



REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH
NATIONAL MALARIA ELIMINATION CENTRE

Zambia Malaria Programme Review 2021

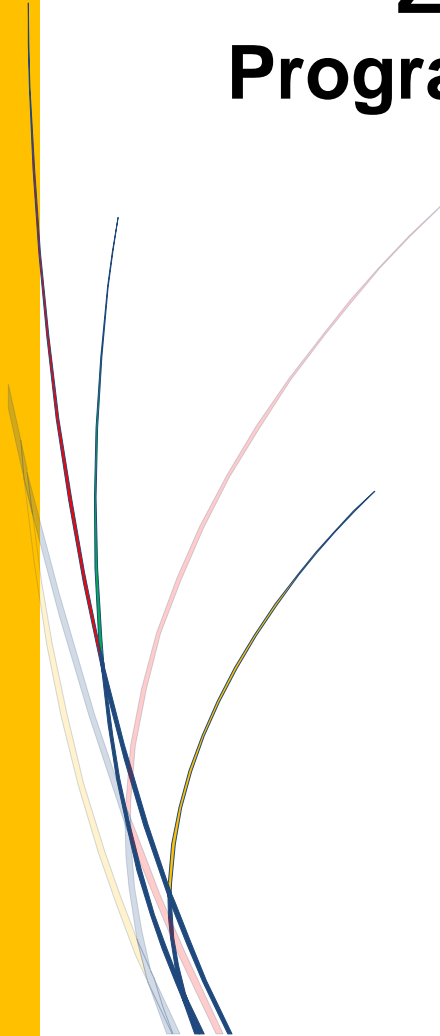


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Foreword

The Malaria Program Review (MPR) of the National Malaria Elimination Strategic Plan (NMESP) 2017–2021 provides an opportunity to evaluate the progress made towards attainment of set targets, identify the key challenges deterring progress and recommend enhancements to improve the malaria programme performance to ensure reductions on malaria morbidity and mortality.

This program review was conducted by the Ministry of Health in collaboration with the Global Fund to Fight AIDS, Tuberculosis and Malaria (GF), the United States President's Malaria Initiative (PMI), PATH-Malaria Control and Elimination Partnership in Africa (MACEPA) and the Rollback Malaria Partnership to End Malaria (RBM), with technical guidance from the World Health Organisation (WHO) between October 2021 and February 2022.

This MPR has revealed that the targets for eliminating malaria by the end of 2021 were not attained. However, there was an appreciable reduction in malaria incidence and mortality by 11% and 47% respectively. The program was able to increase the number of structures targeted for indoor residual spraying to an average of 3 million annually and also conduct a mass distribution campaign of more than 10 million long lasting bed nets during the period under review. Additionally, there were appreciable investments made in increasing access to prompt confirmatory diagnosis and treatment through training and deployment of community health workers in hard to reach areas. The malaria program noted increases in domestic finances, which were primarily channelled towards indoor residual spraying and the deployment of mass drug administration in targeted communities. During the life of the previous strategic plan, the malaria program did experience a spike in malaria cases and mortality in 2020, primarily driven by challenges in intervention deployment, commodity availability, climatic factors and the global Covid 19 pandemic which impacted supply pipelines. Despite these challenges, there has been a notable decline in malaria incidence and mortality in the last year of the NMESP 2017-2021 to 340 cases/ 1000 population and 8 deaths/ 100,000 population.

In this regard, I am confident that the Zambian Malaria Elimination Program, with support from the various partners and stakeholders coupled with evidence-based programming and adoption of innovative high impact approaches, leveraging available resources, is well positioned to revert back to the National aspiration of a malaria free Nation.



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I would like to offer my special thanks to the independent consultant Dr Pascalina Chanda Kapata, who led the process of developing the report. A complete list of names of individuals that participated in the MPR process is provided in the Annex section of this document.



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Abbreviations

| | |
|----------|---|
| ACT | Artemisinin Based Combination Therapy |
| AL | Artemether-lumefantrine |
| ANC | Ante Natal Clinic |
| CHA | Community Health Assistant |
| CHAZ | Churches Hospital Association of Zambia |
| CSO | Civil Society Organisations |
| COVID-19 | Corona Virus Disease of 2019 |
| CVC | Community Vector Collectors |
| DHAP | Dihydroartemisinin-piperaquine |
| DHIS2 | District Health Information Software 2 |
| EMC | End Malaria Council |
| EPI | Expanded Program on Immunisation |
| EPR | Epidemic Preparedness and Response |
| GF | Global Fund |
| GFTAM | Global Fund to Fight AIDS, Tuberculosis and Malaria |
| GRZ | Government of The Republic of Zambia |
| HFCA | Health Facility Catchment Area |
| HMIS | Health Management Information System |
| iCCM | Integrated Community Case Management |
| IPTp | Intermittent Presumptive Treatment during pregnancy |
| IRMMP | Insecticide Resistance Management and Monitoring Plan |
| IRS | Indoor Residual Spraying |
| ITN | Insecticidal Treated Net |
| LLINs | Long Lasting Insecticide Treated Nets |
| LSM | Larval Source Management |
| MACEPA | Malaria Control and Elimination Partnership in Africa |
| MDA | Mass Drug Administration |
| M&E | Monitoring and Evaluation |
| MIP | Malaria in Pregnancy |
| MIS | Malaria Indicator Survey |
| MSP | Malaria Strategic Plan |
| MOH | Ministry of Health |
| MPR | Malaria Programme Review |
| MRRS | Malaria Rapid Reporting System |
| MTR | Mid-Term Review |
| NHSP | National Health Strategic Plan |
| NMEC | National Malaria Elimination Center |
| NMEP | National Malaria Elimination Program |
| NMESP | National Malaria Elimination Strategic Plan |
| PAMO+ | Program for the Advancement of Malaria Outcomes |
| PMI | United States President's Malaria Initiative |
| PMU | Program Management Unit |
| PSM | Procurement and Supply Management |
| PPE | Personal Protective Equipment |
| SMEOR | Surveillance, Monitoring, Evaluation, Operations Research |
| SP | Sulphadoxine-pyrimethamine |
| SBCC | Social Behaviour Change Communication |
| TAC | Technical Advisory Committee |
| WHO | World Health Organisation |

Executive Summary

The Ministry of Health (MoH) through the National Malaria Elimination Program (NMEP) developed and implemented the National Malaria Elimination Strategy 2017-2021 with its associated Malaria Operational Plans (2017-2019 and 2020-2021) and Monitoring & Evaluation (M&E) Plan. The MoH will develop another malaria strategic plan to guide programming for 2022-2026. The new strategic plan will be supported by a 3-year malaria operational plan and an M&E plan. It is with this background that the MoH conducted a Malaria Program Review (MPR) to guide the development of the new strategic plan.

The key objectives of the MPR were to:

- Assess the progress of the malaria programme towards the epidemiological and entomological impact targets of the strategic plan;
- Review malaria epidemiology and update stratification and mapping;
- Review progress towards national, regional and global targets;
- Review the level of financing of the malaria program;
- Review policy and strategic frameworks for planning, programming, management, implementation and timely reporting;
- Review performance of malaria services delivery systems by thematic areas and at different levels of delivery; and
- Re-define the future policies, strategies and support programme transformation to sustain high program performance.
- Stimulate policy and technical dialogue between the MoH and stakeholders/partners, and facilitate consensus on progress, challenges, priorities and proposed solutions

The MPR was conducted in four (4) phases: namely planning, desk reviews, validation and program strengthening from March 2021 to February 2022. The task team members for the MPR included staff from NMEC, PMI, MACEPA, PAMO+, WHO and a national consultant. The heads of units served as thematic leads. Stakeholders were engaged at various stages of the MPR through the Technical Working Groups (TWG) and finally during a stakeholder engagement meeting to disseminate findings, receive inputs and get consensus for the future strategic direction of the program. Both virtual and face-to-face meeting approaches were utilised.

For the period under review, the Zambia NMEP made strides in improving the capacity to deliver malaria services. The NMEP has robust systems in place stems for routine and periodic for data collection. These include the DHIS2, MIS, ZDHS and MRRS. Periodic surveys were conducted to assess coverage and performance for the period under review. Technological adaptation has been achieved by rolling out DHIS2 to all districts. There are several policy and guidance documents to guide policy and programming. There are strong linkages between the community and health facilities. Various local and international partners are involved in financing and implementation of malaria programs. Malaria remains is still a legacy goal of the MOH.

However, the financing levels remained low as the gap was consistently way above 20% from 2017 to 2021. The implementation rate of NMESP activities is low, since less than 75% of the planned activities were fully implemented. Equally, the overall implementation rate of MTR recommendations was low since less than 75% of the recommendations were fully implemented. Low financing levels and delays in disbursing available funds contributed to the low implementation rate. The COVID-19 pandemic disrupted implementation of some planned

activities in 2020 and 2021 thus contributing to the low implementation rate attained. At community level, the lack of essential commodities negatively affected full implementation of activities, in spite of increase in number of trained CHWs.

The low funding levels, procurement and supply chain challenges, COVID-19 pandemic and ongoing restructuring of the program led to low implementation rate of the planned NMSEP activities and MTR recommendations. This resulted in inefficiencies in the delivery of malaria services across all service delivery areas, leading to reductions in epidemiological and entomological impact. Access to vector control interventions among households has declined. ITN utilisation among high-risk groups such as pregnant women and children below five years has reduced. IPTp3 coverage is low. Prompt diagnosis and appropriate treatment has improved but stock outs of essential commodities and supplies threatens these gains. Appropriate health care seeking behaviour remains low. Limited progress was made towards achieving the targets for increasing awareness and knowledge among the population on malaria. There was no national contingency plan for malaria epidemics.

Zambia managed to reduce malaria deaths to some extent but reported a stagnation in malaria incidence and prevalence for the period under review. Majority of the population remain at high risk of malaria transmission. Zambia did not attain 100% malaria-free status by 2021. There is adequate, quality and locally relevant information to guide the future strategic direction and operational planning for the malaria program in Zambia.

In view of the Zambia NMEP capacity to generate quality information, country level information will be key to inform the strategic direction and operations as the country reaffirms its commitment to a malaria free Zambia. There is need to review ambition levels and set realistic targets using lessons learned from implementing NMESP 2017-2021. The findings of the MPR require an update to the technical strategy where relevant and appropriate changes in tactical approach. There is need to improve financing levels and address supply chain challenges. Advances in technology present an opportunity to expand the scope of interventions. Strengthening the program management capacity should remain a priority.

1.0 Introduction

1.1 Demography

Zambia's population by 2020 was at 17,885,422, with 9,033,248 females and 8,852,174 males while 77% of the total population were resident in rural areas (CSO, 2020). The projected population growth rate has remained similar from 2.9 in 2015 to 2.8 in 2020 (CSO, 2020). In 2017, crude birth rate (CBR) was 41.6/1,000 population; crude death rate (CDR) was 12.6/1,000 population; infant mortality rate (IMR) was 72.4/1,000 live births and total fertility rate (TFR) was at 5.5 births per woman (CSO, 2017). Table 1 shows population distribution by province over time.

Table 1: National and provincial population 2015 -2021

| Province (Annual growth rate) | 2015 | 2017 | 2018 | 2019 | 2020 | 2021 |
|-------------------------------|------------|------------|------------|------------|------------|------------|
| National | 15,473,905 | 16,405,229 | 17,351,708 | 17,861,030 | 17,885,422 | 19,145,090 |
| Central (2.5%) | 1,515,086 | 1,591,7878 | 1,631,581 | 1,672,371 | 1,734,601 | 1,868,932 |
| Copperbelt (2.2%) | 2,362,207 | 2,414,176 | 2,467,287 | 2,521,568 | 2,669,635 | 2,734,299 |
| Eastern (2.4%) | 1,813,445 | 1,856,968 | 1,901,535 | 1,947,172 | 2,065,590 | 2,121,626 |
| Luapula (2.3%) | 1,127,453 | 1,179,912 | 1,207,050 | 1,234,812 | 1,276,608 | 1,308,257 |
| Lusaka (3.6%) | 2,777,439 | 2,981,014 | 3,088,331 | 3,199,511 | 3,360,183 | 3,407,539 |
| Muchinga (3.9%) | 895,058 | 966,234 | 1,003,917 | 1,043,069 | 1,095,535 | 1,159,491 |
| Northern (2.9%) | 1,304,435 | 1,381,189 | 1,421,244 | 1,462,460 | 1,520,004 | 1,546,775 |
| North Western (2.4%) | 833,818 | 874,3222 | 895305 | 916,793 | 950,789 | 975,327 |
| Southern (2.7%) | 1,853,464 | 1,954,902 | 2,007,685 | 2,061892 | 2,135,794 | 2,192,883 |
| Western (1.5%) | 991,500 | 1,021,468 | 1,036,790 | 1,052,342 | 1,076,683 | 1,094,335 |

Sources: Central Statistical Office Zambia Data Portal, n.d; Worldometers, 2021; CSO, [Population and Demographic Projections 2011 - 2035](#)

1.2 Zambia Malaria Situation

Zambia remains a high burden malaria country with 7,050,968 absolute number of malaria cases, malaria incidence is estimated to be 340/1,000, prevalence 29% and 8/100,000 in-patient deaths in 2021 (HMIS 2021; MIS 2021). Malaria transmission occurs all year round, with variations in transmission intensity across the country. The levels of malaria intensity are stratified into five levels ranging from no local transmission (level 0) to very low (level 1), low (level 2), low to moderate (level 3), and high (level 4, that is greater than 500 per 1000 population per year). Based on this stratification of malaria incidence, 40% of the population of Zambia live in areas where malaria incidence is above 500/1,000 and 19% are in the 200-499 per 1,000 strata (HMIS/MRRS, 2021). A package of interventions is defined for each stratum in all the health facility catchment areas (HFCAs). The National Malaria Elimination Strategic Plan 2017-2021 guided the malaria elimination strategy in Zambia (NMESP 2017-2021). Diagnosis of malaria is by either rapid

diagnostic test (RDT) or microscopy. The first line treatment for uncomplicated malaria is Artemether-lumefantrine (AL). Rectal artesunate is used for pre-referral treatment while injectable artesunate is the first line treatment for severe malaria cases. Dihydroartemisinin-piperaquine (DHAP) is the drug of choice for mass drug administration (MDA). AL and DHAP still record 100% adequate clinical and parasitological response (ACPR) based on data from the routine therapeutic efficacy monitoring. The deadly *Plasmodium falciparum* accounts for 98% of the malaria parasites. Vector species composition remained heterogeneous at the national level with the three species *An. funestus* s.s, *An. gambiae* s.s and *An. arabiensis*, as the primary vectors of malaria.

The NMESP implementation commenced in 2017, followed by a mid-term review (MTR) in 2019 and the end term program review undertaken in 2021. The key interventions as per NMESP 2017-2021 were:

- a) **Vector Control:** The interventions for vector control in Zambia aimed at preventing transmission are the use of LLINs, the indoor residual spraying (IRS) of eligible structures and, where applicable, larval source management (LSM).
- b) **Case Management:** The objective of the Program is to attain 100% coverage for: Suspected malaria cases that received a parasitological test at public sector facilities; proportion of malaria cases (presumed and confirmed) that received first line anti-malarial treatment; proportion of suspected malaria cases receiving parasitological diagnosis and proportion of children under 5 with fever who took an anti-malaria which was an ACT.
- c) **Intermittent Preventive Treatment** of Malaria during Pregnancy (IPTp) with sulphadoxine pyrimethamine (SP) aiming for >3 doses of IPT delivered during ANC visits.
- d) **Program Management:** improving program coordination and activity implementation, targeted an annual implementation rate of 95%.
- e) **Mass Drug Administration:** implemented in targeted areas, attaining the highest possible coverage, using DHAP.

The Ministry of Health (MoH) through the National Malaria Elimination Program (NMEP) developed and implemented the National Malaria Elimination Strategy 2017-2021 with its associated Malaria Operational Plans (2017-2019 and 2020-2021) and Monitoring & Evaluation (M&E) Plan. Since the current strategic plan ends this year, 2021, the MoH will develop another malaria strategic plan to guide programming for 2022-2026. The new strategic plan will be supported by a 3-year malaria operational plan and an M&E plan. It is with this background that the MoH conducted a Malaria Program Review (MPR) to guide the development of the new strategic plan.

1.3 Definition of MPR

The MPR is a joint evaluation of the national elimination programme within the national strategic planning and programming cycles, to further improve evidence-based, effective and efficient programme management. It is recommended by the World Health Organisation (WHO) for all malaria-endemic countries. The MPR is built on the principle of capacity building at country level, allowing national stakeholders to perform an independent self-assessment. This is further supported by inputs from independent external reviewers.

“Malaria programme reviews are management tools for evidence-based appraisal of the malaria situation and programme performance of a country, with the purpose of strengthening the programme for better results and impact. They evaluate the systems used to deliver interventions, encourage success and propose solutions for bottlenecks and barriers. They

assist countries and partners in setting or resetting the malaria agenda in the medium- or short-term” – WHO 2019

1.4 Objectives of the MPR

The key objectives of the MPR were to:

- Assess the progress of the malaria programme towards the epidemiological and entomological impact targets of the strategic plan;
- Review malaria epidemiology and update stratification and mapping;
- Review progress towards national, regional and global targets;
- Review the level of financing of the malaria program;
- Review policy and strategic frameworks for planning, programming, management, implementation and timely reporting;
- Review performance of malaria services delivery systems by thematic areas and at different levels of delivery; and
- Re-define the future policies, strategies and support programme transformation to sustain high program performance.
- Stimulate policy and technical dialogue between the MoH and stakeholders/partners, and facilitate consensus on progress, challenges, priorities and proposed solutions

1.5 Methods

The MPR was conducted in four (4) phases: namely planning, desk reviews, validation and program strengthening from March 2021 to February 2022 (**Annex I**).

Phase I: Planning: The aim of the planning phase of the MPR was to consult and secure consensus among all partners and stakeholders on the following: objectives of the review; cost of the MPR as contained in a draft protocol/proposal; and the source of funding.

Phase II: Desk reviews: The aim of the desk reviews was to conduct a thematic desk review of the malaria strategic plan. The key steps of this phase included the following:

1. assembling information from reports and documents;
2. undertaking thematic desk review; and
3. planning for external validation (Phase III).

Phase III: Validation: The aim of this phase was to validate and build upon the thematic review reports through national level consultations and sub-national field visits as outlined in Table 2. The validation took place in December 2021 and January 2022 at both national and subnational level (see **Annex II** for the list of sampled sites for the validation exercise). The outcome of the process was a finalised MPR report and Aide Memoire.

Table 2: Sectors/Departments and areas of validation

| Sectors/Departments | Areas of validation |
|---|---|
| Health planning | Information systems (malaria data collection, analysis and dissemination); Health budget; Planning; Service organization; Partnerships; Human resources |
| Pharmaceutical management | Procurement and Supply Chain Management |
| Laboratories | Training; Lab services; Quality assurance/control; reference laboratory |
| Maternal and child health | Malaria in pregnancy; child health (immunization); Integrated Management of Childhood Illnesses (IMCI); Integrated Community Case Management (iCCM) |
| Community health | Integrated Community Case Management; Community Health Workers |
| Environmental health and vector control | Indoor residual spraying; long lasting insecticide treated nets; Integrated vector management |
| Health promotion | Behaviour change and communication |

| Sectors/Departments | Areas of validation |
|------------------------------------|---|
| Disease prevention and control | Surveillance |
| Finance and economic planning | Overall health sector financing; Domestic financing of malaria and prioritization of malaria in the development agenda; National Health Accounts; Disease specific accounts |
| Local government or equivalent | Malaria service delivery and community mobilization |
| Agriculture and water management | Impact of malaria on agro-productivity; insecticide resistance; impact on vector populations; malaria awareness and mitigation |
| Transport | Vehicle allocation and maintenance for health sector |
| Education | School health and malaria control in schools including curriculum development |
| Infrastructure | Malaria prevention and mitigation measures associated with infrastructure development |
| Labour | Malaria policies to protect staff from malaria; malaria treatment |
| Defence | Malaria prevention and treatment in the military services |
| Research and Academic Institutions | Malaria applied and operational research, curriculum development, capacity building, collaboration with national malaria programmes |

Phase IV: Program strengthening: The aims of phase IV were to:

- disseminate findings and recommendations of the MPR;
- implement the recommendations of the MPR.

The task team members for the MPR included staff from NMEC, PMI, MACEPA, PAMO+, WHO and a national consultant (**Annex III**). The heads of units served as thematic leads. The list of key documents formed a basis for the desk review (**Annex IV**). Stakeholders were engaged at various stages of the MPR through the Technical Working Groups (TWG) and finally during a stakeholder engagement meeting to disseminate findings, receive inputs and get consensus for the future strategic direction of the program, the list of participants is attached in **Annex V**.



Validation team members with CHWs at Kasanda Urban Clinic, Kabwe

2. Key findings, conclusions and recommendations

2.1 Key findings

Epidemiological and Entomological Impact

The goal of the NMESP 2017-2021 was to eliminate local malaria infection and disease in Zambia by 2021 and to maintain malaria free status and prevent reintroduction and importation of malaria into areas where the disease has been eliminated. Epidemiological impact indicators included incidence, mortality, and prevalence. The goal to reduce malaria deaths from 15.2 deaths per 100,000 in 2015 to less than 5 deaths per 100,000 population by 2021 was not achieved as in-patient malaria deaths declined from 15.2/100,000 in 2015 to 8/100,000 in 2021, but off target. The review found that the objective to reduce malaria incidence from 336 cases per 1,000 population in 2015 to less than five cases per 1,000 population by 2019 was not achieved. Even though malaria incidence had declined from the baseline 336/1000 population in 2015 to 228/1000 in 2021, this is far below the NMESP target of Zero (0). The objective to increase malaria-free health facility catchment areas (HFCAs) from 0.5 percent in 2015 to 100 percent in 2021 was not achieved as most HFCAs remained in levels 2-4 and more than half of the population are in the strata of high to very high risk of malaria transmission. Increase in malaria prevalence was noted across all provinces, with a national malaria prevalence rate estimated to be 29% in 2021 (MIS 2021). The predominant parasite species remains *Plasmodium falciparum* at 98%.

The NMESP 2017-2021 did not specifically include any entomological impact indicators, as such there is no entomological impact target to report on for the period under review. Vector species composition remained heterogeneous at the national level with the three species *An. funestus* s.s, *An. gambiae* s.s and *An. arabiensis*, as the primary vectors of malaria. Emerging evidence suggests behavior modification in *An. Arabiensis*, biting between 16:00pm -10:00am, with exophilia and exophagia. Vector resistance to pyrethroid insecticides is known to be widespread in the country. The inadequate number of districts conducting entomological surveillance make decision making at the national level difficult.

Financing of the National Malaria Program

Financial allocation to the health sector within the national budget declined from 8.8% in 2017 to 6.1% in 2021. However, total health expenditure (THE) increased for the period under review. The Government of The Republic of Zambia and partners (Global Fund, PMI, Bill and Melinda Gates Foundation, WHO, Isdell: Flowers Foundation, Rotary Club, private sector such as mines and Zambia sugar, etc.) consistently provided financial support to the malaria program. However, the financing levels remained low as the gap was consistently way above 20% from 2017 to 2021. Noteworthy, GRZ continues to provide infrastructure and human resources for health who are critical to the delivery of malaria services at all levels of the health system. The malaria program has a designated budget line in the MoH/National Medium-Term Expenditure Framework (MTEF) budgeting cycle and some specific funds are ring fenced for procurement of IRS commodities and essential medicines. A business plan was developed to support innovative financing mechanisms for malaria elimination. Improving financing levels is critical if the NMESP is to improve implementation rate of planned activities in support of malaria elimination. Existing mechanisms for financial management require strengthening at national and sub-national levels. Malaria prevention and treatment services remain free in the public sector. In 2016, malaria catastrophic

health expenditure (CHE) was estimated at 8% ([Zambia NHA Policy Brief 2103-2016](#)). New CHE estimates for the period under review are not available. The implementation of the National Health Insurance Act, enacted in 2018 (NHI 2018) is expected to reduce out of pocket (OOP) expenditure on health generally and specifically for malaria.

Capacity of the National Malaria Programme to Implement Planned Activities

The NMESP 2017-2021 objective to increase the implementation rate of interventions from 36 percent in 2015 to 95 percent by 2018 was not achieved. Implementation rate for both the NMESP activities (51%) and MTR recommendations (15.4%) was low for the period under review. The implementation rate of NMESP activities is low, since less than 75% of the planned activities were fully implemented. Equally, the overall implementation rate of MTR recommendations is low since less than 75% of the recommendations were fully implemented. Low financing levels and delays in disbursing available funds contributed to the low implementation rate. The COVID-19 pandemic disrupted implementation of some planned activities in 2020 and 2021 thus contributing to the low implementation rate attained. At community level, the lack of essential commodities negatively affected full implementation of activities, in spite of increase in number of trained CHWs.

Effectiveness of the Health System in Delivering Malaria Services

Vector Control

The goal for the NMESP was to attain IRS operational coverage of over *90% of eligible structures benefitting up to 80% of the targeted population*, in a timely manner according to transmission season. For IRS, the eligible structures sprayed were below the 90% target for all the years under review, while the 80% of the targeted population was achieved for 2018-2020 and not achieved in 2017 and 2021 (IRS Program Reports, 2017-2021). In 2021, the national survey estimates for households sprayed in the previous 12 months was at 39%, with the rural and urban households reporting 39% and 29% respectively (MIS, 2021). Between 2018 and 2021, proportion of households sprayed increased from 35% to 39% nationally, however, declines in households sprayed were recorded in five out of 10 provinces (MIS, 2018 and 2021).

LLINs distribution was undertaken on an ongoing basis using various modes (mass, EPI/ANC and schools) albeit with some procurement and supply chain challenges. Trends show a decline in national estimates for household ownership of at least one ITN from 80% in 2018 to 53% in 2021. Furthermore, all provinces reported declines in household ownership of at least one ITN. Utilisation of ITNs reduced for pregnant women and children under five years for the period under review. ITN use among pregnant women reduced from 71% in 2018 to 41% in 2021. There was a decline in ITN use among children aged under 5 years across all wealth quintiles. Access to either ITN or IRS reduced from 84% in 2018 to 71% in 2021 against the target of 100%. Co-deployment of ITN and IRS also declined from 31% in 2018 to 22% in 2021.

