomplicated *P. falciparum* malaria*?	None
What is the first-line treatment for severe malaria?	Injectable artesunate (first-line) Intramuscular Artemether or Intramuscular/Intravenous quinine (alternate) Course of ACTs to follow once patient is stable for discharge.

In pregnancy, what is the first-line treatment for uncomplicated *P. falciparum* malaria in the first trimester?	Oral quinine + clindamycin
In pregnancy, what is/are the first-line treatment(s) for uncomplicated *P. falciparum* malaria in the second and third trimesters?	AL Dihydroartemisinin-piperaquine – DHA-PQ (alternate)
In pregnancy, what is the first-line treatment for severe malaria?	Intravenous quinine in the 1st trimester Injectable artesunate in 2nd and 3rd trimester
Is pre-referral treatment of severe disease recommended at peripheral health facilities? If so, with what drug(s)?	Rectal artesunate or Injectable artesunate given at peripheral health facility
Is pre-referral treatment of severe disease with rectal artesunate recommended for community health workers?	Rectal artesunate given by community health worker
Community Health Policy	
What is the # of CHWs currently providing CCM?	18,920 trained and 16,852 deployed as of May 2022 (2,068 were already attached to health facilities at the time of training) 12,259 active as of May 2022
What is the country's target for the number of CHWs providing community case management?	36,000
What percent of the country's target is met?	53% of target for training and deployment 34% of target for currently active 73% of deployed CHWs currently active (i.e., 12,259/16,852)
Does the country have a policy that enables the routine, regular payment of salaries/stipends for CHWs?	Not yet. In process.
Do CHWs have the authority to test and treat all ages for malaria?	Yes, with the exception of pregnant women and children under two months of age.
Prevention of Malaria in Pregnancy Policy	
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 maternal and child health?	After the first trimester (between 13 and 16 weeks).

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?	Yes, the country's ANC guidelines and data collection tools reflect WHO 2016 recommendations. However, this has not yet been incorporated in the HMIS. The HMIS captures up to the 4th ANC contact.
What is the status of training ANC providers on the WHO recommended 8+ contacts?	The country has trained the focal point persons at provincial and district levels on the WHO recommended 8+ contacts, who in turn oriented the providers in the facilities.
Have HMIS/DHIS2 and ANC registers been updated to include 8+ contacts?	The ANC registers have been updated to include 8+ contacts. However, the HMIS/ DHIS2 have not yet been updated; currently, the HMIS /DHIS2 aggregate 4+ ANC contacts.
Are 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?	Yes, IPTp data is collected as single months.
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?	Currently, policy does not permit.

VII. PARTNER LANDSCAPE

Table 14: Partner Landscape

Partner	Key technical interventions	Geographic coverage	Funding amount or in-kind contribution	Timeframe
Global Fund (MOH and CHAZ)	• Partial support for nationwide ITN mass campaign in 2023 • Implementation of IRS • Procurement of part of national needs for ACTs, RDTs, SP, severe malaria medications • Training and supervision in case management; surveillance, monitoring, and evaluation.	MOH: whole country CHAZ: Eastern, Southern and North Western provinces	$22M/year	Current grant covers 2021 to 2023
BMGF/ MACEPA	• Data quality, data use • Strategic planning • Elimination tools • Advocacy • Research • National level • Southern and Western provinces	National level Southern and Western provinces	$300,000/year	Phase IV grant 2020 - 2024
WHO	• Technical and strategic guidance • Operations research	National OR in Eastern	$100,000.year	Ongoing
Malaria Partners International (Rotary, World Vision, BMGF)	• Scale up of community case management of malaria • Related health system strengthening and SBC	Muchinga Central	$6m over 2 years	2021-23 Potential extension

Partner	Key technical interventions	Geographic coverage	Funding amount or in-kind contribution	Timeframe
End Malaria Council/End Malaria Fund	• Domestic resource mobilization (in cash and in kind) • Accountability (e.g., dashboards) • Advocacy (especially faith leaders, traditional leaders, private sector)	National Provincial EMCs starting e.g., Eastern	$500,000/yr	Ongoing
Isdell:Flowers Foundation	Community mobilization including CCM, SBC cross-border initiatives	Western Province Southern Province	$500,000	Ongoing

Zambia's malaria partnership tends to organize itself along geographic lines, under NMEC guidance. When it comes to technical assistance and training in case management and surveillance, monitoring, and evaluation, PMI has historically concentrated its support in Luapula, Northern, Muchinga, and Eastern provinces, with more modest support in case management in Central and Copperbelt. Since 2019, PMI has supported IRS in the rural Copperbelt, Eastern and Northern Luapula. (See map, Figure 5.)

BMGF/MACEPA have focused on Southern and Western provinces, although the new grant de-emphasizes direct implementation support for particular geographic areas. CHAZ, with its own and Global Fund resources, focused on Eastern, Southern, and North Western; Isdell:Flowers Foundation on Western Province; and the Southern African Development Community Elimination 8 initiative on the border communities of Western and Southern provinces.

The MOH, with its own and Global Fund resources, has provided support throughout the nation. In 2021–2023, Zambia is supported by a Global Fund continuation grant with an emphasis on strategic continuity with the 2018–2020 grant, but with operational improvements to reflect various lessons learned. The two principal recipients are again the MOH (Program Management Unit) and CHAZ. The within-grant allocation amount offered was $65M, a decrease from $69M. In light of the GRZ's continued highly constrained fiscal situation, Zambia is effectively counting on approximately $35M in prioritized above-allocation request (PAAR) funding to cover anticipated implementation gaps. Historically, Zambia has secured PAAR funds, but this is by no means guaranteed.

A small number of mines and plantations provide vector control services on their properties and in neighboring communities, notably First Quantum Minerals in Solwezi and Kalumbila in North Western Province and Zambia Sugar in Mazabuka District, Southern Province. Building on years of well-received, small-scale support on the Copperbelt, since 2021 Rotarians have partnered with World Vision and BMGF in a $6 million, 2-year pilot program to scale up CCM in Central and Muchinga provinces.

Zambia's End Malaria Council is a pioneering intersectoral consortium of institutions and individuals from the private sector, traditional leadership, faith-based organizations, and various line ministries. Set up with backing from the Zambian government, the African Leadership Malaria Alliance, and local partners, the End Malaria Council's objectives are advocacy, accountability, and domestic resource mobilization. The End Malaria Council has formally set up provincial-level councils and a national End Malaria Fund as part of its effort to raise in-kind and in-cash contributions.

Zambia's rapid population growth, estimated at 2.9 percent (World Bank) creates resource challenges for malaria control programming, which relies on achieving high population coverage of key interventions. PMI Zambia's constant funding level of $30M from FY 2017 through FY21, in the face of population increase of over 2.2M, implies an estimated 13 percent decrease in per capita spending over the five years. Similarly, Global Fund's base funding allocations of $69M for 2018–2021 and $65M for 2021–2024 imply an 18 percent drop in per capita support.

Figure 5: PMI Geographic Focus since 2014