Implementation level for LSM was low, with only 29.4% of the planned activities fully implemented owing to lack of specific funding from either the government or partners. The implementation of some LSM activities was enabled by integrating with other activities in iCCM and vector control.

Case management

The proportion of suspected malaria cases receiving diagnosis has declined slightly from 97.8% in 2018 to 96.4% in 2021. Prompt health care seeking among febrile children remains low at 30%

in 2021, though improved from 20% in 2018. There was some improvement in febrile children receiving diagnostic testing, from 55% in 2018 to 59% in 2021, but still below target for the period under review. The proportion of children under five with fever who took AL also increased from 95.6% in 2018 to 96.9% in 2021, below the target of 100%. The proportion of children receiving ACT from CHWs declined from 22% in 2018 to 4% in 2021. Progressive strides were made towards the attainment of all confirmed malaria cases being treated according to national policy from 92% in 2015 to 98.6% in 2020 for all ages.

Severe malaria cases continued to decline for the period under review from 1.6% in 2016 to 0.6% in 2018 but later increased to 1.1% in 2021 (MIS 2016, 2018, 2021). Pre-referral rectal artesunate (RAS) has been piloted and the roll out has commenced.

The IPTp3 target of 100% was not attained for the period under review. The decline in OPD/ANC attendance experienced especially at the onset of the COVID-19 pandemic and SP stock outs contributed negatively to achieving the IPT3 coverage targets.

MDA has expanded from pilot districts to other areas in line with NMESP. By 2021 MDA was scaled up to 10 districts from 10 Provinces covering a population of over 500,000 from 184 HFCAs, attaining coverage of 90.5% of the targeted population.

Procurement and supply management

There were no PSM outcome indicators in the NMESP. The program did however record increase in the facility level stock out rates for all pack sizes of AL from 2017 to 2021. There was no data to report on trends in timeliness of delivery and post-market surveillance of quality of antimalarials.

SBCC

Implementation rate of SBCC activities was low since less than 75% of planned activities fully implemented. This resulted into limited progress towards achieving the targets for increasing awareness and knowledge among the population on malaria. Targeted improvements in awareness and knowledge were not met. However, the program noted progress in the uptake and use of malaria interventions. Use of ITNs among children, household members and pregnant women all showed a decline between 2018 and 2021. Prompt health care seeking remained low among children below five years with fever, at 30% in 2021.

EPR

There is no national contingency plan for malaria epidemics. Guidelines for epidemic preparedness and response have been developed and implementation is expected to begin under the new strategic plan.

SMEOR

The NMEP has robust systems in place stems for routine and periodic for data collection. These include the DHIS2, MIS, ZDHS and MRRS. Periodic surveys were conducted to assess coverage and performance for the period under review. Technological adaptation has been achieved by rolling out DHIS2 to all districts. However, the various malaria reporting systems are not harmonised. Research activities are conducted based on prioritised activities and in line with the national system for health research regulation.

Program management support system

The NMEC program in Zambia operates under the legislative framework of The Public Health Act, Chapter 295 of The Laws of Zambia. There are several policy and guidance documents to guide policy and programming. Zambia does not have one manual covering the programme but has separate guidelines for various interventions or service delivery areas. The programme has a structure at all levels of service delivery namely central, provincial, district and community level with clear management systems. There are strong linkages between the community and health facilities. The number of Community Health Workers (CHWs) and Community Health Assistants (CHAs) has expanded to support implementation of malaria programs at community level. Malaria elimination officers have been introduced at district level. However, not all districts have malaria elimination officers and partner support across provinces/districts is inconsistent. Malaria remains a second legacy goal of the Ministry of Health. The health sector budget continues to have a separate budget line for malaria elimination and has ring-fenced funds for IRS commodities and antimalarials. The programme has benefited from engagements with the regional bodies such as E8 and SADC. Oversight is provided by TWGs at national level while integrated reviews are undertaken at provincial and district levels. The NMEC has strong linkages within the MoH and other directorates.

2.2 Conclusions

The Zambia NMEP has made strides in improving the capacity to deliver malaria services. However, low funding levels, procurement and supply chain challenges, COVID-19 pandemic and ongoing restructuring of the program led to low implementation rate of the planned NMSEP activities and MTR recommendations. This resulted in inefficiencies in the delivery of malaria services across all service delivery areas, leading to reductions in epidemiological and entomological impact. Access to vector control interventions among households has declined. ITN utilisation among high-risk groups such as pregnant women and children below five years has reduced. IPTp3 coverage is low. Prompt diagnosis and appropriate treatment has improved but stock outs of essential commodities and supplies threatens these gains. Appropriate health care seeking behaviour remains low. Zambia managed to reduce malaria deaths to some extent but reported a stagnation in malaria incidence and prevalence for the period under review. Majority of the population remain at high risk of malaria transmission. Zambia did not attain 100% malaria-free status by 2021. There is adequate, quality and locally relevant information to guide the future strategic direction and operational planning for the malaria program in Zambia.

2.3 Recommendations

In view of the lack of attainment of the projected epidemiological and entomological impact, the low financing levels and low implementation rate recorded under the period under review; taking cognisance of the capacity of the program to deliver malaria services and global malaria elimination strategy, the following recommendations are made:

- ❖ Malaria elimination is still the goal in line with the global malaria elimination strategy.
- ❖ In view of the Zambia NMEP capacity to generate quality information, country level information will be key to inform the strategic direction and operations as the country reaffirms its commitment to a malaria free Zambia.

- ❖ Review ambition levels using lessons learned from implementing NMESP 2017-2021.
- ❖ The NMEP to set up realistic targets taking cognisance of the current capacity (finances, HR, systems, etc.) of the programme in Zambia and lessons learned from implementing the just ended strategic plan.
- ❖ Update the technical strategy where relevant and appropriate changes in tactical approach.
- ❖ Implement strategies to improve financing levels commensurate with programme needs including strengthening financial management systems, expanding domestic and external sources of funding
- ❖ Expand internal sources of funding to not only improve predictability of funding but also sustain malaria elimination efforts.
- ❖ Given the increase in Constituency Development Funds (CDF) and in line with the implementation of the decentralisation policy under the new government, explore expanding the role of local government in malaria elimination.
- ❖ Expand external partner support as there is need to continue to improve financing levels for procurement, technical assistance and operations.
- ❖ Strengthen CSO and private sector engagement at various levels.
- ❖ The program will maintain and continue to engage with the various local and international partners through a coordinated and transparent manner.
- ❖ Adaptation of innovations in service delivery and technology as more tools and approaches become available.
- ❖ Breakthroughs in malaria vaccines present an opportunity to expand the package of malaria interventions
- ❖ Recognising the expansion of iCCM, ensure community level commodity security as a priority while improving PSM at all levels.
- ❖ Harmonise the incentive/enabler package for CHWs.
- ❖ Expand and sustain, entomologic surveillance sites across the country, building on the IRMM system.
- ❖ Identify and incorporate entomological indicators in the new MSP
- ❖ Improve the resilience of the program to external shocks (e.g. natural disasters, disease outbreaks, social/political disruptions, etc.) so as to avoid disruptions in the delivery of malaria services

- ❖ Strengthen PSM by improving forecasting and quantification to improve availability of essential malaria commodities including forecasting for outbreaks.
- ❖ Develop a national contingency plan for malaria epidemics.
- ❖ Vector control interventions require a change in strategy as well as improving delivery.
- ❖ Case management strategy to be maintained but improve delivery.

- ❖ Explore collaborations with stakeholders to improve blood transfusion services as part of improving capacity to manage severe malaria.
- ❖ Roll out MDA in elimination settings.
- ❖ Ensure equity in service delivery by addressing gender, youth, people with disabilities (WDs) and track progress in inclusivity.
- ❖ Address financial and social barriers for access to malaria prevention and treatment interventions.

- ❖ Harmonize the malaria reporting systems, clarify roles of stakeholders and harmonise data collection tools.

- ❖ Review and update an Operations Research agenda in support of the new strategic plan.
- ❖ Shift from a communications strategy to a comprehensive SBC strategy
- ❖ Strengthen programmatic approach and financing of SBCC to improve appropriate utilisation of malaria prevention and control interventions.
 - There is need for SBC to be incorporated into all thematic areas for improved uptake of interventions with consistent messaging and better service delivery with provider behaviour.
 - Ensure consistent SBC representation in all TWGs
 - Target priority populations with specific campaigns
- ❖ Tailor malaria messages and activities based on burden, mirroring the transmission intensity and intervention package table with one that details appropriate SBC activity(ies) and metrics.
- ❖ Standardise/Improve tools for SBC reporting and impact measurement and incorporate global best practices/existing tools
 - Apart from the MIS there is need to support other SBC studies to guide the programme on effective implementation.
 - Adopt global best practices and toolkits for measuring impact of our SBC interventions, beginning at the design stage
 - Expand scope of indicators (e.g., include IRS, IPTp), and with a more behavior-focus, and set realistic targets
 - Trial regular collection, analysis and visualization of SBC data for decision makers so as not to wait for the next MIS or DHS.
 - With data malarial partners or cell service providers, use current technology for inexpensive (or corporate sponsorship) survey collection and analysis
- ❖ Improve the tracking and reporting of SBC interventions at all levels, from service delivery points to central level
- ❖ Improve the resilience of the program to external shocks (e.g. natural disasters, disease outbreaks, social/political disruptions, etc.) to avoid disruptions in the delivery of malaria services.
- ❖ In order to strengthen the capacity of the NMEP to implement activities, there is need to improve staffing, financing, infrastructure and equipment at various levels.

3.0 Epidemiological and entomological impact

3.1 Assessment of progress towards epidemiological impact

The Monitoring and Evaluation Plan 2017-2021 was developed to guide the implementation of the National Malaria Elimination Strategic Plan by providing a comprehensive and continuous tracking system and to measure targets against set objectives. Epidemiological impact indicators include; incidence, mortality and prevalence. The indicators tracked were found to be appropriate, *except for the indicator on malaria prevalence at HFCA level because of the absence of tools and resources to capture fine-scale prevalence data* (MTR Report 2019, p13).

The NMESP set the following targets:

- Reduce malaria incidence from 336 cases per 1,000 population in 2015 to less than five cases per 1,000 population by 2019.
- Increase malaria-free health facility catchment areas (HFCAs) from 0.5 percent in 2015 to 100 percent in 2021.
- Reduce malaria deaths from 15.2 deaths per 100,000 population in 2015 to less than five deaths per 100,000 population by 2021.
- Achieve 100 percent malaria-free status by 2021.
- Maintain 100 percent malaria-free status, following 2021.

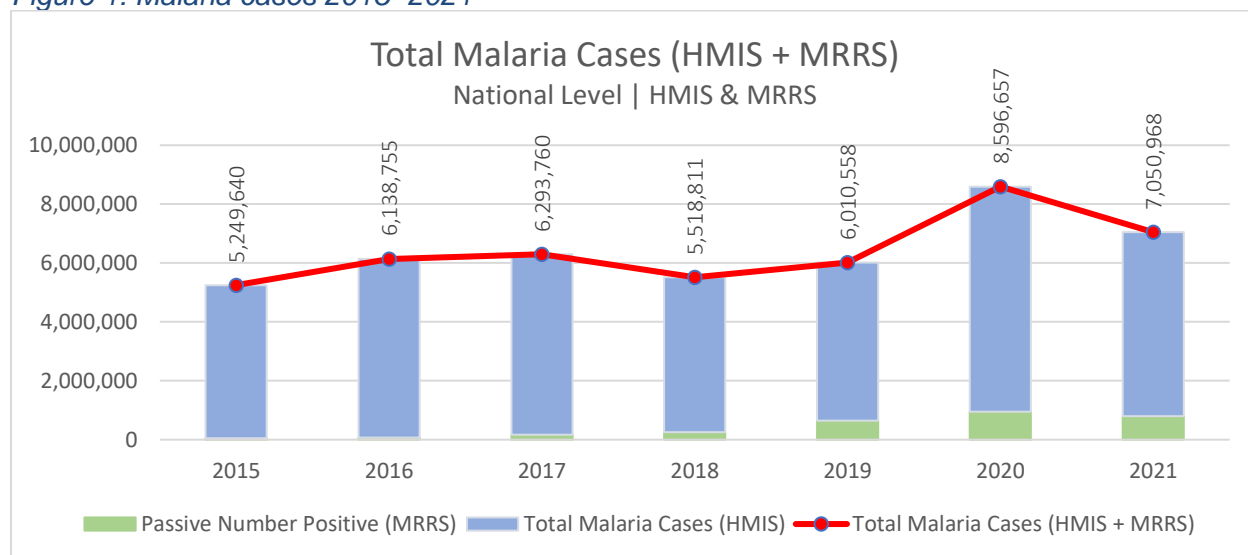
The NMEP Operational Plan 2019–2021 has set the following targets:

- Malaria incidence at 325 per 1000 population in 2017 and 191 per 1000 population in 2018 against a baseline of 336 per 1000 in 2015.
- Malaria mortality at 10 per 100,000 population for 2017 and 9 per 100,000 population for 2018 against a baseline of 15.2 per 100,000 in 2015.

3.1.1 Trends in malaria cases as reported in the HMIS and MRRS 2015-2020

In 2016 and 2017, malaria cases increased from the 2015 baseline but declined in 2018 while remaining slightly higher than 2015. However, cases started to increase after 2018 as shown in **figure 1**. The peak transmission period remains unchanged from around March to May annually.

Figure 1: Malaria cases 2015 -2021



The total number of reported malaria cases have generally remained high across all the provinces for the period under review, with most cases reported in 2020 as shown in **table 3**.

Table 3: National and Provincial Malaria cases, 2015-2021

| Total Malaria Cases | | | | | | | | |
|---------------------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Organisation Unit | Source | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
| Central | HMIS | 418,242 | 596,101 | 627,788 | 487,869 | 521,236 | 774,572 | 500,406 |
| | MRRS | 8,763 | 17,438 | 22,431 | 13,501 | 28,898 | 23,923 | 41,371 |
| | HMIS + MRRS | 427,005 | 613,539 | 650,219 | 501,370 | 550,134 | 798,495 | 541,777 |
| Copperbelt | HMIS | 844,269 | 1,022,764 | 934,394 | 845,315 | 926,277 | 1,228,600 | 937,548 |
| | MRRS | 9 | 925 | 2,174 | 7,028 | 115,718 | 75,760 | 9,335 |
| | HMIS + MRRS | 844,278 | 1,023,689 | 936,568 | 852,343 | 1,041,995 | 1,304,360 | 946,883 |
| Eastern | HMIS | 680,715 | 806,431 | 930,442 | 881,039 | 885,011 | 1,144,025 | 758,023 |
| | MRRS | 0 | 53 | 134 | 960 | 164,639 | 407,144 | 367,513 |
| | HMIS + MRRS | 680,715 | 806,484 | 930,576 | 881,999 | 1,049,650 | 1,551,169 | 1,125,536 |
| Luapula | HMIS | 801,162 | 793,587 | 737,623 | 700,874 | 780,597 | 974,668 | 872,015 |
| | MRRS | | | | 14,194 | 33,268 | 11,444 | 20,316 |
| | HMIS + MRRS | 801,162 | 793,587 | 737,623 | 715,068 | 813,865 | 986,112 | 892,331 |
| Lusaka | HMIS | 93,420 | 115,614 | 122,152 | 76,383 | 75,775 | 146,519 | 122,859 |
| | MRRS | 2,306 | 1,719 | 2,301 | 1,112 | 633 | 1,366 | 2,806 |
| | HMIS + MRRS | 95,726 | 117,333 | 124,453 | 77,495 | 76,408 | 147,885 | 125,665 |
| Muchinga | HMIS | 459,346 | 562,054 | 490,954 | 416,422 | 487,960 | 722,792 | 539,748 |
| | MRRS | | | | 1,759 | 48,645 | 44,337 | 60,968 |
| | HMIS + MRRS | 459,346 | 562,054 | 490,954 | 418,181 | 536,605 | 767,129 | 600,716 |
| Northern | HMIS | 631,724 | 708,380 | 710,612 | 529,759 | 639,786 | 855,767 | 828,485 |
| | MRRS | | | 0 | 615 | 22,489 | 4,077 | 12,077 |
| | HMIS + MRRS | 631,724 | 708,380 | 710,612 | 530,374 | 662,275 | 859,844 | 840,562 |
| North-Western | HMIS | 713,246 | 809,913 | 768,564 | 686,071 | 741,654 | 1,023,842 | 780,101 |
| | MRRS | | | 544 | 3,942 | 87,630 | 195,542 | 159,669 |
| | HMIS + MRRS | 713,246 | 809,913 | 769,108 | 690,013 | 829,284 | 1,219,384 | 939,770 |
| Southern | HMIS | 52,900 | 41,904 | 30,518 | 47,418 | 30,775 | 59,461 | 55,605 |
| | MRRS | 35,262 | 28,318 | 29,312 | 35,101 | 23,961 | 61,860 | 61,209 |
| | HMIS + MRRS | 88,162 | 70,222 | 59,830 | 82,519 | 54,736 | 121,321 | 116,814 |
| Western | HMIS | 505,075 | 616,498 | 770,219 | 591,421 | 276,021 | 719,844 | 859,312 |
| | MRRS | 3,201 | 17,056 | 113,598 | 178,028 | 119,585 | 121,114 | 61,602 |
| | HMIS + MRRS | 508,276 | 633,554 | 883,817 | 769,449 | 395,606 | 840,958 | 920,914 |
| Zambia | HMIS | 5,200,099 | 6,073,246 | 6,123,266 | 5,262,571 | 5,365,092 | 7,650,090 | 6,254,102 |
| | MRRS | 49,541 | 65,509 | 170,494 | 256,240 | 645,466 | 946,567 | 796,866 |
| | HMIS + MRRS | 5,249,640 | 6,138,755 | 6,293,760 | 5,518,811 | 6,010,558 | 8,596,657 | 7,050,968 |

Source: HMIS 2015-2020 and MRRS 2015-2021

3.1.2 Progress towards epidemiological indicators of the NMESP

In order to achieve malaria elimination by 2021, the NMEP Operation Plan 2017-2019 and 2019 to 2021 have set annual targets, with 2015 as the baseline year. Zambia has made progress in reducing malaria morbidity and mortality. Mortality incidence reduced from 15.2 deaths/100,000 in 2015 to 7 deaths/100,000 in 2018 representing 55% reduction against the 20% set target from the baseline. However, after 2018, the country started to experience a rise in mortality as shown in **table 4**. Additionally, prevalence reduced from 17% in 2015 (MIS) to 9% in 2018 and started to increase in 2021 to 29% (MIS 2021). Equally malaria case incidence reduced from 336/1000 in 2015 to 311/1000 in 2018 (HMIS) and rose to 340/1000 population in 2021. The target of achieving an incidence of 0/1000 and mortality of 5/100,000 population by the end of 2021 was not met as shown in **table 4**.

Table 4: Targets and achievement on malaria incidence and mortality 2015-2021

| Key performance indicators | Baseline 2015 | Achievement 2016 | Target 2017 | Achievement 2017 | Target 2018 | Achievement 2018 | Target 2019 | Achievement 2019 | Target 2020 | Achievement 2020 | Target 2021 | Achievement 2021 |
|--|---------------|------------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|------------------|
| Malaria incidence (clinical & confirmed) per 1000 population | 336 | 382 | 325 | 374 | 191 | 311 | 115 | 306 | 57 | 427.5 | 0 | 340 |
| In patient malaria deaths per 100,000 persons | 15.2 | 11 | 10 | 8.4 | 9 | 7 | 8 | 7.7 | 4.7 | 11 | 5 | 8 |

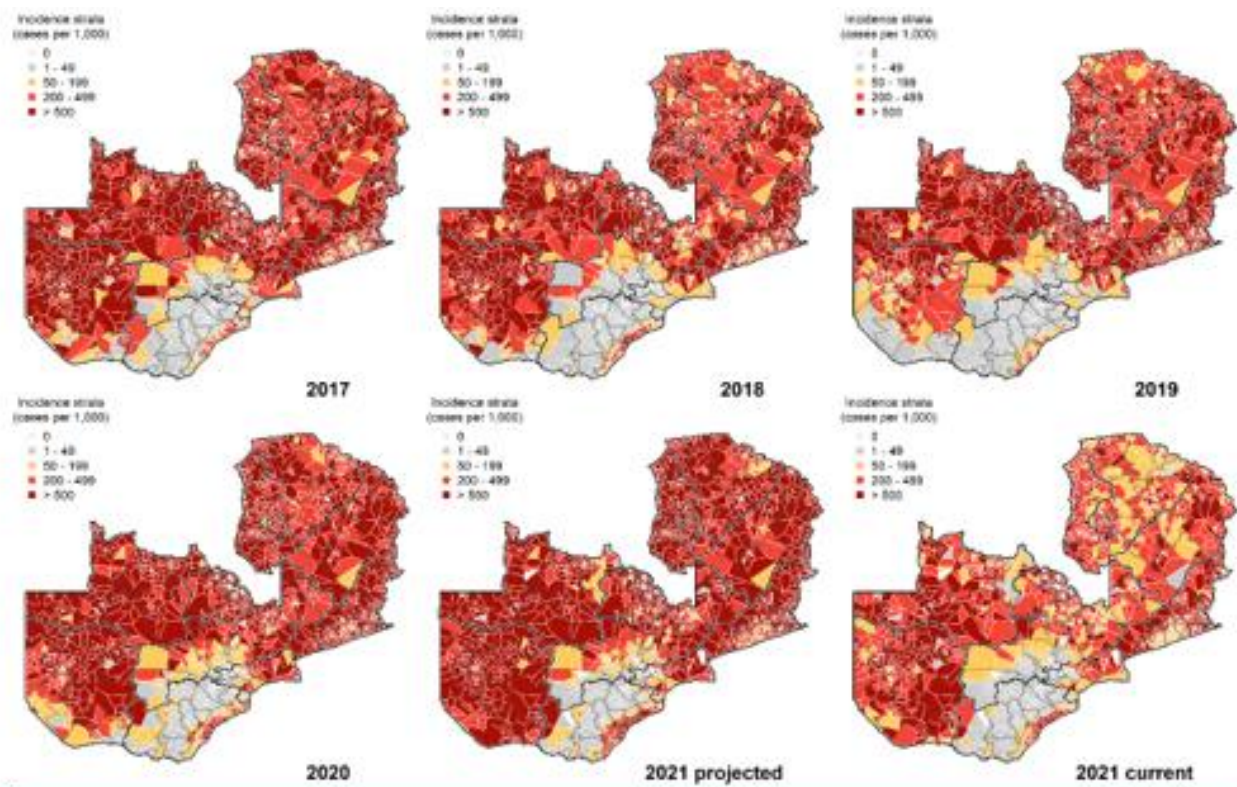
3.1.3 Changes in parasite species distribution

The predominant parasite species remains *Plasmodium falciparum* at 98% (Malaria Diagnosis and Treatment Guidelines 2017). The remaining three species are *Plasmodium vivax*, *P. malariae* and *P. ovale* which collectively constitute 2%. This has been consistent for the years under review as monitored through quality assurance by the case management team.

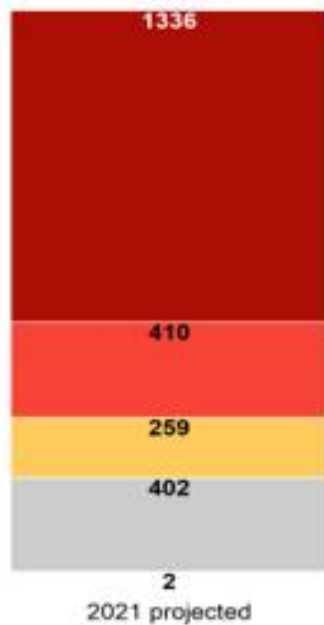
3.1.4 Malaria transmission risk map and stratification

The HFCAs are stratified according to malaria incidence, which guide the package of interventions to be applied in that HFCA. The source of data for the risk maps is the Health Management Information System (HMIS) and the Malaria Rapid Reporting System (MRRS). A combination of spatial population estimates and HFCA boundaries developed from facility locations and population densities are also used in developing these maps. Figure 2 illustrates region progress towards malaria elimination. Between 2017 and 2019, there had been a steady increase in the number of health facilities falling in incidence strata 0 (level 0), 1-49 (level 1), 50-199 (level 2) and 200-499 (level 3) whereas a decrease in health facilities was noticed to falling in the strata 500 and above (level 4) during the same time period. However, from 2020 we saw an increase in the health facilities classified as level 4 compared to other levels. Over half of the population reside in areas of high to very high malaria incidence (**figure 2**).

Figure 2: Malaria incidence stratification from 2017 to 2021



Number of HFCA in each strata



Proportion of population in each strata

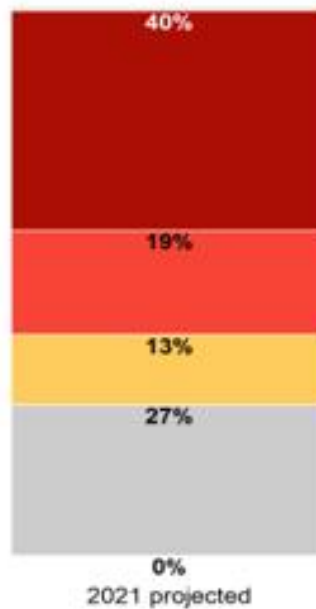
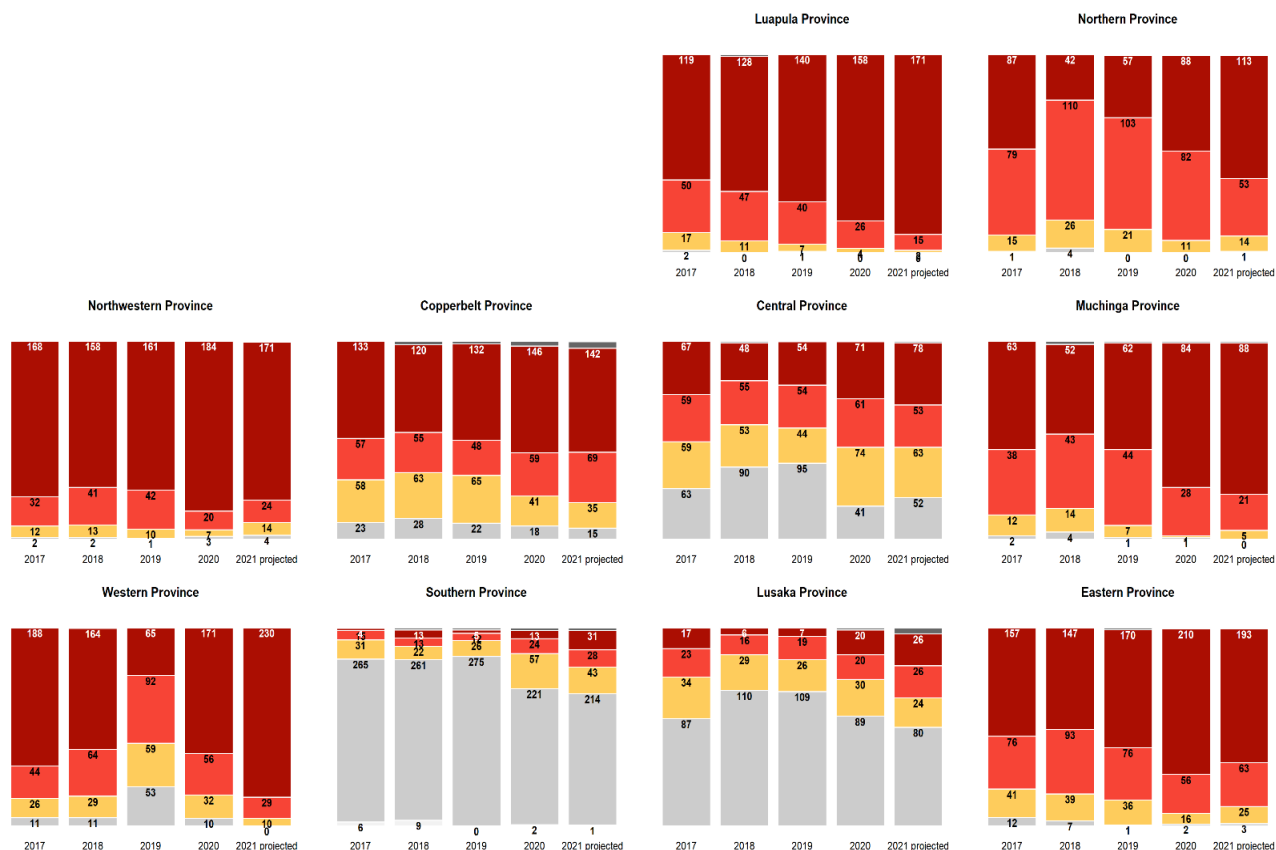


Figure 3, shows that all provinces reported an increase in the population residing in areas of high to very high malaria incidence strata for the period under review.

Figure 3: Malaria incidence stratification by Province from 2017 to 2021



3.1.5 Trends in malaria prevalence

The malaria parasite prevalence among children under five years of age was 9% based on a national representative sample in 2018 with rural/urban variations (MIS 2018). By 2021, parasite prevalence rose to 29% urban (MIS 2021). Variations in parasite prevalence have been reported among provinces, with all provinces reporting a general increase in malaria parasite prevalence, for all ages at OPD, based on information from routine data (HMIS 2018, 2021).

3.2 Assessment of progress towards entomological impact

The NMESP did not specifically include any entomological impact indicators such as entomological inoculation rates (EIR), sporozoite rates, vector density and human biting rate (HBR). Furthermore, the NMESP did not include baseline or end line targets. There is need to include impact indicators in the new MSP and inclusion of baseline/end line targets for entomological indicators. Entomological surveillance is essential for understanding vector species, specific population dynamics, and behavioral traits that affect disease transmission and intervention effectiveness over time. Utilization of entomological surveillance data guides

intervention selection, targeting and tailoring of interventions, and deployment in space and time, and can provide a framework to evaluate complementary strategies and tools (IRMMP 2017-2021).

3.2.1 Progress towards entomological impact targets

For the period under review, there are no entomological impact targets to report on. However, it is recommended that the new NMESP should include the entomological impact indicators as entomological data drives decisions on the primary interventions. Current entomologic surveillance system generates useful data but requires strengthening in order to support evidence-based decision-making. An integral part of entomological surveillance and monitoring will observe robust collection of entomological surveillance data to strengthen identification of mosquitoes feeding and resting habits. The collected data will be crucial to the impact assessment of vector control interventions on mosquito population and behavior when evaluating IRS. The NMEP and partners will continue monitoring the quality of spraying as well as the length of time that insecticides sprayed remain effective and any fumigant effect. Currently, a series of tests are undertaken to determine which insecticides are effective against the target mosquito population. The insecticide resistance data is consolidated annually and submitted to the Technical Advisory Committee (TAC) to decide on the selection of insecticides for subsequent rounds of IRS. Strengthened data collection on: Vector abundance and behavior, IRS quality assurance and residual efficacy, and ITN durability monitoring will be included in the New NMESP. The newly created Entomological Data Management Committee (EDMC) has started looking at generating impact indicators to facilitate data collection. COVID-19 travel restrictions delayed implementation of some activities.

3.2.2 Trends of entomological inoculation rate

There are no documented trends in EIR at the national level or provincial level for the period under review. There are reports of EIR combining several districts from three or more provinces with variation in the districts combined in each report (IRMMP, 2019; TAC Report, 2020). In these reports, the EIRs which were reported by month for *An. funestus* was higher than that for *An. gambiae*. Average *An. funestus* s.l. EIR was in the range of 0.183 to 0.832 bites per person per night, and that of *An. gambiae* s.l. from 0-0.128 bites per person per night (TAC Report 2021; Field Report, 2020).

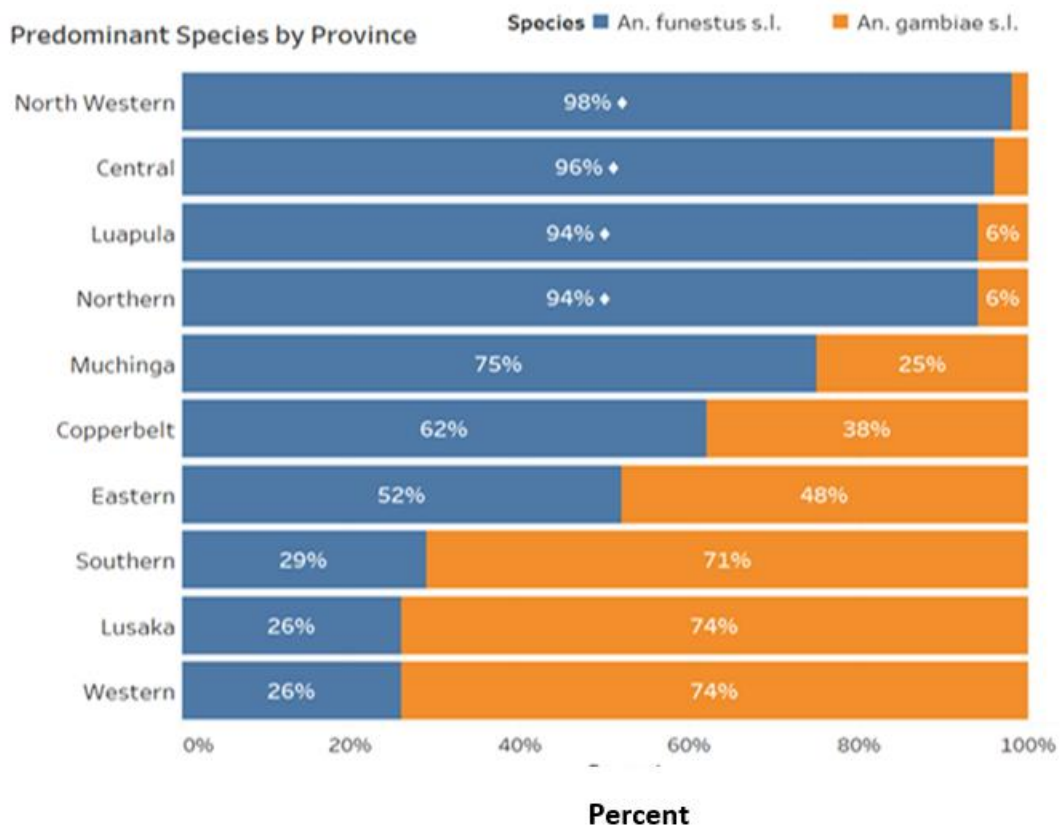
3.2.3 Changes in vector behaviour

The main vectors for malaria in Zambia are *An. funestus* s.s, *An. gambiae* s.s and *An. arabiensis*. Traditionally these vectors bite between 22:00pm - 04:00am (TAC Report, 2021; Field Reports,2020). They exhibit endophilic and endophagic behavior. New evidence suggests behavior modification in *An. arabiensis* to bite between 16:00pm -10:00am, with exophilic and exophagic (TAC Report, 2021; Field Report,2020). Both *An. funestus* s.s and *An. gambiae* s.s are highly anthropophilic, with a few mixed human/animal blood meals identified in both vectors. Most of the bites by both vectors take place indoors late at night.

3.2.4 Trends of malaria vector bionomics

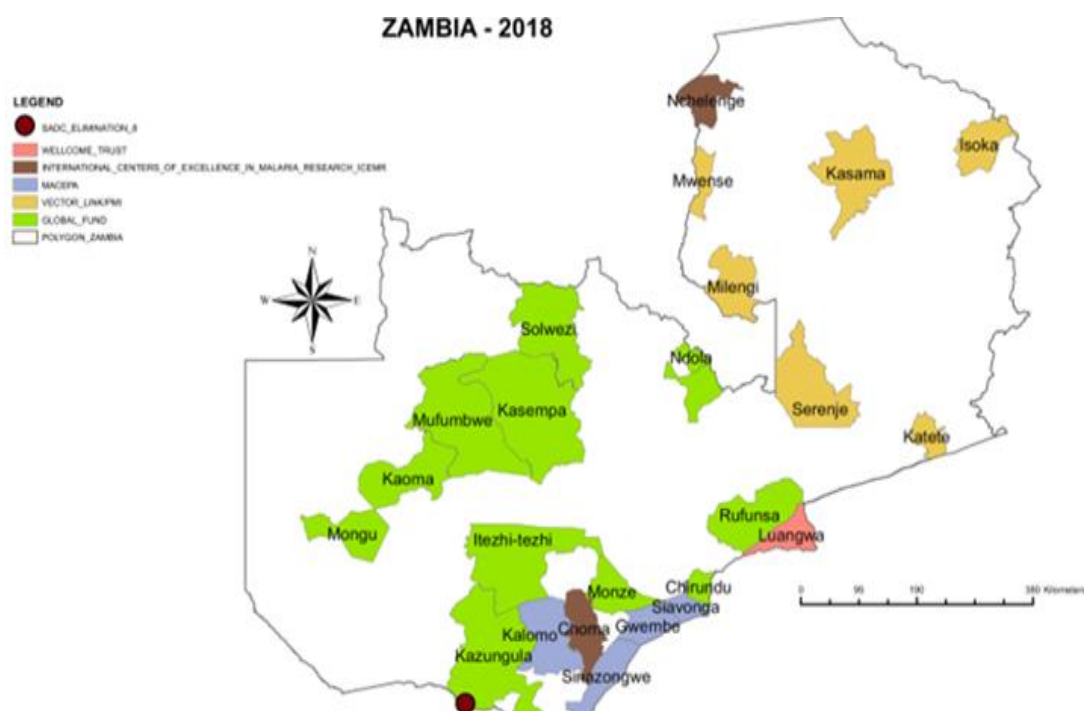
Vector species composition remained heterogeneous at the national level with the three species *An. funestus* s.s, *An. gambiae* s.s and *An. arabiensis*, as the primary vectors of malaria. *An. funestus* is the predominant species across the country except in Southern province where *An. arabiensis* is the predominant species while *An. gambiae* s.s is predominant on the Copperbelt province In Eastern province there is a mixture of *An. funestus* s.s and *An. arabiensis*. Secondary vectors include *An. squamosus*, *An. coustani* and *An. rufipes* in Southern province. There is evidence of a reduction in vector densities among *An. funestus* s.l. in areas in the Northern and Southern provinces where IRS was implemented but little impact on *An. gambiae* s.l. The program recently updated the vector distribution map as shown in **figure 4** (in this figure, *An. arabiensis* is counted under *An. gambiae*). The location of entomological sentinel sites across Zambia is shown in **figure 5**.

Figure 4: Vector species distribution by province in Zambia



Calculated as: Average/ site sample; % *An. Funestus* s.l. vs % *An. Gambiae* s.l.; Past 5 years, 2015-2020; There was insufficient data on vector composition to update this visualisation in 2020

Figure 5: Entomological Sentinel Sites



3.2.5 Vector resistance status and mechanisms

Vector resistance to pyrethroid insecticides is known to be widespread in the country. Vectors are susceptible to DDT in some parts of the country but resistant in others. All the three-vector species; *An. gambiae* s.s, *An. funestus* and *An. arabiensis* are susceptible to Clothianidin and Pirimiphos-methyl. There is information on restoration of susceptibility to pyrethroids when the vectors are pre-exposed to the synergist Piperonyl Butoxide (PBO) indicative of oxidase-based metabolic resistance mechanisms used by local vectors. The *kdr-west* was detected in *An. gambiae* s.s population between 2011 and 2014. Presently there is little being done to investigate the spread of *kdr* mutation in anopheline populations. However, efforts to monitor the *kdr* resistance mechanism are currently under investigation. The country has developed the Insecticide Resistance Management and Mitigation Plan (IRMMP 2017-2021) to address the challenge posed by insecticide resistance. The country continues to monitor the mechanism of insecticide resistance.

3.2.6 Enablers and Constrainers in Entomologic Monitoring

Enablers

- Availability of structures at national and sub-national levels.
- Availability of human resource at all levels (including interns).
- Strong partnerships with implementers, research institutions, and private sector such as the mines.

- Availability of financial and technical support from partners and stakeholders.
- Availability of entomological guidelines.

Constraints

- No sustainability plan as there were no funds allocated in the Yellow Book (Government) for entomological services.
- Inadequate staffing at various levels and lack of basic entomological skills by the Community Vector Collectors (CVCs) in the inactive sites which are supposed to draw from internal resources (partner supported sites are well capacitated).
- Late disbursement of Global funds for entomological implementation resulting in late implementation of activities and arrears of allowances.
- Inadequate equipment and supplies.
- Lack of appropriate PPE, especially for larval collection.
- Unfavourable biological, physical and psycho-social environmental conditions for certain collection methods like Human Landing Catches (HLC) and larval collections.

Best Practices

- Partner and stakeholder's involvement in planning, implementation and evaluation entomological surveillance.
- Involvement of interns to support implementation.
- Consolidation of data produced by the various partners in a single database.
- TAC process supports decision making in vector control.

3.3 Findings

Epidemiological Findings

- Malaria morbidity has increased as shown both by the national average and among all the provinces. Malaria incidence has increased from the baseline 336/1000 population in 2015 to 340/1000 in 2021, below the NMESP of Zero (0).
- In-patient malaria deaths declined from 15.2/100,000 in 2015 to 8/100,000 in 2021, below target of 5/100,000.
- The epidemiological impact indicators tracked were found to be appropriate.
- The predominant parasite species remains *Plasmodium falciparum* at 98%.
- The target of achieving an incidence of 0/1000 and mortality of 8/100,000 population by the end of 2021 was not met.

Entomological Findings

- The functional entomologic surveillance sites generate useful information to support decision making
- However, inadequate number of districts conducting entomological surveillance makes decision making at the national level sometimes difficult.
- Inadequate capacity of community and district personnel at GF supported sentinel sites to conduct entomological surveillance.

- Inadequate equipment and consumables to conduct entomological surveillance (e.g. PPEs, aspirators) at GF supported surveillance sites
- Delayed progress due to Covid-19 preventive guidelines restricting movements between NMEC and sentinel sites.
- Currently, some work is in progress on vector control and entomological indicators and the outcome of this exercise will assist with the process of indicator determination for the next MSP.

3.4 Conclusions

- Progress has been made in reducing mortality but still below target for end term.
- The NMESP lacks entomological impact indicators, baseline, and targets.
- The number of sites conducting entomological surveillance is inadequate.
- The target of achieving an incidence of 0/1,000 and mortality of 5/100,000 population by the end of 2021 was not met.

3.5 Recommendations

Epidemiological recommendations

- Continue tracking of epidemiological indicators and sustain data quality.
- In view of the gaps in implementation, which resulted in low intervention coverage, the program needs to set new realistic targets seeing that at end term, the incidence and mortality targets were not met.
- Pursue national and subnational elimination targets since some HFCAs continue to be malaria free.

Entomological recommendations

- There is a need to decide which entomological indicators to include in the new MSP and which ones to use as impact indicators.
- Update NMESP to include the main entomological indicator(s).
- Update the NMESP to include one or more entomological impact indicators and set the baseline and end line targets.
- Mobilize funds for NMEC to undertake and sustain entomological surveillance.
- Actualize the proposed increase in the number of entomological surveillance sites countrywide.
- Invest in capacity building (recruitment, training, monitoring, etc.) of personnel at all levels, and in equipment and consumables at sentinel sites.
- Establish mechanisms for fast tracking procurement of entomological equipment and consumables.
- Increase fully operational sites for entomological surveillance.

4.0 Financing of the National Malaria Programme

4.1 Assessment of malaria programme funding landscape

The percentage of budgetary allocation to the health sector within the national budget declined from 8.8% in 2017 to 6.1% in 2021, well below the Abuja target of 15%. However, the national budget steadily increased over the years as shown in **table 5**.

Table 5: Budgetary allocation to the health sector within national budget

| Year | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|----------------|----------------|----------------|-----------------|-----------------|
| National Budget - ZMW | 64,510,300,000 | 71,662,385,976 | 86,807,894,727 | 106,071,612,236 | 119,616,011,615 |
| MOH Budget - ZMW | 5,704,829,761 | 6,804,522,100 | 6,364,164,064 | 6,524,200,497 | 7,283,792,435 |
| Percentage (%) MoH budget of the National Budget | 8.84% | 9.50% | 7.33% | 6.20% | 6.10% |

Source: *Yellow Book 2017 – 2021*

The malaria budget within the MOH budget stagnated over the 5 years of the strategic plan as shown in **table 6**. These figures do not include GRZ expenditure on salaries and ring-fenced commodities (Indoor Residual Spraying (IRS) insecticides, antimalarial medicines and rapid diagnostic tests). They also do not include allocations to provinces and districts through the government grants because of the shift from Activity Based Budgeting (ABB) to Outcome Based Budgeting and Expenditure (OBBE). Budgetary allocation to malaria by the government for IRS, as sent directly to provincial level was inconsistent for the period under review as shown in **table 7**. The implementation of the SHI Act is also expected to reduce catastrophic health expenditure (CHE); the malaria specific CHE was estimated at 8% in 2016 ([Zambia NHA Policy Brief 2103-2016](#)).

The NMEC has developed a business plan that will enable the country to explore innovative financing mechanisms to fund its malaria elimination efforts.

Table 6: Budgetary allocation to malaria programming within the health sector - sent to NMEC

| Year | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---------------|---------------|---------------|---------------|---------------|
| MOH Budget - ZMW | 5,704,829,761 | 6,804,522,100 | 6,364,164,064 | 6,524,200,497 | 7,283,792,435 |
| Malaria Budget -ZMW | 4,093,639 | 4,408,070 | 4,912,549 | 4,961,673 | 4,961,673 |
| Percentage (%) of the Malaria Budget within the MoH Budget | 0.07 | 0.06 | 0.08 | 0.08 | 0.07 |

Source of data: *Yellow Book 2017-2021 Budget line 5072*

Table 7: Budgetary allocation to malaria – sent to Provincial level for IRS (GRZ funding in ZMW)

| Province | 2017 | 2018 | 2019 | 2020 | 2021 |
|--------------|------------|------------|------------|------------|-----------|
| Central | | | | | |
| Copperbelt | | | | | |
| Eastern | - | 462,605.45 | 111,852 | - | - |
| Luapula | 350,000 | 350,000 | - | - | - |
| Lusaka | 829,025.85 | 273,430.81 | - | - | - |
| Muchinga | | | | | |
| Northern | 400,000 | 435,393.30 | 101,891.25 | 310,965.91 | 84,341.25 |
| Northwestern | | | | | |
| Southern | 823,715.92 | 517,779.62 | 130,687.61 | 351,873.90 | - |
| Western | - | - | 150,490.01 | 405,231.05 | 19,560.45 |

Note: No data received from Northwestern, Central, Muchinga and Copperbelt; Provinces showing hyphen indicate that they did not receive funds in that year.

Various partners have consistently contributed to financing the malaria programme for the entire period of the NMESP 2017-2021 as shown in **table 8**. The external source of financing for malaria control has remained significant for the period under review.

Table 8: Partner financial contribution to malaria programming

| Year | 2017 | 2018 | 2019 | 2020 | 2021 | Total |
|------------------------------|--------------|--------------|--------------|--------------|---------------|---------------|
| PMI | \$25,000,000 | \$30,000,000 | \$30,000,000 | \$30,000,000 | \$30,000,000 | \$145,000,000 |
| MACEPA | \$4,670,000 | \$3,539,000 | \$3,229,000 | \$2,628,000 | \$3,202,000 | \$17,268,000 |
| Isdell Flowers | \$560,000 | \$560,000 | \$560,000 | \$1,441,000 | \$1,745,000 | \$4,866,000 |
| Mopani | \$472,545 | \$274,135 | \$127,000 | \$36,668.7 | \$116,000 | \$1,026,349 |
| Rotary | \$870 | - | \$260,000 | \$204,000 | \$7,000,000 | \$7,464,870 |
| EMC | n/a | n/a | \$118,241 | \$668,498 | \$351,444 | \$1,138,183 |
| Zambia Sugar | \$79,894 | \$100,685 | \$82,205 | \$65,980 | \$44,117 | \$372,881 |
| Konkola | \$27,597 | \$14,835 | \$60,009 | \$52,032 | \$62,950 | \$217,423 |
| FQML | \$175,000 | \$175,000 | \$175,000 | \$175,000 | \$175,000 | \$875,000 |
| Global Fund (MoH-PMU) | \$17,295,390 | \$12,977,524 | \$10,341,000 | \$9,445,281 | \$4,406,140 | \$54,465,335 |
| GF Portfolio optimisation | - | - | \$6,000,000 | \$16,400,000 | - | \$22,400,000 |
| COVID-19 funding for malaria | - | - | - | - | \$330.00 | \$330.00 |
| Global Fund (CHAZ) | \$3,342,169 | \$6,941,761 | \$4,121,620 | \$6,662,109 | \$14,092,315 | \$35,159,974 |
| WHO | \$200,000 | \$200,000 | \$300,000 | \$300,000 | \$300,000 | \$1,300,000 |
| World Vision | \$63,000 | \$96,732 | - | \$1,338,084 | \$3,257,851 | \$4,755,667 |
| RBM TA | \$10,000 | - | - | \$10,000 | - | \$20,000 |
| MAMaZ | \$33,068 | \$47,905 | \$81,936 | \$26,864 | \$32,878 | \$222,651 |
| Macha Research Trust | \$714,263* | \$697,896* | \$752,674* | \$720,097* | \$1,049,425** | \$3,934,355 |
| Elimination 8 | - | - | \$150,000 | \$150,000 | \$150,000 | \$450,000 |
| World Bank | - | - | - | \$3,000,000 | - | \$3,000,000 |
| IRS commodities in kind | \$ 470 | - | - | - | - | \$470 |

Note: a) EMC = ZRA, FLAME, IFCBMI, ALMA, AKROS, Zambia Sugar*, FQML*. b) *Denotes separate funding. c) The amount of funding at Macha Research Trust (MRT) was actually for malaria research and not for malaria programs. MRT does not directly carry out interventions but rather design prospective new interventions, and evaluate the existing ones. Funding for 2021 was the budget submitted as the actual amount is not yet known. d) Source exchange rate: <https://tradingeconomics.com/> accessed 24/11/2021

Financial contribution to malaria from other government ministries is limited. The Ministry of Local Government contributed a total of ZMW 108,893 broken down as follows; ZMW28,380, ZMW30,500, ZMW 27,153 and ZMW22,860 from 2017-2020. Other Government Ministries such as Defense, Education, Tourism and Agriculture offer technical assistance in form of collaboration in the implementation of interventions.

4.2 Assessment of malaria expenditure in the context of need-based budget

The programme financing need has generally been increasing, with the financing level being consistently low (gap above 20%) for the period under review as shown in **table 9**.

Table 9: Trends of budget and gap, 2017-2021

| | 2017 | 2018 | 2019 | 2020 | 2021 | Total |
|----------------------------|------------|-------------|-------------|-------------|------------|-------------|
| Budget (need) USD | 98,849,718 | 117,716,537 | 175,069,767 | 163,993,399 | 77,973,342 | 633,602,763 |
| Expenditure USD | | | | | | |
| MoH | 408,547 | 372,933 | 351,902 | 236,834 | 236,270 | 1,606,486 |
| Partners | 58,583,164 | 55,838,199 | 73,206,570 | 90,385,800 | 60,391,524 | 338,405,256 |
| Total USD | 58,991,711 | 56,211,132 | 73,558,471 | 90,622,634 | 60,627,794 | 340,011,742 |
| % (expenditure/budget) gap | 60 | 48 | 42 | 55 | 78 | 54 |

Key for assessing financing gap

| | |
|--|---|
| | High financing level: <10% financing gap during the period under review |
| | Moderate financing level: 10-20% financing gap during the period under review |
| | Low financing level: >20% financing gap during the period under review |

4.3 Enablers and Constrainers

Enablers

- Availability of Business plan up to 2020.
- Establishment of the End Malaria Council (EMC)/End Malaria Fund (EMF) to expand domestic resource mobilisation for the programme and narrow the funding gap.
- Broad Partnership for Malaria (Exemplified by the NMEP Directorate Platform) (optimize value of Partner contributions) harmonization of malaria work plans among all partners in the NMEP.
- GRZ dedicated budget line for Malaria Programme
- Use of the scorecard to facilitate tracking of major malaria indicators is a tool that encourages continued and increased funding.
- Collaboration with other Government ministries to expand implementation capacity of indoor residual spraying (IRS) by leveraging on their resources (expertise and logistics)
- Establishment of provincial and district Malaria Task Forces

Constrainers

- Reduced fiscal space for public health due to global economic downturn (recession).
- Government was constrained due to implementation austerity measures
- Preprogramming reduces flexibility. Different partners work in predefined technical areas and sometimes limited in geographical reach.
- Fragmented implementation/methodology, standardization, completeness creating islands of excellence. For example, method of implementing IRS countrywide is not harmonised.
- Allocative Efficiency: Rank priorities with resource allocations.
- Reduced disbursements for malaria programming.
- Delayed disbursements: Late disbursement of funds for DDT procurement in 2018.
- Fragmented budgeting.

- Limited information on expenditure – No system for tracking GRZ expenditure regularly and fragmented expenditure tracking by source of funds for both GRZ and partners.
- Delayed retirement of project activities affects sources of funds.
- Unresolved drug debt with the MoH prevented new procurements of additional treatments.
- Differences in commitments and actual expenditures.
- COVID-19- has made the unit of cost operations higher.
- COVID-19 led to reprogramming of funds to help in the COVID-19 response (GF, MOH).
- Planning and implementation of some activities is still concentrated at a central level hence limiting level of funding to subnational levels.

4.4 Findings

Given that the financing gap is over 20%, the financing level was rated as low for the period under review. The program had set very high ambitions for the strategic plan whereas the resources made available did not meet the need for malaria elimination. Despite the financing gap, GRZ and partner contribution has continued to increase over time. The Global Fund provided additional funds through portfolio optimization fund. PMI also provided additional funds through the sub grantees. The EMC mobilized additional funds through the malaria fund initiative. However, considering the population growth, the per capita malaria expenditure declined for the period under review. The gaps in commodity funding led to shortages and erratic supplies to health facilities and CHWs for SP, ACTs and RDTs, resulting in lowered coverages. Some of the CHAs have not been deployed and CHWs are not paid. Under investment in SBC led to disappointing MIS results in KAP.

4.5 Conclusions

The malaria program received incremental financial support from both government and partners. The government budgetary allocation to health sector falls short of the Abuja Declaration thus reducing the level of resources trickling down to malaria control due to competing health priorities. Finance flow projections in the business plan were not realised. The National Malaria Elimination Business Plan 2018–2020 estimated a gap of approximately US\$100 million. The drivers of the financing gap were integrated community case management (iCCM) and MDA (Business Plan, p. 22). The funding levels remained low for the entire period of the strategic plan, leading to low implementation of planned activities. This was a significant contributory factor to non-attainment of the malaria elimination targets.

4.6 Recommendations

- Improving financing levels is required if the NMEP is to improve the implementation rate of planned activities in support of malaria elimination. The program should either adjust the ambitions or raise more resources, or both.
- Government and partners must improve both commitments and disbursements to malaria control if the country is to meet its elimination targets. Improvement in timeliness of disbursement of funds will facilitate timely implementation.
- Innovative resource mobilisation strategies are required from both internal and external sources including private sector engagement.
- Engage partners such as the World Bank for more resources for IRS.
- Decentralise some of the planning and implementation of activities to sub-national levels to improve program efficiency.

- The NMEP to invest in improved financial management systems including central repository for funds and regular expenditure reporting/information sharing on receipts, commitments and sources.
- Smart (-er) spending; targeting approach with interventions and ensure the core set is well funded to achieve the desired impact.
- There is a need for coordinated budgeting to procure commodities.
- Track and allocate government expenditure on systems to understand ongoing GRZ support for cross cutting resources such as infrastructure, equipment, human resource and utilities.

5.0 Capacity of the National Malaria Programme to Implement Planned Activities

5.1 Assessment of rate of implementation of planned NMESP activities

The objective of the strategic plan was to increase the implementation rate of planned activities from 36 percent of 2015 baseline to 95 percent by the end of 2018. The end line findings show that 51% of the planned activities were fully implemented by 2021 (89% at MTR in 2019), 41% partially and 8% not implemented. The implementation rate of NMESP activities is low, since less than 75% of the planned activities were fully implemented as shown in **table 10**.

Table 10: Summary performance by strategic action

| Strategic Action | Description | Implementation rate (%) | Interpretation as per WHO guidance |
|------------------|--|-------------------------|------------------------------------|
| 1 | Strengthen capacity of the National Malaria Elimination Programme to implement planned activities | 77 | Moderate |
| 2 | Strengthen the management of malaria cases | 81 | Moderate |
| 3 | Strengthen IRS implementation capacity in all eligible HFCAs | 80 | Moderate |
| 4 | Strengthen entomological surveillance | 54 | Low |
| 5 | Strengthen larval source management | 53 | Low |
| 6 | Improve ownership and use of ITNs | 84 | Moderate |
| 7 | Strengthen the surveillance system at all levels (19,000 CHWs, 2,400 health facilities, 106 districts, 10 provinces and national levels) | 69 | Low |
| 8 | Strengthen monitoring and evaluation | 65 | Low |
| 9 | Strengthen operational research | 82 | Moderate |
| 10 | Strengthen the capacity to implement social behavioural change | 72 | Low |
| | | | |

Key for assessing implementation rate of NMESP activities

| | |
|-----------------|--|
| High | >90% activities fully implemented |
| Moderate | 75–90% of activities fully implemented |
| Low | <75% activities fully implemented |

5.2 Assessment of the status of implementation of MTR recommendations

The mid term review (MTR) of the NMESP was undertaken in 2019. Arising from the MTR, 26 recommendations were made across thematic areas, of these 15.4% (4/26) were fully implemented, while 76.9% (20/26) of the recommendations were partially implemented and 7.7% (2/26) were not implemented as shown in **table 11**.

Table 11: Implementation Status of MTR Recommendations.

| Recommendations | Implementation Status |
|--|-----------------------|
| Epidemiological Impact | |
| Sustain progress in reducing malaria mortality | Yellow |
| An urgent need to address the contributing factors that led to not achieving the target | Yellow |
| The NMEP should use incidence by HFCA as an indicator. | Green |
| The NMEP should use head count for programme implementation and Central Statistical Office (CSO) population for indicator estimates. | Green |
| Entomological Impact | |
| Increase fully operational sites for entomological surveillance. | Yellow |
| Effectiveness of the health system in delivering malaria services | |
| Strengthen resource mobilisation | Yellow |
| Decentralise operational planning and management to the provinces and districts | Yellow |
| Programme financing analysis | |
| The NMEP should continue to harness and explore innovative mechanisms to improve domestic investments in malaria elimination | Yellow |
| Vector Control | |
| Sustain achievements for vector control and accelerate towards target. | Yellow |
| Use enumeration to determine number of eligible structures for IRS | Yellow |
| Conduct IRS in a timely manner | Yellow |
| Use head count population to estimate LLIN need for mass campaigns | Green |
| Use door-to-door distribution of LLINs during mass campaigns | Green |
| Implement community-based IRS where applicable. | Yellow |
| Mobilise resources for storage facilities for vector control commodities | Red |
| Case Management | |
| Taking advantage of the increased capacity to train CHWs, accelerate CHW training and deployment to achieve saturation | Yellow |
| Implement pre-referral treatment with RAS to scale. | Yellow |
| Scale up MDA according to NMESP (pg. 37). | Yellow |
| SBCC | |
| Prioritise SBCC within the budget | Yellow |
| Procurement and supply chain management | |
| Adequate funding commitments and timely disbursement of funds will greatly improve the procurement performance. | Yellow |
| Scale up “storage in a box” to more health centres. | Red |
| Ensure that facilities being built have adequate storage space. | Yellow |
| SMEOR | |
| The NMEP should use head count for programme implementation and CSO population for indicator estimates. | Yellow |
| Roll out the enhanced malaria surveillance package to scale | Yellow |
| Collate the data sets into a central repository to enhance programme implementation. | Yellow |
| Institutionalise data quality audit and reviews at district level. | Yellow |

Key for Implementation status of MTR recommendations

| | |
|-----------------------|-----------------------|
| Fully implemented | Fully implemented |
| Partially implemented | Partially implemented |
| Not implemented | Not implemented |

The overall implementation rate of MTR recommendations is rated low since less than 75% of the recommendations were fully implemented (see key below).

Key for assessing overall implementation rate of MTR recommendations

| | |
|----------|--|
| High | >90% MTR recommendations fully implemented |
| Moderate | 75–90% MTR recommendations fully implemented |
| Low | <75% MTR recommendations fully implemented |

5.3 Findings

Full implementation of planned activities was at 51% of the strategic actions, resulting in a low implementation rate. The reason for the low implementation rate of NMESP activities include delays in disbursement of funds, low financing levels of the NMEP in respect of the need and discrepancy between commitments and disbursements. Also, some of the captured partner support does not go towards service delivery, it ends with the various agencies as administrative costs.

Less than 75% of the MTR recommendations were fully implemented by 2021, giving a low implementation rate. Reasons for the low implementation rate of MTR recommendations include: COVID-19 interrupted implementation of activities; financing gap, delays in procurement and gaps in procurements (e.g. for vector control commodities).

5.4 Conclusions

The implementation rate for both NMESP activities and MTR recommendations was low. The funding gap (low financing levels with respect to the need), delays in procurement of essential commodities and the COVID-19 pandemic constrained full implementation of NMESP activities and MTR recommendations.

5.5 Recommendations

- Embark on resource mobilisation to improve the financing levels in support of the malaria elimination goals.
- Continue to advocate for an increase in domestic resources to improve predictability of financing for malaria elimination.
- Improve malaria early warning system.
- Improve human resource capacity at national and sub national level.
- Improve procurement and supply chain management (PSM).
- Strengthen financial management.

6.0 Effectiveness of the Health System in Delivering Malaria Services

6.1 Level of attainment of vector control outcome targets

Baseline and targets for vector control outcome indicators were included in the NMSEP for both IRS and LLINs. The goal for the NMESP was to attain operational coverage of over 90 percent of eligible structures benefitting up to 80 percent of the population of Zambia, in a timely manner according to transmission season. To mitigate the reported vector resistance to insecticides in Zambia, the WHO prequalified insecticides are used in rotation, subject to the TAC recommendations. In 2020, there was a change in vector control deployment strategy to ensure that 50% of Zambians would receive IRS, and 50% of Zambians would receive LLINs, and allow for a 10% overlap in a bid to improve the chance of 100% Zambians covered by vector control (either IRS or ITN). Combined vector control coverage is best measured at the level of population reached and household coverage. Population reached is reported by IRS and ITN campaign reports, with addition from ITN continuous distribution channel reports. Household coverage is reported by the MIS, both for IRS alone, ITNs alone, and combined coverage (IRS or ITN).

6.1.1 Trends of indoor residual spraying (IRS) outcome indicators and targets and programming implications

The IRS operational targeted structures sprayed was below the 90% target for all the years under review except for 2018 when 92% was attained (**table 12**). The NMESP coverage target of spraying 90% of eligible structures was not attained for the period under review. The program attained 80% population protected over all the NMESP years except in 2017 and 2021. The total population protected by IRS declined as of 2021.

Table 12: Trends of IRS outcome indicators and targets 2017-2021

| Year | Total eligible structures | Targeted structures | Sprayed structures | Percent of targeted structures sprayed | Percent of total eligible structures | Targeted population | Population protected | Percent of the targeted population protected. | Percent of total population protected |
|------|---------------------------|---------------------|--------------------|--|--------------------------------------|---------------------|----------------------|---|---------------------------------------|
| 2017 | 3,281,046 | 2,331,898 | 1,915,821 | 82% | 58% | 10,205,737 | 7,800,704 | 76% | 55% |
| 2018 | 3,281,046 | 1,958,905 | 1,798,995 | 92% | 55% | 8,212,571 | 7,451,289 | 91% | 53% |
| 2019 | 3,376,196 | 3,381,159 | 2,848,342 | 84% | 84% | 14,606,607 | 11,767,404 | 81% | 66% |
| 2020 | 3,474,106 | 3,112,240 | 2,720,479 | 87% | 78% | 12,888,635 | 11,157,421 | 87% | 61% |
| 2021 | 3,821,517 | 3,196,663 | 2,386,962 | 75% | 62% | 11,680,656 | 9,022,770 | 77% | 48% |

**Coverage targets: 90% of eligible structures sprayed and 80% of targeted population protected.*

Table 13 below shows that the quantities of insecticides, PPEs and pumps procured were less than the planned amounts, except for 2020 insecticides and pumps for 2019 and 2021.

Table 13: Planned and achieved IRS commodities

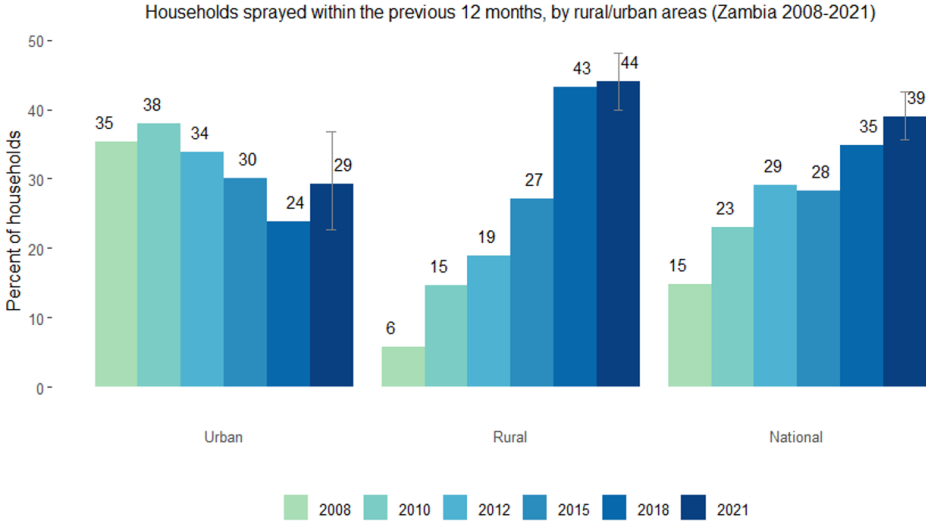
| Year | Planned insecticides | Insecticides procured | Planned sets of PPEs | Sets of PPEs procured | Planned pumps | Pumps procured |
|------|----------------------|-----------------------|----------------------|-----------------------|---------------|----------------|
| 2017 | 731,715 | 475,000 | 6000 | 1700 | 1200 | 200 |
| 2018 | 945,954 | 255,846 | 7500 | 6829 | 2300 | 893 |
| 2019 | 913,827 | 831,602 | 5000 | 4,138 | 1000 | 1863 |

| Year | Planned insecticides | Insecticides procured | Planned sets of PPEs | Sets of PPEs procured | Planned pumps | Pumps procured |
|--------------|----------------------|-----------------------|----------------------|-----------------------|---------------|----------------|
| 2020 | 841,146 | 870,544 | 7500 | 5423 | 4564 | 4415 |
| 2021 | 870,041 | 660,085 | 7500 | 4,643 | 2931 | 3,700 |
| Total | 4,302,683 | 3,093,077 | 33500 | 22,733 | 11,995 | 11,071 |

Trends in household IRS coverage as reported by the malaria indicator surveys (MIS).

There was a slight increase in IRS delivery nationally from 35% in 2018 to 39% in 2021 as shown in figure 6. By residency, households from urban areas recorded a 5-percentage point increase while the rural households reported a decline by 1 percentage point.

Figure 6: Trends in Household sprayed within the previous 12 months, 2008-2021



There were variations in households sprayed at provincial level, with modest gains reported in Eastern and largest gains in the Copperbelt province as shown in figure 7. The largest drop was recorded in Northern, while other provinces such as Southern, Lusaka, Muchinga and Western reported declines between 2018 and 2021.

Figure 7: Trends in Households sprayed within the previous 12 months, 2010-2021

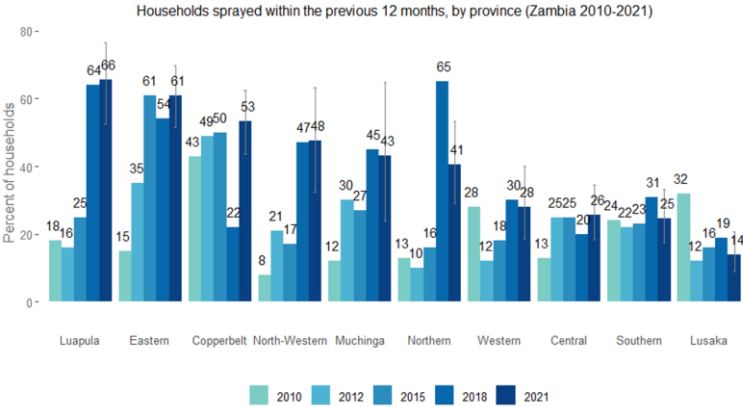
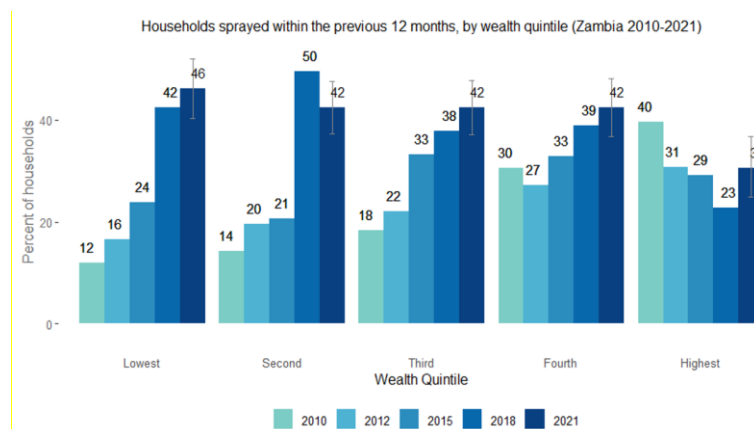


Figure 8 shows that IRS is characterized by equitable access across wealth quintiles as shown by progressive improvements in coverage among households sprayed between 2018 and 2021 except in the second quintile.

Figure 8: Trends in households sprayed within the previous 12 months, by wealth quintile, 2010-2021



6.1.2 Trends of long-lasting insecticidal net (LLIN) outcome targets and programming implications

Zambia conducted a nationwide mass distribution campaign in 2020 targeting areas that were not eligible for IRS using a door-to-door strategy. The mass campaign was part of the National Malaria Elimination Strategy to attain universal vector control coverage. LLINs were also distributed through routine continuous distribution using channels such as antenatal care (ANC), Expanded Programme for Immunization (EPI) and selected primary schools throughout the strategic plan years. Procurement of LLINs for the period under review is shown in **table 14**.

Table 14: LLIN Procurements 2019-2021

| Year | Programme | Planned ITNs | Procured ITNs |
|------|--|--|--|
| 2017 | <ul style="list-style-type: none"> Mass campaign | <ul style="list-style-type: none"> 9,084,764 | <ul style="list-style-type: none"> 10,524,841 |
| 2018 | <ul style="list-style-type: none"> ANC and EPI | <ul style="list-style-type: none"> 1,435,456 | <ul style="list-style-type: none"> 1,003,364 |
| 2019 | <ul style="list-style-type: none"> ANC and EPI School | <ul style="list-style-type: none"> 1,410,664 328,716 | <ul style="list-style-type: none"> 908,072 328,716 |
| 2020 | <ul style="list-style-type: none"> Mass Campaign ANC and EPI | <ul style="list-style-type: none"> 5,050,013 1,948,203 | <ul style="list-style-type: none"> 7,000,457 417,000 |
| 2021 | <ul style="list-style-type: none"> ANC and EPI School | <ul style="list-style-type: none"> 2,003,546 50,000 | <ul style="list-style-type: none"> 2,100,000 50,000 |

Zambia uses WHO recommended LLINs with technical specifications and standards that are WHOPES Approved. During the period under review, the country distributed standard and PBO LLINs.

Table 15 shows that there has a decline in national ITN ownership and use, including among the high-risk groups (pregnant women and children under five years).

Table 15: LLINs outcome targets and results

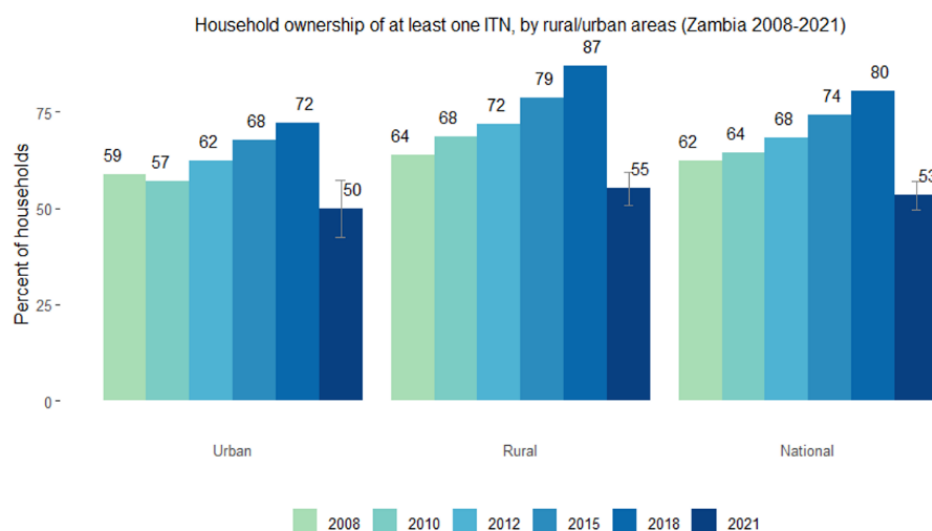
| Indicators | 2015 Baseline | 2018 Target | 2018 Result | 2021 Target | 2021 Result |
|--|---------------|-------------|-------------|-------------|-------------|
| % of households (HHs) with at least one insecticide-treated net (ITN) | 77 | 100 | 80 | 100 | 53 |
| % of HH members who slept under ITN the previous night | 55 | 80 | 64 | 100 | 39 |
| % of HHs with at least one ITN per sleeping space | 62 | 100 | 47 | 100 | 30 |
| % of pregnant women who slept under an ITN the previous night | N/A | 100 | 71 | 100 | 41 |
| % of children ages 0–59 months who slept under an ITN the previous night | 56 | 100 | 69 | 100 | 46 |

Source: MIS 2015, 2018 and 2021

Household ITN use and ownership as reported by the MIS

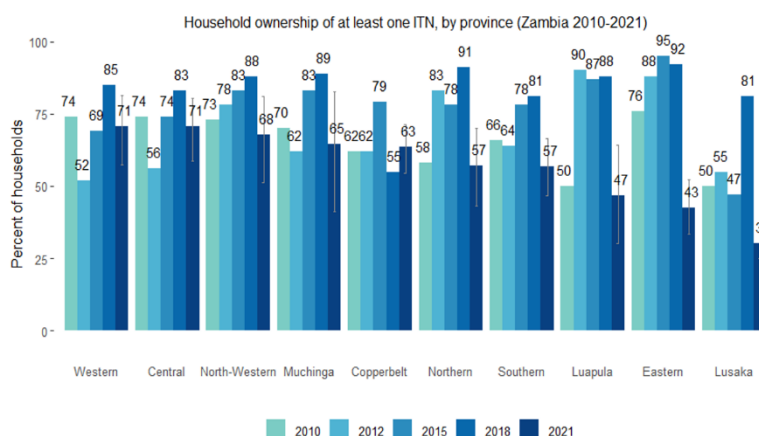
There was a marked drop in household ownership of at least one ITNs between 2018 and 2021, from 80% to 53% national, 72% to 50% in the urban and 87% to 55% in the rural areas (**figure 9**). This signifies the biggest drop since 2008.

Figure 9: Trends in Household ITN ownership, 2008-2021



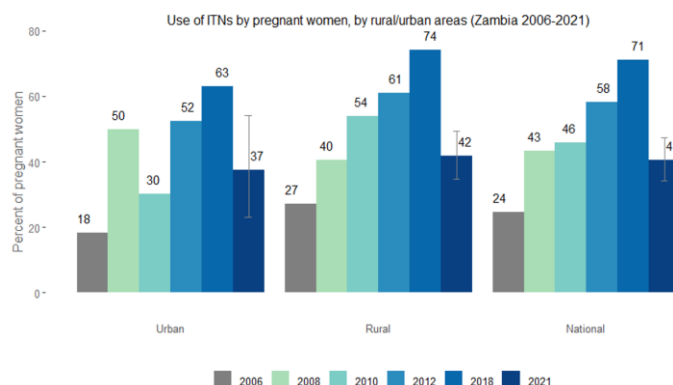
Between 2018 and 2021, all provinces, except Copperbelt reported a decline in ownership of at least one ITN (**figure 10**). Greatest drops reported was in Luapula, Eastern and Lusaka for the period under review.

Figure 10: Household ownership of at least one ITN by province, 2008-2021



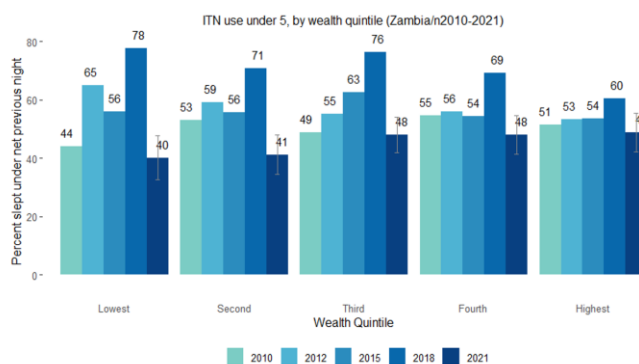
ITN use by pregnant women declined from 71% in 2018 to 41% in 2021 nationally (figure 11). Both urban and rural areas reported a drop in ITN use by pregnant from 63% to 37% in the urban and 74% to 42% in the rural areas.

Figure 11: Trends in ITN use by pregnant women, 2006-2021



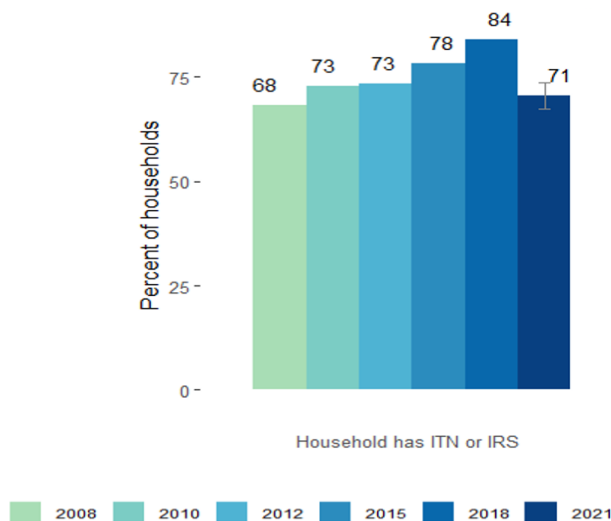
There was a decline in ITN use by under five children across all wealth quintiles as shown in figure 12. The biggest reduction in ITN use by children under five years was reported in the lower wealth quintiles (lowest to third).

Figure 12: Trends in ITN use by children under five years, by wealth quintile 2010-2021.



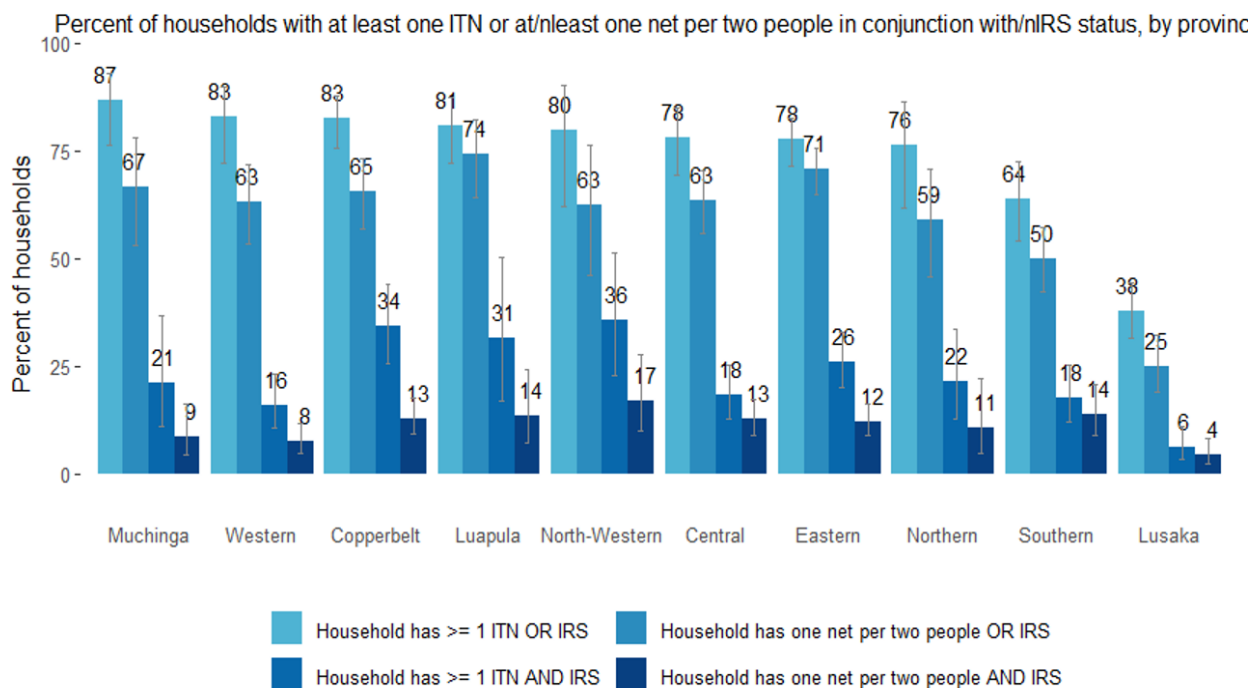
There was a decline in households covered with by either ITN or IRS from 84% in 2018 to 71% in 2021 against a target of 100% (figure 13). Only 57% of households use IRS or “adequate” ITNs (= 1 net per 2 persons, rather than 1 net per household) in 2021, **figure 14**.

Figure 13: Trends in household coverage by either ITN or IRS combined (Mosaic) 2008-2021.



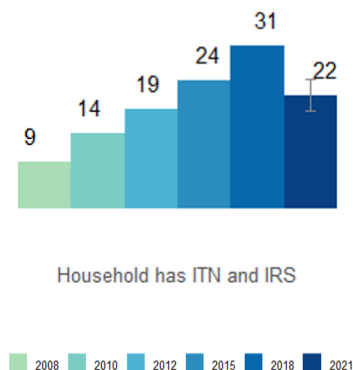
None of the provinces attained 100% access to either IRS or ITN, similarly co-deployment of ITNs and IRS was very low across all the provinces (figure 14).

Figure 14: Household access to one ITN or at least one net per two people in conjunction with IRS by province, 2021.



There was a decline in co-deployment of ITN and IRS at household level by 9 percentage points between 2018 and 2021 (**figure 15**).

Figure 15: Trends in co-deployment of ITN and IRS at household level, 2008-2021



6.1.3 Status of Larval Source Management interventions

Although larval control is part of the IVM strategy of the NMEP, it has not been widely implemented in vector control, as attention and resources have been primarily invested in the IRS and ITN strategies. There are only a few LSM initiatives undertaken by the mines, local governments and other private companies. The implementation status of planned LSM activities is shown in **table 16**.

“The lack of larval control is also attributed to the hard-to-reach breeding sites in the rainy season, and difficulties in implementing this intervention in the rural areas. There is also a multiplicity of breeding sites in the rain season, which makes it difficult to implement the fixed, few, and findable sites as per guidance of the WHO. However, with the emergence of insecticide resistance and the documented outdoor biting and resting behavior of vectors in the country, larval control by environmental management and larviciding could provide an alternative vector control intervention” (NMESP, 2017-2021).

The World Health organization (WHO) emphasizes on the importance of introducing LSM as the country aims to eliminate malaria because it targets both indoor and outdoor biting mosquitoes. LSM has not been implemented at national level for the period under review. LSM elimination of aquatic habitats by environmental modifications and manipulations, where possible can provide long- term and cost-effective solutions. Larviciding requires no substantial change in human behaviour or the management of key resources such as water, land and skills for larviciding can be similarly acquired as those for Indoor Residual Spraying. LSM has the potential to be integrated into control program after LLINs or IRS have reduced transmission to moderate or low levels of transmission and therefore should be considered in the consolidation phase of control and malaria elimination where it can be targeted in space and time. LSM will further reduce transmission, in synergistic fashion and help manage insecticide resistance.

Key LSM indicators include habitat availability, habitat occupancy and larval density. The LSM indicators were not included in the NMESP. Of the planned LSM activities, 29.4% (5/17), 29.4% (5/17) and 41.2% (7/17) were fully, partially and not implemented respectively (**see table 16**). Thus, implementation rate remained low for the period under review. This intervention did not get

any funding from any source for the entire period of the NMESP. Data from the private is still not harmonized.

Table 16: Implementation status of planned LSM activities

| Planned LSM Activities | Implementation status |
|--|-----------------------|
| Formation of larva Source working group (LSWG) | Green |
| Development and dissemination of Larval Source Management Guidelines | Yellow |
| Conduct LSM needs assessment | Red |
| Develop Training Materials | Green |
| Training of Trainers of LSM | Green |
| Improved coverage and access to malaria prevention services-LSM | Red |
| Integration of Larval Source Management in National Malaria Control/Elimination Programme | Yellow |
| Inception of Mapping of Breeding Sites | Yellow |
| Procurement and Distribution of Larvicides | Red |
| Implementation of Larval Source Management in districts | Red |
| Monitoring and Supervision of LSM | Red |
| Capacity building through international and Local Educational Visits | Red |
| Collaboration with partners on LSM: Mines, Indeni, Sugar company and local authorities. | Green |
| Community engagement: - Community Meetings with stakeholders (NHCs, WDCs, Church, Public announcements, Media Program, Trainings (ICCM, IRS) | Green |
| Environmental management at household and community levels: - Identification of bleeding sites, Clearing of temporal ponds | Yellow |
| Larviciding - community level: - Procure Larvicide, Larviciding | Yellow |
| Monitoring and evaluation: - Conduct an Entomological survey (Pre-& Post) | Red |

Key to assessing implementation status of planned LSM activities

| | |
|--------|-----------------------|
| Green | Fully implemented |
| Yellow | Partially implemented |
| Red | Not implemented |

6.1.4 Enablers and constrainers in vector control

The enablers and constrainers for vector control are summarised in **table 17**.

Table 17: Enablers and constraints for IRS, LLINs and LSM

| Vector Control Intervention | Enablers | Constrainers |
|-----------------------------|--|---|
| IRS | <ul style="list-style-type: none"> -Funding from partners. -Strong partnership. -Existing community structures. -Political will. -Presence of a well-structured system (NMEP). -Qualified human resource at all levels (National, provincial, district and community). | <ul style="list-style-type: none"> -Inadequate funds and late disbursement for procurement of insecticides, for IRS training and implementation. -Spraying in the rainy season in 2017-2020 campaigns in most GF/GRZ areas (making it difficult to access the hard to reach areas; people go for farming, and household items cannot be brought out in the rains). -High refusals to IRS in urban areas. -Inaccurate estimation of eligible structures. |

| Vector Control Intervention | Enablers | Constrainers |
|------------------------------------|---|---|
| | <ul style="list-style-type: none"> -Availability of environmental regulations. -Availability of guidelines. -Improved timeliness of IRS in 2021 necessitated by early procurement | <ul style="list-style-type: none"> -Competing social economic and health activities during IRS implementation such as farming, caterpillar harvesting and Child Health Week. -Limited classes of WHO prequalified insecticides. -High cost of insecticides. -Mismanagement of IRS commodities (PPEs and Equipment) by SOPs. -Inadequate supervision. -COVID 19 Pandemic. -Long distances between spray areas as well as between structures in the rural communities. |
| LLINs | <ul style="list-style-type: none"> -Strong partnership (funding and other logistical support). -Existing community structures. -Political will. -Availability of human resource at all levels (National, provincial, district and community). -Availability of ITN guidelines. | <ul style="list-style-type: none"> -In 2020, disruption of international supply chains resulted in the postponement of LLIN distribution activities. -Inadequate LLINs for routine distribution. -Inadequate storage for ITNs. -Ineffective data management and reporting for routine distribution. |
| LSM | <ul style="list-style-type: none"> -The keep Zambia Clean, Green and Health campaign. -The Millennium Challenge projects. -Riding on other activities such as IRS activities, Entomology, ICCM activities and Cross border initiative supported by E8. -Existing community structures. -Political will. -Availability of human resource at all levels (National, provincial, district and community). -Availability of LSM guidelines. | <ul style="list-style-type: none"> -Lack of resources to implement LSM country wide (Not included in the yellow book). -Lack of partners to support LSM at national level. |

6.1.5 Status of Entomological Surveillance

There was no data available for the period under review. A Data Management Committee (DMC) was recently formed to address this aspect. Due to lack of data base there is no Entomological impact score trend.

Entomological investigations are an important and essential aspect of malaria vector control, as these investigations provide information on vector species, their distribution, density, bionomics and susceptibility/resistance to insecticides used for malaria control. In addition, these investigations are useful for the monitoring of potential vectors and the role they could play in disease transmission. Information collected through entomological surveillance techniques assist

in the understanding of the spatial and temporal changes in vector species, efficacy and effectiveness of vector control measures employed for malaria vector control. Conducting regular entomological surveillance on a wide scale is costly & labour intensive. Hence, these investigations cannot be carried out in all locations where malaria transmission occurs but have to be limited to selected localities in each district/province. To increase the usefulness of data collected from surveillance and to maximize the use of available resources, entomological investigations are carried out in sentinel sites, selected localities where potential out-breaks are expected and during out-breaks or epidemics.

6.1.6 Findings

Findings – IRS

IRS was implemented once every year with variations in timeliness and coverage. Less than 90% of the eligible structures were sprayed for each year under review, while the targeted population covered by IRS was attained for 2018-2022, below target for 2017 and 2021. IRS was implemented on time in 2021 nationwide as compared to other years – 2017 to 2020. IRS acceptance rates were affected by changing community preferences (some prefer ITNs to IRS), “gassing” fears, late implementation, use of spray operators unknown to the community among other things. Implementation of Community IRS has generated interest at all levels because of higher acceptance rates, reduced supervision ratio and improved coverage of households and coverage was high. However, some issues in implementing community IRS included: High initial costs due to construction of bases and provision of bicycles, areas not manned by EHTs or CHAs had challenges with supervision, uncertainty around number of supervisors to be trained in case of big geolocations and supervision was inadequate in some areas. Population based survey, MIS, showed a slight improvement in the trend of households sprayed from 35% in 2018 to 39% in 2021, but still below target. IRS access was mostly equitable as there were improvements in the proportion of households sprayed across all wealth quintiles between 2018 and 2021, except for the second quintile. There is need to address the difficulties with interpreting and communicating IRS coverage indicators at all levels.

The spray quality was found to be 100% based on an assessment conducted among 7 selected districts, during the 2021 IRS campaign. For the 2020 IRS quality assessments, two teams were refrained, as a precautionary measure because at least one member of each team did not attain 100% mosquito mortality at the end of the observation period. During the pandemic, WHO provided guidelines on “*Targeting the malaria interventions during Covid-19 pandemic*”. The IRS program domesticated these guidelines; hence no disruptions were noticed and no case of COVID-19 was reported from the spraying teams. IRS logistics under the supply chain were procured on time and by the time COVID-19 pandemic was pronounced in March 2020, IRS logistics were already in the country.

Findings – LLINs

LLINs distribution has been ongoing using various modes (mass, EPI/ANC and schools) albeit with some procurement and supply chain challenges. LLINs procurements were undertaken for each year of implementation. The distribution program experienced some delays due to disruption of international supply chains in 2020. This resulted in the postponement of LLIN distribution activities from August 2020 to November 2020 due to COVID-19. Despite all these challenges,

the country recorded positive achievements such as 100% of the quantified LLINs were procured and 100% of the requested LLINs were delivered to the health facilities in 2020. There are some reported challenges with ensuring consistent supply of ITNs for continuous distribution (ANC and EPI clinics).

Based on MIS estimates, household ownership of at least one ITN declined from 80% in 2018 to 53% in 2021 (MIS, 2021). ITN use by pregnant women and children aged below five years declined. Access to either IRS or ITN declined and so did co-deployment of IRS and ITNs (MIS, 2021). However, equity in access to ITNs was good as rural and poorer households reported higher access. ITN durability monitoring studies show median useful life of less than 2 years. Pyrethroid resistance widespread. PBO synergist shown to restore susceptibility.

Since universal ITN coverage was dropped as a national goal in 2017, ITN ownership and use have dropped dramatically, including among vulnerable population (children, pregnant women, PW, rural residents and the poor). Increases in IRS coverage were too modest to make up the difference. Deployment of IRS and ITNs in a sub-district mosaic approach (adjacent areas within same district are targeted for one or the other) faced many operational challenges, met with community resistance, and achieved poor results (MIS, 2021). The mosaic approach is also unappealing to donors. Ongoing innovations in vector control are required. The Constituency Development Funds (CDF) under Local Government may provide a new source of resources for vector control.

Targeting vector control interventions has yielded areas for further research or refinement:

- What are the optimal targeting criteria for ITNs and IRS (epidemiology, entomology, operational)?
- What if the definition of the operational area? Is it HFCA or district?
- What happens to ITN areas during non-campaign years? Should IRS be applied?
- What are the priority areas for IRS? Is it moderate to high burden, but avoid very high transmission areas?

Findings – LSM

Implementation level for LSM was low owing to lack of specific funding from either the government or partners. The implementation of some LSM activities was enabled by integrating with other activities in iCCM and vector control. LSM is deployed by the private sector such as the Zambia Sugar Company, the Mines more especially on the Copperbelt and some local authorities. Child Fund is implementing larviciding in some of the 13 HFCA in Mumbwa district and 10 HFCA in Shibuyunji district, Central province.

LSM indicators were not included in NMESP 2017-2021. There is limited availability of trained personnel. There is still uncertainty around targeting LSM. Advocacy for LSM is limited.

Findings-Entomological surveillance

There is evidence of insecticide resistance in Zambia. The country level information has been key in informing decision making in vector control. However, the number of operational sites for entomological surveillance is limited. The personnel trained in entomological surveillance remains inadequate. Furthermore, there is a lack of data management. There is inadequate equipment

and consumables to conduct entomological surveillance (e.g. PPEs, aspirators) at GF supported surveillance sites. Quality assurance is not fully implemented in the government-supported districts.

6.1.7 Conclusions

Conclusions –IRS

The eligible structures sprayed were below the 90% target for all the years under review. The target for population protected was achieved in 2018-2020 and below target for 2017 and 2021. Inadequate resources and late disbursement of funds delayed IRS implementation and resulted in reduced coverage. IRS refusals were due late implementation (rainy season), use of spray operators unknown to locals, myths/misconceptions on safety of IRS and local security concerns (e.g. house gassing). House gassing was suspected human life threat that was reported largely in all the districts on the Copper belt and Lusaka provinces with isolated cases in other provinces. Since gassing is similar to spraying in IRS, this created problems among community members.

Conclusions - LLINs

ITN ownership and use has declined in Zambia. Mixed modes of delivery provide an opportunity to continue improving access to ITNs. Targeting of ITNs to areas not eligible for IRS has created gaps in overall population covered by either of the vector control interventions since the IRS coverage remains low. The 2020 mass campaign was successfully conducted attaining 98% coverage against the target of 100% universal coverage in the ITN designated areas. Signifying the important role that mass campaigns play in increasing household ITNs ownership. Improvements in quantification, procurement and distribution of ITNs is key. Disruptions in international supply chain have the potential to delay timely implementation of activities, as was the case in 2020 due to the COVID-19 pandemic.

Conclusions – LSM

The implementation of LSM remained low for the period under review. Inadequate resources and limited advocacy for LSM constrained implementation of LSM.

Conclusions - Entomological surveillance

The NMESP lacks entomological impact indicators, baseline and targets. Further the number of sentinel sites conducting entomological surveillance is inadequate. An Entomological data management Committee (EDMC) has been put in place to address the two concerns.

6.1.8 Recommendations

Recommendations -IRS

1. Timely disbursement of adequate funds for procurement of all IRS commodities training and implementation according to the adjusted IRS management cycles
2. Maintain the timing of the spray campaign before the peak transmission period, which most times tends to coincide with the onset of the rainy season.

3. Enhance the involvement of the traditional and influential leaders in IRS mobilization to help improve community acceptance.
4. Conduct baseline structure enumeration in new IRS areas.
5. Insecticide rotation in line with the Zambia IRMMP
6. Conduct the Post Spray Data Quality Audit
7. Consider GF recommendations where IRS is implemented in a targeted manner complementary to ITN
8. Implementers should provide coverage estimates in terms of total population and/or total households – in addition to the usual “spray progress” (sprayed/targeted) and “spray coverage” (sprayed/found). Formulate a glossary of terms to be used for IRS.
9. Decision makers want to know the population that has been actually protected out of full total populations. Continued use of maps to provide the pop and structure denominators.
10. Continue with timely planning; timely comprehensive budgeting; timely funding, procurement and implementation of IRS. The IRS Management cycle must have specific timelines to be followed by all stakeholders. Delayed IRS undermines community acceptance, access, and impact.
11. Intensify stakeholder engagement in IRS at all levels (community, facility, district, province and National). Strongly recommend early engagement. Intensify collaborations with health promotions units. Necessary to reduce refusals, improve coverage. Intensification of SBCC on the benefits of both interventions.
12. Increase the proportion of IRS areas using the community model. Begin with phased approach, explore cheaper ways of putting up facilities/bases to meet ZEMA standards and take advantage of existing infrastructure in communities.
13. Intensify both internal and external supervision at cascade and implementation (increase resources towards quality monitoring and supervision at cascade training and implementation). Essential to assure quality, safety, high coverage, and impact.

Recommendations Cross cutting IRS/ITNs/Vector Control

1. Avoid the sub-district mosaic approach in future. A mosaic at the district level may be considered. Although unit of analysis and operations in the NMESP is the HFCA, this has not proven feasible for vector control campaigns.
2. Revert to policy of universal population coverage with LLINs. IRS to be deployed as a complementary intervention in targeted high-burden areas.
3. To inform the new NMESP, the targeting criteria should be defined based on lessons learned from implementing the NMESP 2017-2021, WHO guidance and use of modelling resources.
4. Consider pilots to follow the trials of ATSB, improved housing and explore potential of biological control (fish).
5. All districts to take advantage of the CDF to improve funding levels for malaria vector control. NMEP to develop advocacy materials for this.

Recommendations –LLINs

1. Improve availability of ITNs within a household to enable improvements for use among all household members

2. Maintain high ITN coverage, between periods of mass distribution campaigns, vital for malaria elimination.
3. ITN to assume primary role in Vector control, targeting universal access and prioritising high burden areas (levels 2-4).
4. Education, advocacy to counter misperceptions that they are not used. Target distribution for minimum one ITN per two persons.
5. Continue to deploy ITNs in an equitable manner.
6. Consider conducting mass distribution of ITNs every two years. Expand ongoing delivery through continuous distribution channels.
7. Reaffirm national policy of procuring, distribution PBO or NextGen LLINs, no longer standard ITNs.
8. Resource mobilization coupled with supply chain strengthening. Develop realistic, costed plans to ensure transportation of nets from DHOs to facilities.

Recommendations - LSM

1. Identify the larval habitats where LSM is applicable (Few, Fixed and Findable)
2. Identification and mapping of all the larval habitats or breeding sites
3. Develop LSM indicators and targets
4. Mobilise funds for LSM including exploring CDF.
5. Implement targeted LSM to complement other vector control interventions.
6. Utilize the available trained personnel to implement LSM and invest in further training

Recommendation-Entomological Surveillance

1. Increase the number of sentinel sites (from 24 to 39) for entomological monitoring
2. Conduct annual evaluations of insecticide at all sentinel sites to support evidence –based decision making
3. Implement and review the IRMMP every two years
4. Strengthen capacity building and logistical support for entomological surveillance
5. Strengthen quality assurance and quality control for vector control interventions
6. Strengthen entomological data management and reporting. Entomological data management systems to be harmonized with other available data management systems
7. Establish mechanism(s) fast-track procurement of entomological equipment and consumables
8. Mobilize funds, especially from internal sources in the Yellow book for NMEC to undertake and sustain entomological surveillance. Maximise utilisation of available funds from external sources.
9. Update the NMESP to include one or more entomological impact indicator and set the baseline and end line targets.
10. Focal point persons to provide the needed Entomological Surveillance data
11. Conduct refresher trainings and trainings to facility staff/CHWs in sites
12. Share findings with districts and provinces, not just at national level.

6.2 Level of attainment of chemoprevention outcome targets

Zambia does not meet the recommended criteria to implement seasonal malaria chemoprophylaxis (SCM) and hence this is not included in the malaria strategic plan. Intermittent preventive treatment in infants (IPTp) was also not part of the NMESP 2017-2021.

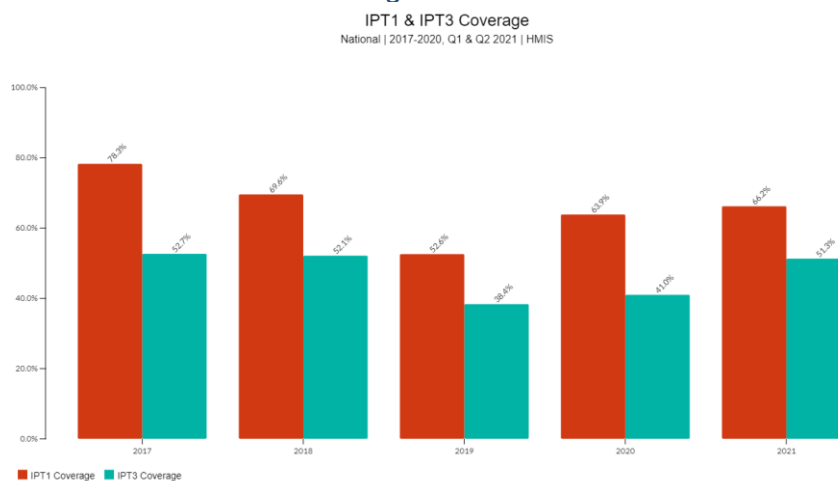
The Strategic plan incorporates the deployment of intermittent presumptive treatment to eligible pregnant women (IPTp) using Sulphadoxine Pyrimethamine (SP) through routine antenatal clinic visits as per ANC guidelines. The guidelines are an adaptation from the WHO guidelines for the Antenatal care for a positive outcome of pregnancy and are appropriate.

The chemoprevention indicator contained in the strategic plan is '**Proportion of women who received 3+ doses of intermittent preventive treatment during ANC visits during their last pregnancy**'. This indicator is appropriately well phrased and contains baseline figures (NMESP/MOP). Baselines and targets for IPTp were included in the NMESP/MOP.

6.2.1 Progress towards IPTp outcome targets

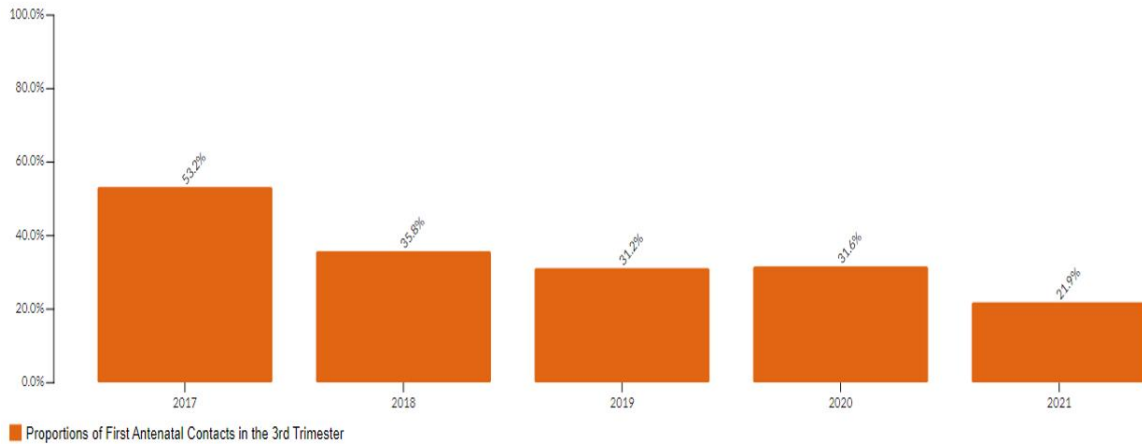
The WHO guidance on antenatal guidelines have been adopted so as to increase health facility-pregnant women contact times. IPTp delivery relies heavily on antenatal attendances. The IPTp uptake for three doses with SP has stagnated from 60.8% in 2015 (MIS 2015) to 67% in 2018 (MIS 2018) and 68% in 2021 (MIS 2021) against the target of 100% as per National Strategic plan. Commodity availability and booking at first antenatal visit before the third trimester were among the key drivers of IPT uptake especially in the first half of 2019 to the first half of 2020 when Sulphadoxine-pyrimethamine was readily available at service delivery points. The proportion of pregnant women booking for first ANC visit in their third trimester (what can be termed as late booking for IPT3 uptake) has shown a reduction trend which must be sustained if the target set against this indicator are to be met (**see figure 16**). Other factors that impeded progress against this indicator include, poor data capturing at service delivery points, premature deliveries /miscarriages experienced during early stages of pregnancy, HIV positive women on Cotrimoxazole (who do not qualify for this intervention) are not excluded from the denominator. Long distance to the health facilities especially if no problem is identified during the first visit, missing appointments, women who book early in the first trimester (before 12 weeks) are not eligible for IPTp, some of the discrepancies were to do with data challenges and late booking. Also, the stock out of SP at the facility had a negative impact on IPTp uptake. The stock out of SP in the country were partly due to supply chain disruptions, weaknesses in forecasting/quantifications and failure to manufacture the commodity locally.

Figure 16: Trends in IPT1 and IPT3 Coverage



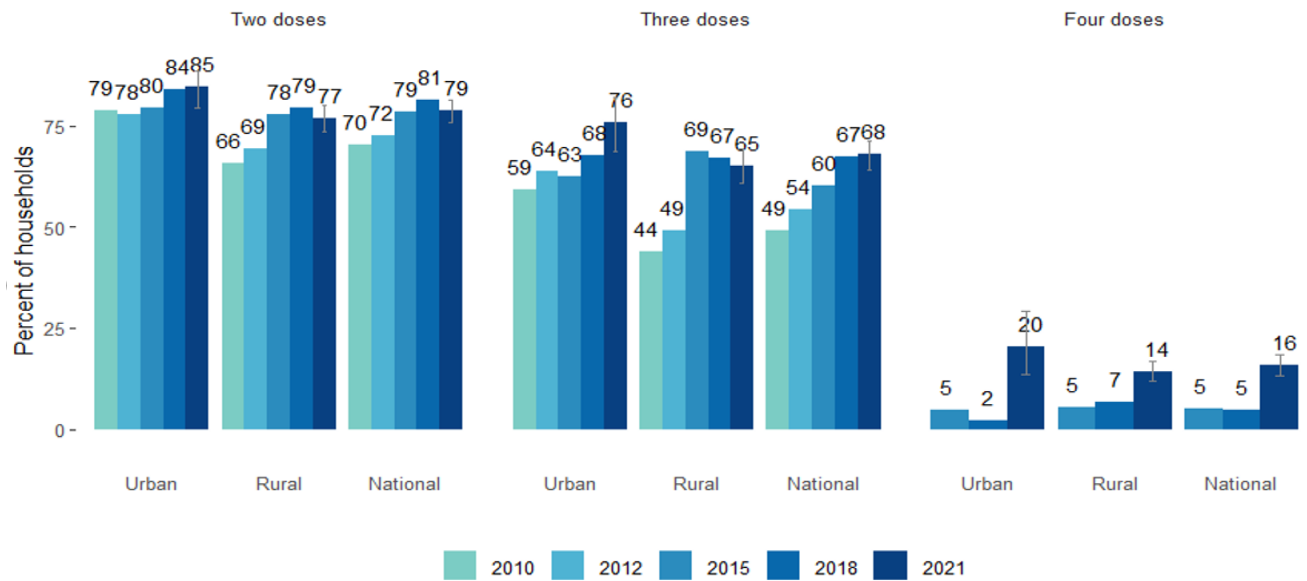
The proportion of first ANC contacts in the 3rd trimester declined from 53% in 2017 to 23% in 2021 (Figure 17). This is important as it creates more opportunities for delivery of IPTp.

Figure 17: Trends in First ANC Contacts in the 3rd Trimester, 2017-2021



In spite of stagnation in coverage of IPT2 and IPT3, there has been substantial progress made in IPT4 between 2018 and 2021 (MIS 2018, 2021) as shown in figure 18.

Figure 18: Women with recent births reporting coverage of at least two, three, and four doses of intermittent preventive treatment during pregnancy, by urban and rural areas (Zambia 2010–2021)



The decline in OPD/ANC attendance, experienced especially at the onset of the COVID-19 pandemic also contributed negatively to achieving the IPT3 coverage targets. This could be in part due to:

- Conversion of some health facilities to COVID-19 treatment and isolation centre thereby interrupting normal service delivery.
- Stay at home orders for the prevention of the spread of COVID-19.
- Anecdotal reports of fear to access malaria services due to fear of being diagnosed with/contracting COVID-19 and then quarantined.
- Reduced outreach activities especially for hard to reach communities who depend on these programs for ANC.

6.2.2 Gap between antenatal care (ANC1) coverage and IPTp1 and reasons for the gap

- Long distance to the health facilities especially if no problem is identified during the first visit
- Miscarriages experienced during early stages of pregnancy
- The denominator for this indicator does not exclude the HIV positive women on Cotrimoxazole who are not eligible to receive this intervention

6.2.3 Enablers and constraints

Enablers

- Availability of updated tools, guidelines and policies.
- Availability of clean drinking water, buckets and cups for administration of SP as DOTs.
- Availability of ANC registers
- Sensitization on early ANC booking
- Integration of MIP supportive supervision into all malaria case management activities such as OTSS
- Availability of updated ANC and Malaria treatment guidelines and Malaria Job Aids.
- Increased capacity to train SMAGs in ANC guidelines.
- Availability of storage/ distribution of SP and LLIN's through at ANC or other designated posts
- Availability of clean drinking water, buckets and cups for administration of SP as DOTs.
- Availability of ANC registers
- Sensitization on early ANC booking
- Integration of MIP supportive supervision into all malaria case management activities such as OTSS
- Availability of updated ANC and Malaria treatment guidelines and Malaria Job Aids.
- Increased capacity to train SMAGs in ANC guidelines.
- Availability of storage/ distribution of SP and LLIN's through at ANC or other designated posts

Constrainers

Despite the progress made in IPTp coverage, there are notable constraints that made the NMEP fail to achieve the set targets. This was mainly due to the disruption of shipments for malaria commodities and long lead time due to restricted travel and reduced manufacturing capacity, led

to delayed receipt of SP. This was compounded by lack of a buffer stock.

6.2.4 Findings

The IPTp uptake for three doses with SP had improved from 60% in 2015 to 67% in 2018 but stagnated in 2021 with an uptake of around 68%, against the target of 100 percent as per NMESP (MIS 2015, 2018 and 2021). The IPT3 target of 100% was not attained for the period under review. The decline in OPD/ANC attendance experienced especially at the onset of the COVID-19 pandemic and erratic SP supply also contributed negatively to achieving the IPT3 coverage targets.

6.2.5 Conclusions

The preliminary results of the 2021 malaria indicator survey show a plateau in the uptake of IPT3, from 67% in 2018 to 68% in 2021. Disruptions in ANC attendance among pregnant women affects attainment of 100% IPT3 coverage. Improvements in commodity security are required to facilitate uninterrupted uptake of IPT3.

6.2.6 Recommendations

1. Implement focussed SBCC to improve ANC attendance
2. Improve malaria commodity security including SP for IPTp by addressing PSM challenges at various levels.
3. Explore the possibility of administration of subsequent SP doses to pregnant women by community-based volunteers.
4. Continue engagement with reproductive health unit to scale up pregnancy testing and linkage to ANC services at all service delivery points including CHW's.
5. Capacity building for health facility staff in data handling, including conducting data audits for ANC/IPTp.

6.3 Level of attainment of malaria diagnosis and treatment targets

The following case management indicators were included in the NMESP 2017-2021:

- *All suspected malaria cases should be subjected to a parasitological test (RDT or Microscopy) and*
- *All confirmed cases are provided with prompt, effective malaria medicines according to national guidelines.*

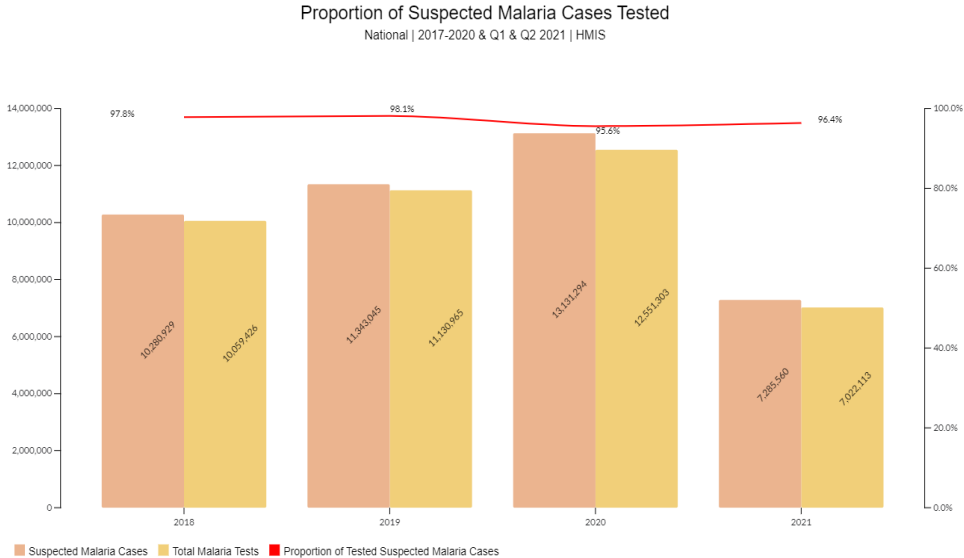
The malaria case management diagnosis and treatment policy are appropriate. The indicators are well phrased and baseline targets included in the NMESP/MOP 2017-2021 thus deemed appropriate.

6.3.1 Progress towards NMESP Case Management outcome targets

Trends of the proportion of suspected malaria cases tested

There was progress towards the proportion of suspected malaria cases receiving parasitological diagnosis from a baseline of 80% in 2015 to 98.1% in 2019 as shown in **Figure 19**. In 2020 however, there was a 2.5% decline in this indicator mainly due to COVID-19 pandemic related supply chain disruptions and lack of buffer stock. This led to a performance of 4.6% below the target of 100% as outlined in the malaria operational plan.

Figure 19: Trends of Proportion of Suspected Malaria Cases Tested



The preliminary results from the MIS 2021 survey also shows an increase in the proportion of children under five years with fever and received a finger stick from 55% in 2018 to 59% in 2021 (see figure 20). Additionally, the survey shows an improvement in the promptness to care seeking from 20% in 2018 to 30% in 2021 in under five children reported to have had fever in the past two weeks (Figure 21). The Malaria strategic plan does not track annual blood examination rate. Progressive strides were made towards the attainment of all confirmed malaria cases being treated according to national policy from a baseline of 92% in 2015 to 98.6% in 2020.

Figure 20: Percentage of reported febrile children under age five years with a reported finger/heel stick for diagnostic testing (Zambia MIS 2010–2021)

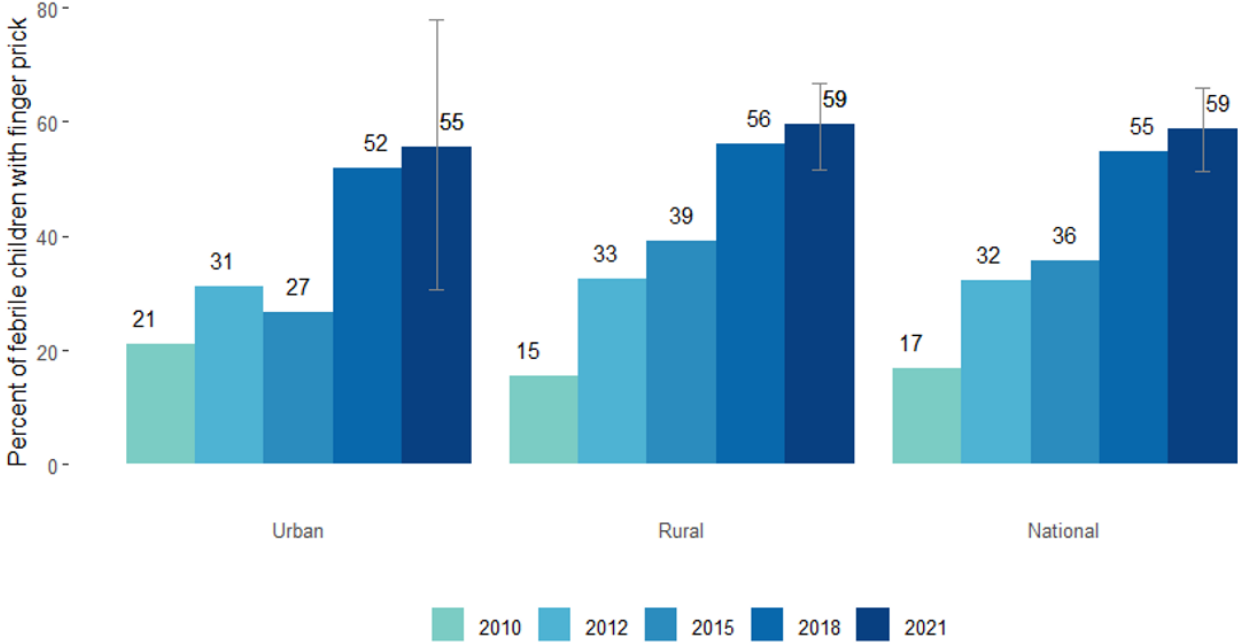
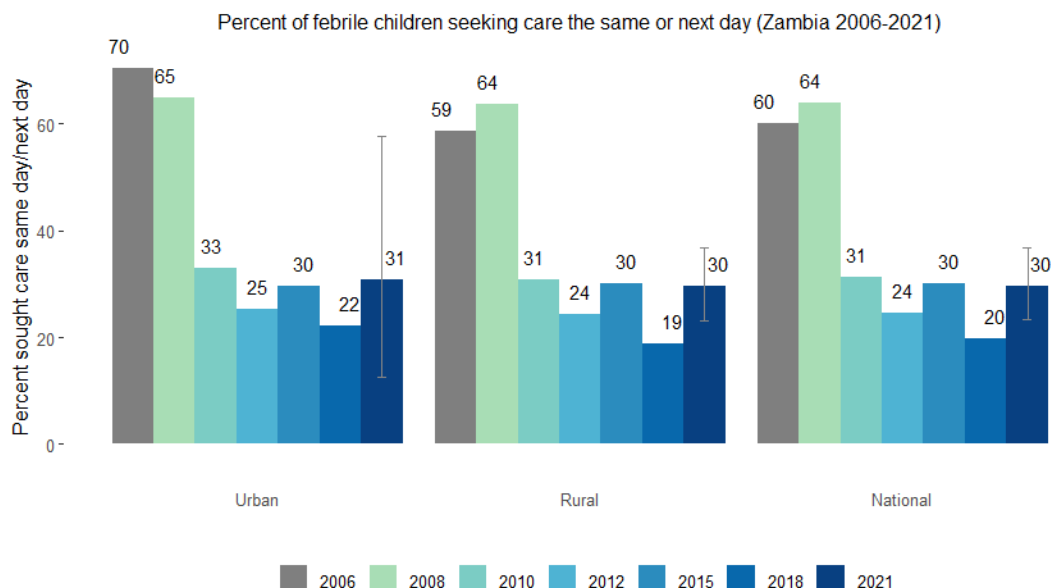


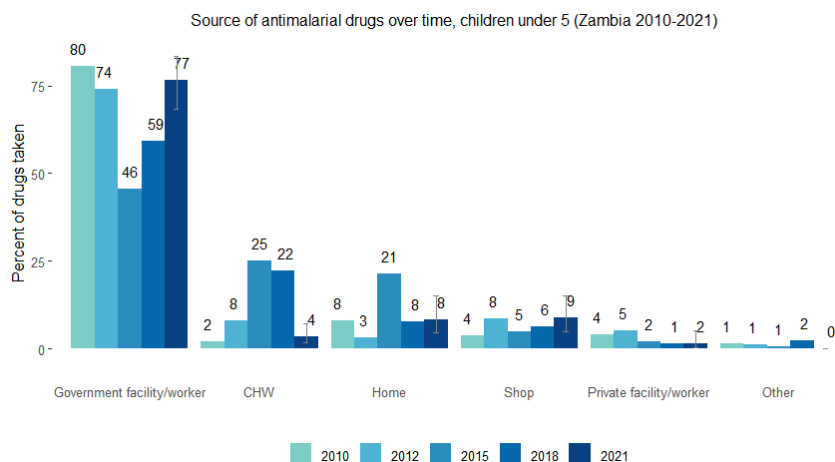
Figure 21: Among children with fever, trend in promptness of care seeking (Zambia MIS 2006–2021)



Progress in integrated community case management of malaria

The NMEP has developed an integrated curriculum incorporating surveillance into iCCM training. This was scaled up from 3600 CHWs in 2017 to approximately 12,000 CHWs in 2020 across the country. There is however a marked reduction in children with fever who took antimalarial medicine via community health workers from 22% in 2018 to 4% 2021 as shown in Figure 22 (MIS, 2021). This is despite training of over 16,000 CHWs countrywide to date, to improve access to malaria case management services. The main reason for the gaps in iCCM is the lack of commodities for the CHWs coupled with inconsistent or lack of provision of enablers and incentives.

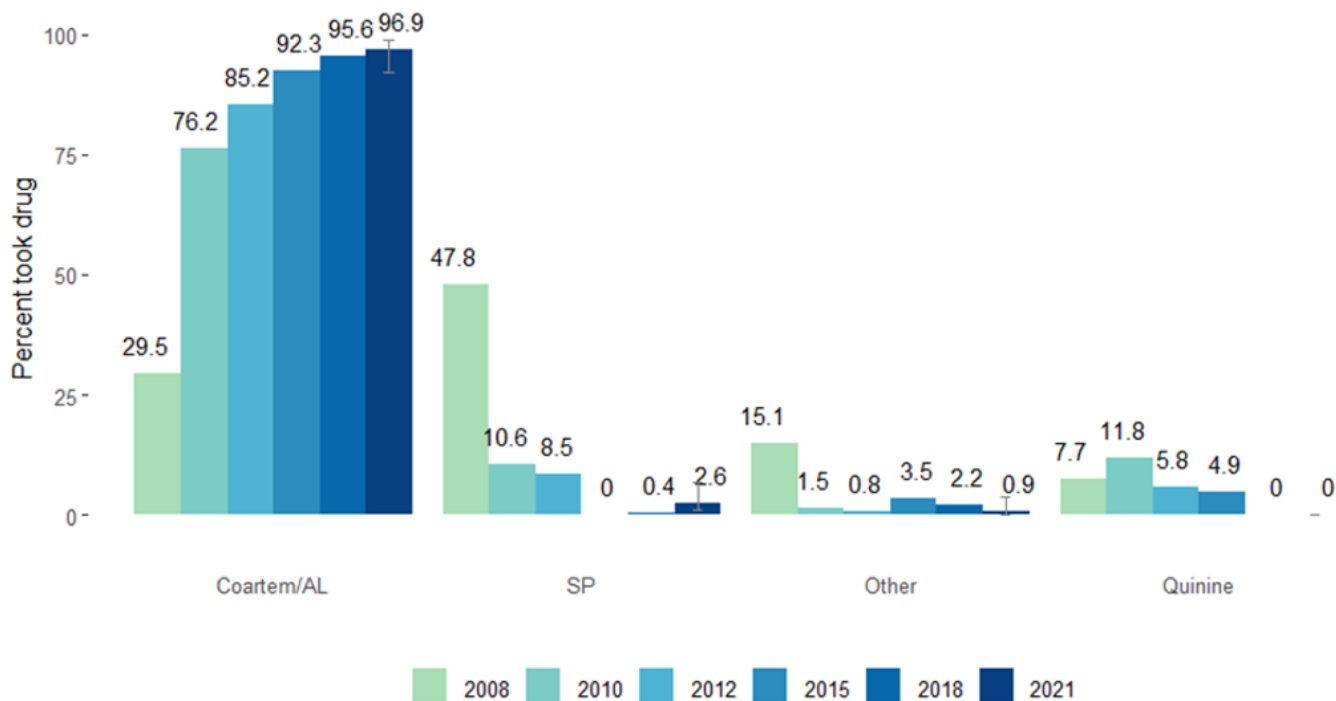
Figure 22: Source of antimalarial drugs among febrile children under age five years (Zambia MIS 2010–2021), unweighted due to low sample size



Trends of the proportion of test positives that received artemisinin-based combination therapy (ACTs)

The proportion of children under five with fever who took AL also increased from 95.6% in 2018 to 96.9% in 2021 (figure 23).

Figure 23: Among febrile children taking antimalarial drugs, the percentage of each drug taken (Zambia 2008–2021), unweighted due to low sample size



6.3.2 Trends of management of severe malaria according to policy

Zambia has made significant progress in the reduction of severe malaria cases from 1.6 percent of total cases (96,230 out of 6,077,828 cases) in 2016 to 0.6 percent of total cases (31,598 out of 5,266,569 cases) in 2018 and 1.1 % (70,259 out of 6,259,297) in 2021. The increase in severe malaria cases may be attributed in part due to CHW’s inactivity due to unavailability of stock at community level.

The NMEP has built capacity in the use of injectable Artesunate for the management of severe malaria in all health facilities and has scaled up the use of Rectal Artesunate suppositories (RAS). The NMEP piloted and then adopted the use of RAS as a pre-referral treatment for severe malaria at community level from 1 in 2017 to over 10 Districts in 2020. Over 45 districts will be implementing this intervention by the end of this calendar year.

6.3.3 Enablers and constraints.

Enablers

- Availability of updated tools, guidelines and policies.
- Increased capacity to train CHWs.
- In certain geographies and time periods, provision of ACTs and RDTs at all levels worked well when stock was available.
- Massive recruitment of the qualified personnel by the government.
- Capacity built in malaria microscopy diagnosis, through staff training increasing the ability of detecting non-falciparum species and support quality assurance Increased diagnostic capacity through procurement of 131 microscopes (65 from CHAZ and 66 from PMI)
- The Programme changed the treatment regime for severe malaria from Quinine injection to Artesunate injection.
- The NMEP has built capacity in the use of injectable Artesunate for the management of severe malaria in all formal health facilities.
- The NMEP piloted and then adopted the use of RAS as a pre-referral treatment for children aged 2 months to 6 years. In 2019 to 2020 the use of RAS was rolled out to 10 districts
- The scale up of training of CHWs saw the increase in the access points for service delivery. This had an impact in the reduction of severe cases of malaria. Over 12,000 CHW's were trained from 2017 to date.

Constrainers

Despite the progress that Programme witnessed, there are notable constraints that made the NMEP fail to achieve the set targets, which was due to the following:

- Erratic supplies of ACTs and RDTs commodities within the supply chain and this was worsened during the COVID 19 pandemic especially in certain provinces.
- Malaria microscopy was affected by the power outages that the country experienced during the 2019 to 2020 period.
- Disruption of shipments for malaria commodities and long lead time due to restricted travel and reduced manufacturing capacity, led to delayed receipt of commodities (RDTs, ACTs, SP, LLINs, insecticides).
- This was compounded by lack of a buffer stock. Some commodities arrived in smaller consignments than planned, hence creating distribution challenges in the country.
- Failure to saturate trained CHW's to reach the desired target due to inadequate financial resources.

6.3.4 Mass Drug Administration

Progress has been made to scale up this intervention outside the traditional geographical of Western and Southern Provinces where this intervention was piloted and first implemented. This intervention was scaled up to 10 districts from in Provinces covering a population of over 500,000 from 184 HFCA's as shown in **table 18**.

Table 18: MDA Status in the targeted districts

| District | Number of HFCA | Population listed | Population Treated | Total District Population CSO | Percentage coverage | Total number of HFCA |
|--------------|----------------|-------------------|--------------------|-------------------------------|---------------------|----------------------|
| Solwezi | 10 | 34271 | 34,070 | 136,661 | 99.4% | 32 |
| Mushidano | 17 | 74,257 | 59,848 | 81,939 | 80.6% | 23 |
| Kalumbila | 37 | 92,577 | 89,674 | 300,000 | 96.7% | 55 |
| Zambezi | 25 | 102,396 | 78,656 | 105,196 | 74.8% | 25 |
| Nakonde | 16 | 57,628 | 56,850 | 181,583 | 91% | 21 |
| Chama | 31 | 100,169 | 96,577 | 163,744 | 96.4% | 43 |
| Senga Hill | 13 | 45,490 | 41,739 | 175,000 | 94% | 31 |
| Mbala | 4 | 18,915 | 18,548 | 154,494 | 98.1% | 28 |
| Lunga | 3 | 26,671 | 25,225 | 82,200 | 95% | 4 |
| Mansa | 28 | 111,068 | 103,866 | 270,386 | 79% | 76 |
| Total | 184 | 663,442 | 508,570 | 1,651,386 | 90.5% | 338 |

Enablers

- End malaria council who have committed to raise funds for the intervention
- Government and partner (MACEPA, FOSUN Pharma and FQM) commitment towards scaling up of the intervention
- Presence of community health workers trained in ICCM who play a key role in increasing access to malaria case management and surveillance system

Constrainers

- Shifting cultivation making CHWs to cover very long distances
- Mismatch between official CSO population and actual headcount population at implementation level
- Late disbursement of funds to implementing units due to new bureaucracy in the disbursement process
- Myths associating MDA drug to COVID-19 vaccines
- Clash of key activities due to shift in dates resulted in difficulty to smoothly implement the activity as key staff from the District health office, Facilities and community ear marked for MDA were also engaged in these activities such as mass net campaign, indoor residual training, Mass Drug Administration for elephantiasis etc. Loss of drugs through Road Traffic accident involving Medical Stores Limited Truck which reduced the targeted population and implementing health facilities
- Due to these challenges, some districts did not manage to implement MDA 2 rounds in their targeted HFCA's (Mansa, Nakonde and Chama)
- Inadequate ACT's at health facility level made some facilities resort to DHAP the drug for MDA for treatment of outpatient malaria cases
- Inadequate DHAP received due to COVID-19 related low production from industrial closure
- Delayed commencement of this intervention and difficulties to implement the activity as it

was conducted deep in the rainy season campaign

6.3.5 Findings

The proportion of suspected malaria cases receiving diagnosis has increased but the level of attainment is below target. Prompt health care seeking among febrile children remains low (around 30%). Some improvements in febrile children receiving diagnostic testing but still below target for the period under review. Progressive strides made towards the attainment of all confirmed malaria cases treated according to national policy (from 92% in 2015 to 98.6% in 2020). The discrepancy between malaria cases and antimalarial consumption requires further review. Severe malaria cases continued to decline for the period under review from 1.6% in 2016 to 0.6% in 2018, but increased to 1.1% in 2021 (Jan-Sept). Level of attainment of IPT3 remains below target. Pre-referral RAS was piloted and roll out has commenced.

MDA expanded from pilot districts to other areas in line with NMESP. However, some implementation delays were experienced due to changes in funding mechanisms. Some drugs were damaged due to an accident and this led to the second-round implementation not to be conducted in some areas.

The NMEP has a system for monitoring efficacy of antimalarial drugs. For the period under review, AL and DHAP remain effective treatments for malaria. The quality assurance system for RDT and microscopy has helped improve malaria diagnosis.

CHWs continue to play a critical role in malaria case management. Community members and facility staff have positive perceptions on the value of CHWs. However, the limited supplies for CHWs negates their impact.

6.3.6 Conclusions

The milestones for case management as per NMESP were achieved however, this was not the case for malaria in pregnancy and MDA (NMESP Pg. 37). The NMEP has built capacity for case management at community level but saturation has not yet been achieved (NMESP Pg. 12). In spite of the increase in number of CHWs trained, lack of essential commodities at community level disrupted service delivery at that level and potentially led to increase in severe malaria cases. The rollout of pre-referral treatment using RAS has commenced and may in part have contributed to reducing malaria deaths.

Lessons Learnt

- a) Strengthen malaria case management at community level especially through commodity supply, monitoring and supervision
- b) Strengthen malaria case management training for pre-service and in-service staff
- c) Develop mechanism to ensure Commodity availability through strengthening of the Logistic Management System, improving the supply chain and procurement of malaria supplies
- d) Strengthen malaria quality assurance program to adequately support the diagnostic program
- e) Continued engagement and collaboration with Reproductive and Maternal health and all key stakeholders to improve the uptake of IPTp-3

6.3.7 Recommendations

1. Taking advantage of the increased capacity to train CHWs, accelerate CHW training and deployment to achieve saturation.
2. Continue scaling up the Implementation pre-referral treatment with RAS to full capacity.
3. Implement targeted MDA as an important intervention in the malaria elimination strategy for the country. Secure adequate resources to support implementation and conduct MDA campaigns before onset of the rain season.
4. Mobilise resources and disburse timely to ensure malaria commodity availability at all times. The recommendation to maintain a 6-month buffer stock will be important to improve resilience in the face of pandemic-related or other threats.
5. Continue to monitor the efficacy of the key antimalarial drugs used for treatment.
6. Ensure that the National Malaria Reference Laboratory has full functionality to support malaria quality assurance and control.
7. Ensure availability of malaria commodities to CHWs: Regular orientation/capacity building of the health centre staff on the need to release commodities.
8. Updating higher learning institutions for health for Pre-service and in-service so that they move together with government policy direction.

6.4 Level of attainment of procurement supply management (PSM) outcome targets

The Procurement and Supply Management Unit ensures adequate supply and availability of malaria case management commodities at both the central warehouse and at the service delivery points. The key activities in ensuring commodity availability include annual forecasting and quantification of commodities, supply plan development, quarterly forecast review and regular monitoring of the pipeline. The PSM strategy for anti-malaria commodities mandates case management to coordinate the forecasting, quantification, and procurement of anti-malarial commodities and supplies to ensure that 100% of health facilities report no stock-out of anti-malarial commodities lasting more than one week.

6.4.1 Appropriateness of the PSM mechanisms and processes

Processes and mechanisms involved in the procurement of anti-malaria commodities include the following:

- Need identification /assessment (forecasting and quantification, development of supply plan)
- Raising of requisition orders in respect to lead time
- Authority gotten from NMEC management/Requisition sign off
- Floating of bids
- Bid analysis
- Bid picked, manufacturers prepare order according to lead times
- Commodity and shipment tracking by procurement team
- In the case of changes in the Pipeline due to F&Q assumptions, reviews, or supply chain challenges, recommendations are made by the FASP team to cancel, delay or bring forward shipments.
- Receipt and storage of commodities followed by distribution

These processes are appropriate for PSM of anti-malaria commodities. Different statutes and documents such as Zambia Public Procurement Act No. 15 Of 2011 and SOP Manual for Essential Medicines govern all the above processes. The procurement, storage and distribution

of medicines is under the Zambia Medicines and Medical Supplies Agency (ZAMMSA) which operates under the Zambia Medicines and Medical Supplies Agency Act No. 9 of 2019.

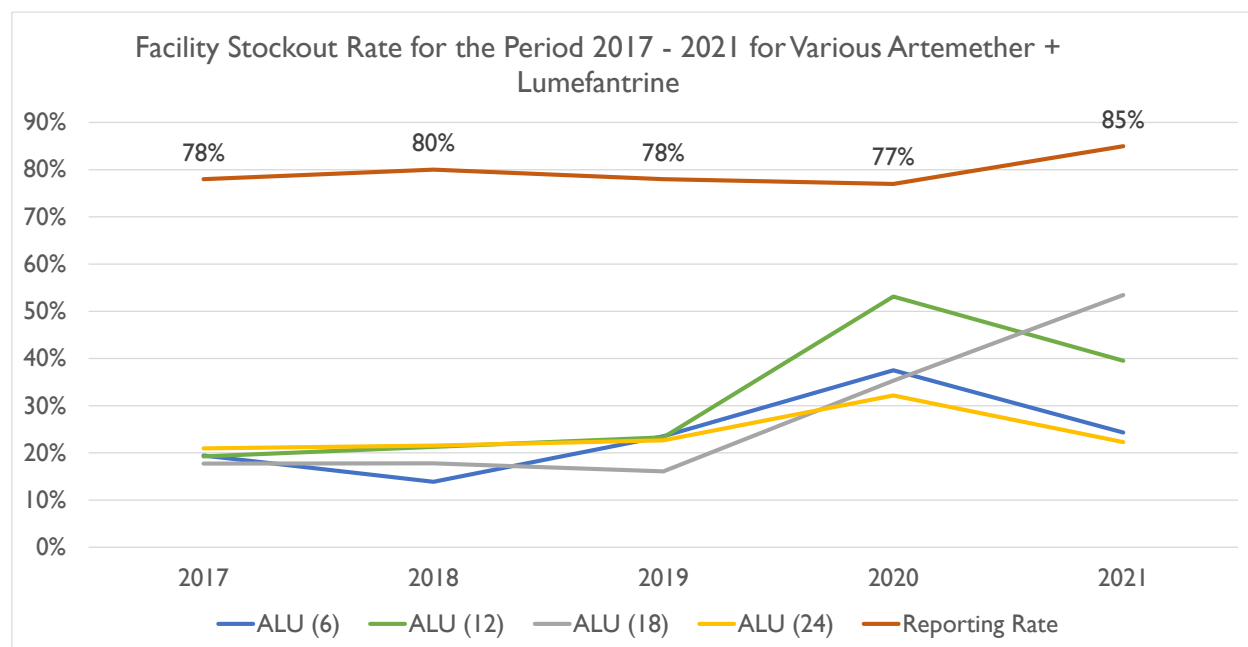
There are no PSM outcome indicators in the NMESP. The Malaria Operation Plan 2019-2021 has some PSM indicators as outlined below which are well phrased, measurable and with no baselines:

- Percentage of health facilities with no stock outs of ACTs for more than a week within a month
- Percentage of health facilities with no stock outs of RDTs for more than a week within a month
- Percentage of CHWs with no stock outs of RDTs for more than a week within one month
- Percentage of CHWs with no stock outs of ACT's for more than a week within one month

6.4.2 Progress towards NMESP PSM outcome targets

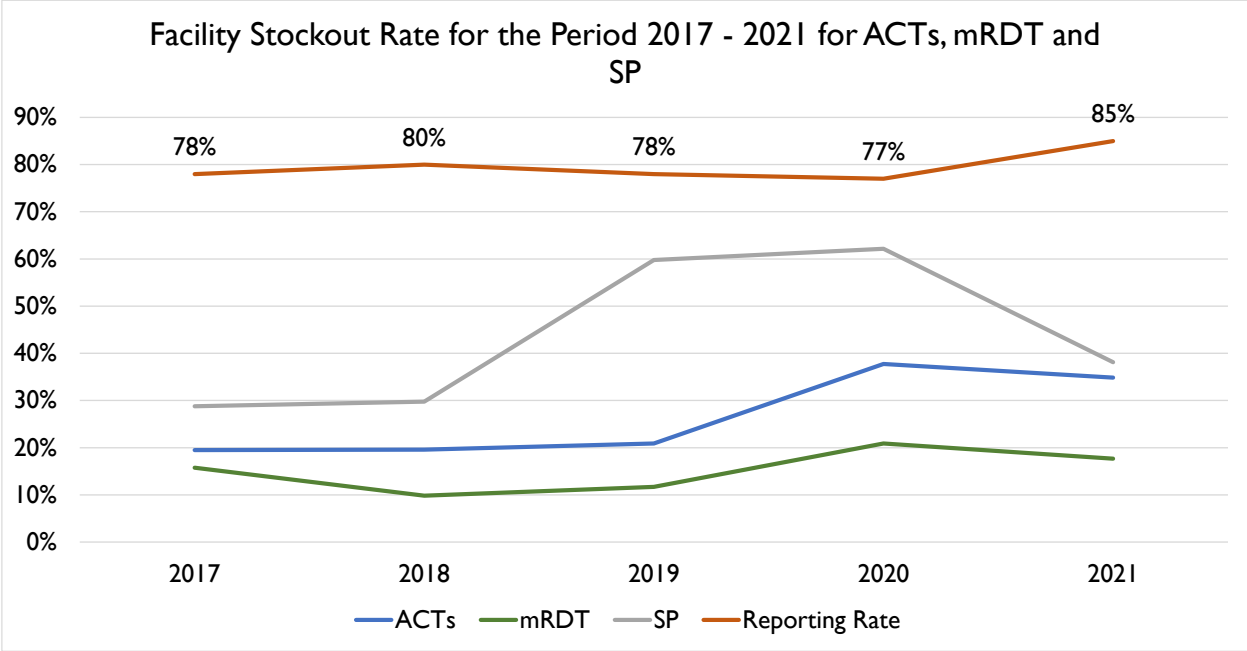
The facility level stock out rates have been increasing for all pack sizes of AL from 2017 to 2021 with a peak in 2020 (**figure 24**). Reporting forms were mostly out of stock for the period under review.

Figure 24: Trends of commodity stock outs - AL pack sizes and Reporting Forms



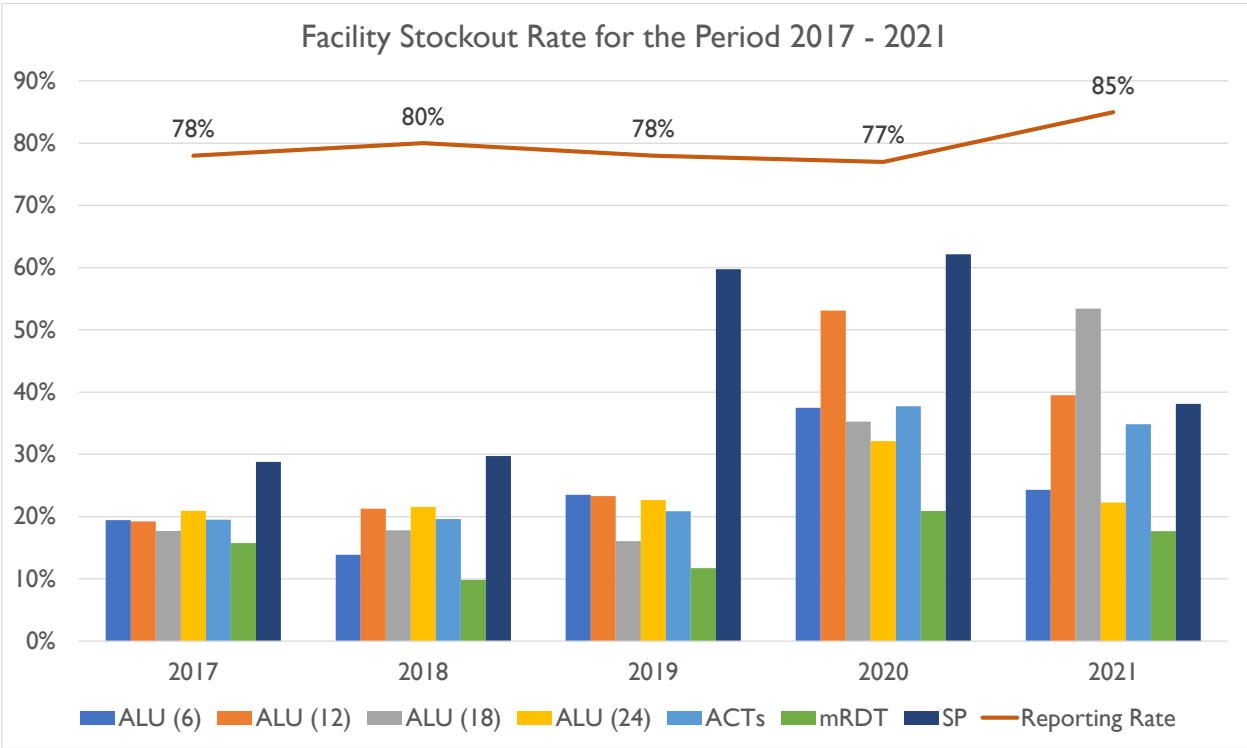
The stock out rates for RDTs and SP have been increasing for the period under review, with the highest stock out rates reported in 2021 (**figure 25**).

Figure 25: Trends of commodity stock outs- ACTs, RDTs, SP and Reporting Forms



Reporting forms for commodities and medicines have generally been very high ranging from 88% in 2017 to 90% in 2021 (figure 26).

Figure 26: Trends of commodity stock outs at facilities - AL, RDT, SP, Reporting Forms



At the time of the MPR, there was no information on timeliness of the deliveries and quality trends such as loss rate or post market surveillance of antimalarials. However, all the medicines used in antimalarial drug efficacy monitoring undergo quality assurance at WHO accredited laboratories.

6.4.3 Enablers and Constraints in the Supply Chain

Enablers

- Opening of seven (7) ZAMMSA Hubs in various provinces.
- Rolling out of the electronic Logistics Management Information Systems (eLMIS) facility edition to over 1,100 health facilities.
- Holding of quantification of anti-malaria commodities, quantification review meetings and monthly supply chain meetings
- Distribution and set-up of prefabricated storage units to expand the capacity of storage space for a select number of facilities.
- Presence of established logistics supply chain management systems

Constraints

- Inadequate resources to fully procure malaria commodities and supplies as forecasted
- Limited distribution capacity of ZAMMSA to deliver commodities to all health facilities and lack of adherence to the bi-monthly distribution schedule
- Lack of real time data at all levels of health care delivery
- Increased lead-time of delivery of commodities due to the COVID-19 pandemic related travel restriction and low manufacturing capacity.
- Lack of malaria consumption data and therefore use of proxy consumption data (movement of commodities from HF store-rooms to HF dispensaries).

6.4.4 Findings

Legal and institutional frame works for procurement, storage and supply of medicines and essential commodities are in place. Further steps have been made to decentralise storage and distribution of medicines through the creation of regional hubs. Monitoring of the PSC has is being improved through the roll out of eLMIS. However, facility level stock outs of antimalarials, testing supplies and reporting forms remained a challenge for the period under review. There are no PSM outcome indicators in the NMESP 2017-2021 and hence trends on quality and timeliness were not tracked. Disruption of international supply chains and the lack of adequate buffer stock contributed to the already existing procurement and supply chain challenges.

6.4.5 Conclusions

The procurement and supply chain for antimalarials and essential commodities requires strengthening at various levels. Improvements are required in forecasting and quantifications, monitoring timeliness of deliveries and quality of commodities is essential. The decentralisation of the storage and distribution of medicines and medical supplies has done little to improve commodity security at facility and community level pointing to the need to review forecasting, quantification and consumption to identify problem areas and address bottlenecks in the supply chain.

6.4.6 Recommendations

1. Review PSC indicators and update the M&E log frame and MSP to include the indicator for percentage of orders delivered to service delivery points according to distribution schedule

2. Increase fund allocations towards malaria commodities and supplies for both the patient need and buffer stock
3. Improve collaboration among key stakeholders for timely disbursement of funding for PSM
4. Standardize the monitoring and data collection tools for logistics with all partners
5. Work towards actualization of the last mile distribution from all regional hubs to all facilities.
6. Roll out eLMIS facility edition to all health facilities and upgrade it to be able to view real time data.
7. Enhance the logistic system to have near real time data and actual consumption data
8. Continue capacity building programs at all levels including mentorship, supportive supervision, on the job trainings etc. to strengthen logistics system
9. Ensure a fully functioning pull system for commodity orders in Zambia.
10. Proposal to delineate roles between procurement and supply management and pharmaceutical supply chain and delivery services.
11. Need to have indicators that are sensitive to supply chain system performance to avoid disrupting service delivery even for a day (Commodity availability indicators).

6.5 Level of attainment of advocacy, social mobilization and social and behaviour change communication (SBCC) outcomes

6.5.1 SBC policy and its relevance

The review established that there is no specific national SBC policy for the NMEP. However, the SBC interventions were guided by the 2017-2021 National Communication Strategy for Malaria Elimination¹ whose primary purpose was to guide district malaria focal point persons, health facility personnel, and partner organizations to engage with community members and community health workers to advance the uptake and use of malaria interventions. The strategy envisioned that malaria information would be delivered by a trusted source and in a language and format that is appropriate for the diverse audiences within communities. The objectives of the communication strategy:

- To increase knowledge of malaria from the 2015 baseline to 100 percent by 2019.
- To improve uptake and correct use of key malaria interventions from the baseline to 90 percent by 2019.
- To arm influencers, health workers, and communities with the communication tools required to achieve elimination.
- To promote the recognition and celebration of communities that attain malaria-free status.
- To provide guidance to communities on the messages and materials needed to maintain malaria-free status and remain vigilant about imported infections and the potential for resurgence.

To achieve these objectives, the strategy clearly outlines its communication guidance based on the five NMEP's intervention components. The components are classified from A to E where A is accelerating and scaling up vector control and case management, B is building information systems, C is community parasite clearance, D is detecting and investigating individual malaria cases, and E is elimination of malaria and ensure it does not return. **Figure 27** is an example of

¹ <https://www.nmec.org.zm/s/National-Communication-Strategy-for-Malaria-Elimination.pdf>

the communication matrix for Component A. For each of these components the communication strategy clearly identifies the target audiences, identifies behavioral and communication objectives, and provides example messages that communicators can use in the SBC interventions.

Figure 27: Example of the communication matrix for Component A

| | Priority audiences | Behavioural objective | Communication objective | Example messages |
|--|--------------------------------------|--|---|--|
| High ↓ RANGE OF TRANSMISSION INTENSITY ↓ Low | Pregnant women & children under five | All pregnant women have LLINs and use them every night, all year-round | To increase knowledge of malaria/the mosquito | <ul style="list-style-type: none"> • IRS and LLINs prevent malaria by killing or repelling mosquitoes. LSM prevents malaria by decreasing the local mosquito population. |
| | All household members | All household members, including adolescents, have access to LLINs and use them appropriately/ allow their households to be sprayed/clear stagnant water in surroundings | To increase understanding of LLINs/IRS/LSM activities, and increase the awareness of the benefits of vector control | <ul style="list-style-type: none"> • IRS, LLINs, and larvicides are safe; the insecticides are not harmful to children or adults. • IRS/LLINs are free. Sleep under a net every night, throughout the year. • Prevention is better than cure. • Mosquitoes know no boundaries. Mosquitoes breeding in your area can infect your neighbours with malaria. Keeping your surroundings clean keeps your community safe from malaria. |
| | Migrant workers/mobile populations | Migrant populations carry LLINs wherever they go/have a responsibility to allow their homes to be sprayed | To communicate the community benefit of vector control | <ul style="list-style-type: none"> • If you are infected with malaria, mosquitoes can transmit the malaria parasites from you to others. Sleeping under a net every night and allowing your house to be sprayed stops this cycle. • Encourage your neighbours/community to have their houses sprayed, sleep under LLINs. • You can import malaria anywhere you travel. Not sleeping under a net puts you <i>and</i> others at risk of malaria. |

The communication strategy also affirmed the national malaria communication campaign under the slogan *Malaria Ends with Me* with the sole purpose of organizing all malaria activities and partners—including the private sector—under a united theme, and to amplify the reach of elimination communication efforts.

An evaluation of the communication strategy² showed that the objectives of the strategy are relevant because they cover two critical elements of social behavior change: increasing knowledge and awareness of interventions among the population and influencing behavior for uptake and use of those interventions. The strategy also provides guidance on what is required for SBC to attain malaria elimination. However, it is limited in its focus on behavior change. Instead, it emphasizes communication which can be biased toward Ministry of Health personnel (malaria focal point persons, health care workers) and partner organizations disseminating information on malaria activities to raise awareness and mobilize uptake among community members. The communication channels used during the period under review included interpersonal and mass media (village meetings, radio, print materials (including job aids), billboards, TV, and social media). These approaches and channels delivered messages to a range of audiences.

While these approaches can be effective, social behavior change requires more than communicating and informing people about available interventions. SBC requires strategies that empower people to transition from knowledge to acceptance to adopting behaviors to become social norms for malaria control and elimination. By leaning heavily on communication, the strategy does not articulate a theory-based community engagement model anchored on three key principles of effective community engagement:

1. that there is no one-size-fits-all community engagement strategy – true engagement involves the people knowledgeable about their own context;
2. community engagement must ensure effective collaboration between experts in the science of malaria and the local leaders who are experts in their own realities; and
3. community members must be at the heart of malaria elimination efforts and should lead in interventions based on their realities.³ The key strengths and weaknesses of the 2017-2021 National Communication Strategy for Malaria Elimination are summarised in **table 19**.

Table 19: Summary findings on the communication Strategy: Strengths and weaknesses

| Strengths | Weaknesses / Areas for Improvement |
|--|---|
| The strategy affirms the national goal of malaria elimination by outlining the country's vision, goals, and objectives for attaining malaria elimination | <p>Although the communications strategy is aligned to the NMESP, the strategy was not informed by recent and SBC-specific data. The strategy was completed in early 2018, before that year's MIS report, and formative SBC research was only done the following year, in 2019 (<i>An Exploration of Social Behavioural and Normative Factors Underlying Malaria Prevention for the Design of Effective Communication Strategies</i>).</p> <p>A new malaria communication (SBC) strategy will benefit from the results of the 2021 MIS.</p> |
| Outlines evidence-based malaria interventions which the communication strategy supports | <p>Key interventions mostly support communication efforts and not broad social and behavior change interventions. This is at the expense of other social and behavior change strategic activities such as advocacy, training & skills, more innovative social mobilization approaches and information, communication technology among others, which could also positively influence behavior as may be guided by behavioral barrier investigations.</p> <p>For example, the strategy does not tackle traditional / cultural beliefs and practices that promote or impede malaria transmission, e.g., drinking traditional medicines for malaria symptoms.</p> |
| Communication strategy is structured in line with the components of the national malaria elimination strategy | <p>Inadequate evidence-base in suggesting SBC interventions. For the next strategy include a wider range of SBC indicators, e.g., IPTp, IRS, location and role of CHW.</p> <p>Current strategy does not explicitly state which model(s) or theory guides the document and as such it misses some aspects of SBC.</p> |

6.5.2 Appropriateness of SBCC outcome indicators

The two outcomes and their associated indicators are appropriate as they track both knowledge and utilization of that knowledge to uptake and use malaria interventions by members of the community. They were also largely SMART: **s**pecific (measuring a particular intervention); **m**asurable (had a clear baseline and target); **a**chievable (a realistic target based on what has been accomplished to date); **r**elevant (it contributes to larger SBC malaria goals); and **t**ime-bound (a specific time frame, a deadline). It should be noted that while ambitious targets can be a good motivator for improvement, aiming for 100% of knowledge was not achievable. Simply having heard of malaria (99%) was an impressive figure at baseline but that same high level is not possible for the other knowledge indicators. However, the indicators used to measure progress toward achieving the desired outcomes are limited.

- **Indicators for uptake and use of malaria intervention covers health seeking behaviors and ITN use – it needs to be expanded to include IRS, IPTp, etc.:** Outcome 2 - to improve uptake and correct use of key malaria interventions from the baseline to 90 percent by 2019 - has four indicators to measure whether the use of SBC has led to uptake and use of key malaria interventions. The indicators are related only to two malaria interventions – seeking of treatment at health facility and sleeping under an ITN by children under the age of 5, pregnant women, and any household member. The MIS and other surveys collect information on uptake of IRS, intermittent presumptive treatment of malaria in pregnancy (IPTp) and seeking health care from community health workers. The next national SBC malaria strategy should incorporate and track these important indicators.
- **There is no outcome and associated indicators for advocacy:** Although the strategic plan has placed advocacy as one of the key SBC strategies, the plan did not have any outcomes or related indicators for advocacy. This makes it difficult to measure the advocacy efforts of the national program.
- **There is no outcome and associated indicators for messaging:** The MIS and other surveys collect and present information on message recall, channels of communication, etc. It will be good to reflect that data in the new malaria SBC strategy, e.g., health facility personnel continue to be the main source for malaria messages. Some provinces also have a significant percentage that report CHWs as a source. It would also be good to capture recognition of malaria branding such as *Malaria Ends With Me*.

In the strategic plan and the subsequent operational plans, the NMEP identified and defined the desired outcomes, indicators and the targets to measure those outcomes. **Table 20** is the summary of the program outcomes, the baseline data as at 2015 prior to the commencement of the 2017-2021 national malaria strategic plan and communication strategy, and the progress made toward achieving the intended outcomes using the 2018 and the 2021 MIS reports.

Table 20: Malaria program outcomes, indicators and targets

| Outcomes | Indicator to measure progress | MIS 2015 (%) Baseline | MIS 2018 (%) | MIS 2021(%) |
|--|--|--------------------------|--------------|-------------|
| Increased Knowledge of malaria from the 2015 baseline to 100 percent by 2019 | Percentage who have heard of malaria | 99 | 90 | 83 |
| | Percentage who recognize fever as a symptom of malaria | 77 | 71 | 64 |

| Outcomes | Indicator to measure progress | MIS 2015 (%) Baseline | MIS 2018 (%) | MIS 2021(%) |
|--|--|--------------------------|--------------|-------------|
| | Percentage who reported mosquito bites as a cause of malaria | 85 | 82 | 77 |
| | Percentage who reported a mosquito net treated or untreated as a preventive method | 91 | 86 | 79 |
| To improve uptake and correct use of key malaria interventions from the baseline to 90 percent by 2019 | Percentage who sought treatment from a facility provider same day or next day | 31 | 20 | 30 |
| | Percentage of children under five who slept under an ITN | 56 | 69 | 46 |
| | Percentage of pregnant women who slept under an ITN | 58 | 71 | 41 |
| | Percentage of household member reported to have slept under an ITN the previous night. | 53 | 64 | 39 |

6.5.3 Progress towards MSP SBCC outcome targets

Proportion of targeted population utilizing correct malaria prevention and control interventions

- The outcome indicators have clear targets which were to be achieved by 2019, two years before the end of the malaria strategic plan and then revised in 2020 for the end of strategy in 2021. In 2020, there was a midterm program review which assessed whether the program achieved its SBC outcomes by 2019. As shown in Table 1, the 2018 MIS showed limited progress toward achieving the targets for increasing knowledge among the population on malaria. The goal was to reach 100% but both awareness (people who heard about malaria) and knowledge indicators (percentage who recognize fever as malaria; mosquito bites as a cause of malaria; mosquito net as a preventive method) were all below target. However, the program noted progress in the uptake and use of malaria interventions. Use of ITNs among children, household members and pregnant women all showed an increase beyond the baseline. The only indicator which was not reached was the health seeking behavior indicator that in fact declined from the baseline from 31% in 2015 to 20% in 2018.
- The 2021 MIS showed the majority of women of child-bearing age (15-49 years) had heard of malaria (83%) and 79% understood that nets were used for the prevention of malaria. Nationally, 64% of women reported fever as a symptom of malaria. These figures represent a reduction compared to the 2018 survey – malaria knowledge indicators reduced across the board. It is interesting to note that Northern Province reported the highest percentage of women who recognized fever as a symptom of malaria at 83% while Southern Province reported the lowest percentage (37%). Southern Province has experienced intense investment over the years, but it appears the lower transmission may have resulted in less interaction with CHWs and health facility staff around malaria, resulting in lower knowledge levels. This can also be seen in Lusaka Province (only 41% recognizing fever as a symptom), an area with historically low malaria burden.
- A reduction in ITN availability, and therefore use, was expected due to the policy of parallel deployment (nets or indoor spraying) for the primary vector control interventions. But the

reductions seen in the three indicators of sleeping under an ITN (children under five, pregnant women, any household member) was greater than expected and the planned IRS prioritization did not fill the resulting gap. The average reduction across ITN indicators, when compared to the 2018 MIS, was 38%.

Activity implementation rate

- The program uses the online malaria harmonized workplan and scorecard, a management tool, to track the implementation rate of planned activities. Between 2020 to June 2021, for example, the program planned to implement 43 SBC activities. Of the planned activities, 74% (n=32) were fully implemented, 21% (n=9) were partially implemented with significant progress made toward completing them. Only 5% (n=2) of the activities were not implemented.

Proportion of people in the targeted population reached through SBCC

To measure the effectiveness of interventions, having a target population and tracking how many of the target population are reached with SBC is critical for management of social behavior change interventions. The current SBC strategy and operational plans did not have a targeted population. Malaria indicator surveys include the number of respondents on the women's questionnaire, however because it's a randomized national sample survey it doesn't provide useful information below provincial level (save for areas that are over-sampled). The next survey will be informed by the MIS 2021 results but this population question shows the need for more frequent and subnational SBC data collection to understand malaria intervention and message penetration in target populations.

6.5.4 Enablers and Constrainers

Enablers

- **Media:** The presence of media platforms in the country such as commercial and community radio, television, print, and social media enabled the NMEP to implement its SBC program. The program took advantage of media's ability to reach the intended target audiences with malaria control and elimination messages. Messages were disseminated through radio jingles, TV adverts, and the malaria program Facebook page (<https://www.facebook.com/NMECZambia/>) and SBC TWG WhatsApp group.
- **Coordination and partnerships:** The SBC program have partners that include the private sector implementing SBC interventions across the country. This strong and diverse partnership base enabled the NMEP to implement its communication strategy for malaria elimination. The program instituted a coordination mechanism at the national level through the monthly directorate meetings at which performance was reviewed and through the SBC technical working group through which technical aspects of the SBC programs were discussed on a quarterly basis. The SBC program collaborated with cross border programs to develop interventions and limit cross border transmission.
- **National malaria elimination slogan:** the NMEP developed a national slogan, *Malaria Ends With Me*, as a rallying point for all partner organizations to pull in one direction to influence behaviors for malaria elimination. The slogan personalized the fight against malaria which enabled SBC messaging to be targeted at individuals to influence behavior change.

- **Advocacy and leadership:** the NMEP's advocacy efforts were enabled by the strong political will to end malaria. The Ministry of Health set malaria elimination as Legacy Goal number two to contribute to the overall development of the country. The deliberate shift from a malaria control to malaria elimination, embodied in the transformation of the National Malaria Control Centre to the National Malaria Elimination Centre as a directorate, improved the ability of the program to engage in effective advocacy for resources and new initiatives, and rallied partners to support the new agenda. The participation of partners in advocacy activities particularly leaders (community, religious, traditional, and civic leaders) and the formation of End Malaria Councils at national and provincial levels were strong enablers to the SBC program for malaria elimination.

Constrainers

- **Limitations in leveraging media resources:** Although a range of media is available in Zambia, the malaria program does not utilize media to a full extent. Many Zambians are not aware of the country's push to end malaria including areas of significant progress where transmission has been reduced to very low levels. Radio, and especially TV, can have limited reach in remote areas but there remains the need for more continual malaria programming both for the primary audience (sensitization and mobilization of rural communities and their leaders) and general population (information and advocacy). Malaria remains a disease of the rural poor but the increasing access to and influence of social media means it has a role to play. The NMEP does not have a clear monitoring and tracking plan of how the overall population, especially those beyond the urban centres, use these platforms to learn more about malaria. It is also a challenge to understand how access and use social media could influence behavior change around malaria.
- **Limited coordination of stakeholders at provincial, district, and community levels:** while at national level there is a national coordination mechanism through the technical working group and the directorate meetings, that is not the case at the provincial and district level. The lack of coordination could lead to duplication of efforts that has potential to lead to wastage of resources and deprivation of certain communities to have access to the SBC interventions.
- **Ad hoc engagement of private sector in SBC programs:** Although the private sector has a long history of supporting malaria programs in Zambia, their participation in the SBC programs was deemed to be ad hoc often oriented to support the program during national events such as the World Malaria Day or the SADC malaria week. There is a need to leverage private sector resources for sustained SBC interventions at community level and to systematize their SBC interventions around their target audiences and geographic coverage. The establishment of the End Malaria Council could help to coordinate and formalize engagement with the private sector around SBC opportunities.

6.5.5 Findings

The current strategy was not informed by recent data, in particular the 2018 MIS and Formative Research concluded after the strategy was finalized. The indicator on health seeking behavior indicator was not reached and in fact declined from the baseline from 31% in 2015 to 20% in 2018. The indicators for uptake and use of malaria interventions covers health seeking behaviours and ITN use, leaving out IRS and IPTp. Use of media was observed in particular community radio, but limited investment in social media platforms to reach missed target audiences such as young

people, in school and out of school. Limited strategic engagement of private sector, mainly engaged during commemoration events. There were no indicators or associated indicators on advocacy and messaging. Average reduction across ITN indicators revealed in the 2021 MIS as compared to the 2018 MIS (38%). The level of attainment for improvements in both awareness and knowledge was below the target of 100%.

There is no specific national SBC policy for the NMEP. However, the SBC interventions were guided by the 2017-2021 National Communication Strategy for Malaria Elimination. The Strategy emphasises communication but has limited focus on behaviour change. There was no outcome and associated indicators for advocacy. The current SBC strategy and operational plans did not have a targeted population. There is no outcome and associated indicators for messaging.

6.5.6 Conclusions

The SBC thematic area has observed an increase in investment evidenced by the number of partners supporting SBC interventions. However, poor coordination of SBC at sub national levels was noted resulting in duplication efforts, ineffective and inefficient implementation of interventions. Additionally, the 2021 MIS revealed a decrease across all indicators, which entails the need to invest in tailor and context specific messaging and SBC interventions, with particular attention to the two low transmission provinces as populations' risk perceptions seemed to have reduced over the years.

6.5.7 Recommendations.

- **There is no need to develop a separate national NMEP SBC policy but a national SBC malaria strategy that will facilitate, guide and promote the knowledge adoption and maintenance of key behaviours:** The national malaria program is in the process of developing a national malaria policy which will provide overall policy guidance for all malaria elimination activities in the country. Therefore, there is no need to produce a separate SBC policy. Instead, the NMEP should ensure that SBC is prioritized in the overall national malaria policy. The planned barrier analysis and KAP study will help to identify barriers and also where there is success. These results will contribute to improved tailored messaging and activities.
- **There is need to incorporate other sources of data to measure the impact of SBC activities and add to the evidence base,** e.g., adding the new global SBC module – developed by RBM – to Zambia's next Malaria Indicator Survey (MIS). There is also a lot of relevant data in surveys that don't end up in reports; there is an opportunity to mine existing datasets to better understand indicator trends over time. The aim of the malaria program is to reduce and eventually end local malaria transmission in communities. Beyond large surveys, therefore, we recommend the regular collection, analysis and visualisation of local SBC data (KAP surveys, barrier analyses) for decision makers. In addition to indicators about availability and use of malaria interventions, information collected can include questions found in the larger surveys, e.g., do you know the location and role of your community health worker.
- **Shift from a communications strategy to a comprehensive SBC strategy:** Given that a communication strategy can overly emphasize communications, it is recommended that the NMEP develop a comprehensive SBC strategy. It should be grounded in theory, evidence-based, and clearly articulate behavioral determinants, barriers and motivators to allow for responsive interventions. In the spirit of a bi-directional approach to community engagement, SBC must be interwoven and embedded within proactive community-led

actions that will leverage community assets for behavior change. A national malaria SBC strategy should address behavioral barriers that hinder people from adopting and using proven malaria interventions and promote determinants that lead to acceptance and use of those interventions. The strategy should also address service provider attitudes that could limit people's ability to access, adopt and use malaria services.

- **Use continuous learning and adaptation principles through regular data reviews:** There is no one size fits all in SBC programming. It is therefore recommended that the NMEP's SBC program institutes a continuous, learning and adaptation (CLA) strategy. Given that partners implement malaria SBC interventions there is a need for effective collaboration and coordination among those partners and to create platforms for partners to learn lessons from the activities they implement and to adapt by dropping interventions that clearly do not work to those that have demonstrated potential to bring about the desired change. To ensure that CLA is inbuilt within the SBC strategy, the NMEP should deliberately hold regular data analysis to review progress in malaria indicators and to interrogate what is working and what is not working, and hold annual symposia for the harmonization, coordination and adaptation of interventions among partners.
- **Tailor SBC messaging and activities to the local transmission intensity:** Increasingly, areas of low transmission are showing lower levels of malaria knowledge. Luapula and Lusaka, for example, have very different epidemiological profiles. According to the 2021 MIS, in the former 74% of respondents recognized fever as a symptom of malaria; in the latter, only 41%. This is perhaps due to fewer interactions with health facility staff and CHWs about malaria. SBC must therefore be relevant to the local malaria burden. In higher burden areas the focus is on universal coverage and usage towards sharply reducing transmission. In areas of very low transmission there is the growing challenge of selling zero malaria. Health talks must remind audiences of the dangers of malaria resurgence, and CHWs must be trained and equipped to address more urgent health concerns. The benefits of no local transmission – no missing work or school, improved productivity – must continue to be emphasized and communities should celebrate their malaria-free status. This includes high profile events such as carving out malaria free zones led by local leaders and in partnership with the private sector.
- **Strengthen community engagement for community-led SBC actions:** communities must be at the center of the SBC strategy. The NMEP should therefore articulate its community engagement strategy which should include exploring institutionalization of proven approaches such as working with malaria community change agents and embedding them in the neighborhood health committees (NHCs) structures at the health facility level for enhanced community-based SBC activities, conducting community dialogues to overcome barriers to uptake and use of interventions, and systematize engagement of community, civic, and religious leaders. Community engagement will be the bedrock for verifiable ownership and sustainability of interventions, anchored on key behavioral data and community driven planning.
- **Media use:** ensure we segment the audiences to target for communication. Support local language programming that target appropriate individuals to push for the ending malaria agenda. Use community radio where available and cultivate relationships with media so there is regular media coverage of malaria activities beyond annual commemoration events.

- **Social Media:** There is need to develop a framework for social media and inclusion of social media as a communication channel in the SBC Strategy. With clearly defined target audience and an impact indicator that can be measured. In the MIS social media, SMS and other sources of malaria messaging are lumped together in the **Other** category. It is important to unpack those channels by province to understand how those platforms are being used.
- **Advocacy for awareness, innovation and resource mobilization is key to growing the partnership base.** In 2019, the formation of the End Malaria Council and End Malaria Fund helped to shine a brighter spotlight on fighting malaria and to coordinate a network of partners in support of NMEP priorities. This advocacy needs to be strengthened with regular data exchange with companies to provide feedback about their investment and to promote their brand on our channels (NMEC website, social media). There are also advocacy opportunities with the youth. Malaria data continue to show high levels of parasitemia and low levels of bed net use in school-age children. Schools therefore need student influencers to spread awareness and raise the profile of ending malaria with the next generation. These ambassadors can also help to push innovative malaria campaigns on social media.
- **Enhance partner coordination:** At national level the NMEP has constituted the Malaria SBC National Technical Working Group that focuses on ensuring that SBC interventions are technically sound and coordinated. Malaria SBC materials have an established process of TWG review, pre-testing and finalization. Still, there needs to be better standardization of materials by intervention and a central repository to maintain the latest materials and messages. The NMEC website has been proposed to acts as a repository for both MOH personnel and malaria partners at all levels. Malaria activities, however, do not enjoy the same level of coordination, especially at the subnational levels. It is recommended that the NMEP establishes a coordination mechanism at the provincial and district levels to minimize duplication, leverage partner resources, and maximize impact through partner cohesion. This can be led by the provincial and district health promotion teams.
- In view of the expanding malaria community (e.g. now includes World Vision, Rotary, private sector, FLAME, EMC, etc), there is need for NMEC-led orientation of messaging and materials for all malaria partners by way of standardised guidelines, training manuals and tool kits to guide partners on SBC approaches for sensitization, mobilization and community engagement.

6.6 Level of attainment of epidemic preparedness and response (EPR) outcomes

EPR is not covered explicitly in the NMESP. However, the NMEP has updated the National Malaria Policy that encompassed EPR among the other interventions and submitted it in early 2020 to the Ministry of Health of headquarters for review. The NMEP has also developed malaria EPR guidelines to support the NMESP and provide guidance for malaria epidemic and response in high, moderate, low, very low and zero transmission settings. The EPR draft guidelines were developed to direct the forecasting, early detection, prevention and control of malaria epidemic by providing a comprehensive and continuous tracking system and to measure targets against

set objectives. Epidemiological outcome indicators include; incidence rate and case-fatality rate. The indicators tracked were found to be appropriate.

Malaria is endemic in Zambia, and the levels of endemicity vary from place to place. In the past epidemics may have occurred in some areas, but due to unstable reporting and forecasting systems, these may have gone unnoticed thus baselines and targets for each EPR outcome indicator were not set and highlighted in MSP. Thus, it was not feasible to assess progress against targets. However, the EPR guidelines provided the criteria for epidemic detection based on the malaria strata for districts and health facilities.

In order to sustain the gains towards malaria elimination, the NMEP EPR guidelines have set the criteria for calculating epidemic thresholds based on malaria strata. Districts and Health facilities should detect malaria outbreak at the earliest possible time (within two weeks). NMEP has been scaling the weekly rapid reporting system to where it has not been rolled out to support early detection and response to malaria epidemics. The program envisioned to train all the provinces in malaria epidemic preparedness and response, however, only 2 out of 10 provinces were trained with support from E8, limited to border districts. Although no MSP EPR outcome targets were set, it was noted there has been a delayed response to surges in malaria cases. Once the EPR guidelines are implemented, pre and post-epidemic evaluations will be undertaken to guide future response to malaria epidemics.

6.6.1 Enablers and Constrainers

Enablers

- Availability of EPR guidelines
- Availability of real time surveillance system in the 1663 facilities where the MRRS has been instituted. Real-time surveillance is being scaled up to other facilities that have no MRR.
- Availability of projects and partners supporting the implementation of ITN, IRS and iCCM including The Global Fund, PMI, MACEPA, Rotary club, World Vision, mining companies and others. This will facilitate response to epidemics when they occur.

Constrainers

- Funding gap for EPR
- EPR not explicitly addressed in the NMESP
- Applicable districts not trained in malaria EPR, especially for border districts (particularly border facilities) in 3 provinces

6.6.2 Findings

- The new EPR guidelines were not fully finalized and disseminated to the districts.
- Only Malaria Elimination 8 (E8) supported EPR trainings particularly in border districts of 2 provinces
- There is no national contingency plan in place to respond to malaria epidemics

6.6.3 Conclusions

- NMEP revised and developed EPR guidelines in line with NMESP to maintain, mitigate and sustain the gains in malaria elimination.
- Real time and enhanced surveillance systems in place and being scaled up provide an opportunity for malaria epidemic early detection.

6.6.4 Recommendations

1. Finalize the EPR guidelines and disseminate to all stakeholders.
2. Develop a national contingency plan for malaria epidemics.
3. Budget and provide resources for EPR.
4. Train all the provinces in malaria EPR.
5. EPR should be explicit in the MSP, thus capture EPR in the current draft as new strategic and operational plan.
6. Track epidemics on a regular basis both at district and facility level.

6.7 Level of attainment of surveillance monitoring and evaluation and operational research (SMEOR) outcome targets

The objective of SMEOR is to strengthen the capacity to monitor and evaluate the performance of malaria programs and conduct evidence-based programming through research. It also provides timely and sound evidence to guide the implementation and policy-making process for malaria control and elimination in Zambia. There is currently no stand-alone document that outlines policy on SMEOR. However, these are contained in the malaria policy/strategies as outlined below:

1. The Monitoring and Evaluation section of the MOH shall have the overall responsibility of monitoring and evaluating the performance of the health sector including the NMEP.
2. Data shall be routinely collected using the HMIS. During the implementation of the NMESP, the HMIS shall be strengthened for the system to be able to produce good quality, timely, and reliable information.
3. In addition to the routine collection of data, there will also be studies commissioned by the MOH and partners to monitor progress in implementation of interventions and the impact such interventions are having. The ZDHS and MIS are examples of studies that are done every few years and these surveys collect information on impact level indicators.
4. The MOH, in consultation with partners, shall organize an annual joint review, which will review the progress being made in the implementation of the policy, strategic and operational plans and how challenges being experienced can be dealt with. All major stakeholders in the health sector including development partners, line ministries shall attend the AJR to account for their roles and responsibilities.

The strategies on operations research are:

1. Conduct periodic insecticide resistance monitoring in vector populations as well as determining the mechanisms responsible for this resistance;
2. Carry out therapeutic efficacy testing studies of anti-malarial treatments and diagnostic tools as per WHO protocols;
3. Commission studies on uptake of new and innovative malaria interventions in communities;
4. Provide effective channels of communication and dissemination of research findings;
5. Engage collaborating research institutions/partners to translate research outputs into policy implementation.

Furthermore, Research is carried out in accordance with the Zambia National Health Research Authority (ZNHRA) guidelines and in conformity with the national research priorities.

Progress and Appropriateness of SMEOR Outcome Indicators

The program outcome indicators data quality which include; completeness, timeliness and accuracy. For the period under review;

- The reporting rate increased from 71.3% in 2015 to 90% in 2020. Timeliness of reporting increased from 49.2% in 2015 to 68% in 2021. The SMEOR outcome indicators are appropriate, however, there is need to consistently ensure data is of high quality.
- The programme has adopted the MRRS to complement the national HMIS (in 1,954 health facilities)
- The Program has rolled out web-based scorecard that track malaria indicators
- The programme developed a monitoring and evaluation plan to track the implementation of the 2017 to 2021 NMESP.
- The programme developed a strategic operational research agenda to support evidence-based programming and has conducted research activities focused on evaluations of malaria elimination interventions.
- The NMEP also successfully conducted the 7th (2021) MIS to assess the coverage and performance of key interventions.

6.7.1 Enablers and Constrainers

Enablers

- A robust national surveillance reporting system (HMIS and MRRS) exists.
- The systems for data collection, reporting and use are institutionalised at all levels.
- Availability of an M& E plan
- Availability of the national research agenda
- Availability of partnerships/TWG

Constrainers

- There is limited dedicated human resources to implement M&E activities.
- Multiple reporting platforms
- Non-availability of standard data collection and reporting tools in some health facilities
- Data use culture not embraced
- Unavailability of reporting mobile phones in some health facilities

6.7.2 Findings

Zambia has systems in place for both routine and periodic data collection, reporting and use. Periodic surveys were conducted to assess coverage and performance of malaria interventions. Routine data sources include HMIS and the MRRS. Technological adaptation was achieved by rolling out the MRRS to all districts to capture vector control data and 86 districts to capture case management data. Progress has been made in utilizing DHIS2 to capture and integrate data from epidemiological and entomological sources (HMIS + MRSS +ento surveillance) as well as implementation data quality assurance. However, reporting systems from different sources are not fully harmonized. Data quality, demand and use is still a challenge in health facilities. The roles of MOH-M&E, NMEP, ZNPHI, and partners in Malaria data collection and management have not been clarified. Some beneficiaries preferring one intervention over the other for example some beneficiaries preferring ITNs over IRS.

6.7.3 Conclusions

Various malaria reporting systems are being utilised by MoH, NMEC and ZNPHI. Clarity and harmonisation are required so as to improve the capacity to monitor and evaluate the performance of malaria programs and conduct evidence-based programming through research. There is currently no stand-alone document that outlines policy on (SMEOR).

6.7.4 Recommendations

1. Harmonize the malaria data collection tools and reporting systems (Ministry of Health through the HMIS HIA1,2&4 reports, National Malaria Elimination Center using MRRS and ZNPHI through IDSR)
2. Clarify the roles of MOH-M&E, NMEP, ZNPHI, and partners in Malaria data collection and management.
3. Develop a policy/guidance document on SMEOR.
4. Roll out the MRRS to scale covering all health facilities in all districts
5. Conduct operational research and disseminate research findings and other learnings annually.
6. Institutionalize and strengthen the capacity for data collection, reporting and verification to improve data quality and data use at district level.

6.8 Functionality of programme management support system

6.8.1 Availability of policies and guidance

The program has been using the following documents to guide policy and programming

1. National Malaria Elimination Strategic Plan (2017-2021)
2. Draft Malaria Policy
3. National Communications Strategy (2017-2021)
4. National Malaria Surveillance, Monitoring and Evaluation Plan 2017-2021
5. Malaria Operational Plan 2020-2021
6. National Malaria Elimination Business Plan (2018-2020)
7. Mid-Term Review of the National Malaria Elimination Strategic Plan (2017-2021)
8. Guidelines for Diagnosis and Treatment of Malaria in Zambia, Fifth Edition 2017
9. National Guidelines for Larval Source Management, 2019

10. National ITN Guidelines, 2017
11. National DDT Guidelines for IRS, 2019
12. National IRS Guidelines, 2019
13. National Insecticide Resistance Management and Monitoring Plan, 2019
14. National Malaria Indicator Survey 2018
15. End Malaria Council Communication Framework 2019 - 2021
16. Community Health Worker Job Aid, COVID-19 and Malaria
17. Zambia National Health Strategic Plan 2017-2021,

Availability of legislative framework for malaria control

The program operates under The Public Health Act, Chapter 295 of The Laws of Zambia as the legislative framework for malaria control.

Existence of malaria manual

Zambia does not have one manual covering the programme but has separate guidelines for the intervention areas e.g. LLINs, IRS guidelines, Diagnosis and treatment guidelines, etc.

6.8.2 Appropriateness of programme structure/management systems

The programme has a structure at all levels of service delivery; central, provincial, district and community level with clear management systems. Not all districts have malaria elimination officers. The newly proposed structure for NMEC reduces staff numbers in key roles. Ongoing restructuring of the NMEC creates job insecurity and has potential to disrupt implementation. Not all provinces/districts have consistent partner support.

Placement of NMP within the MOH hierarchy

The National Malaria Control Centre (NMCC) was rebranded to National Malaria Elimination Centre (NMEC) by the Office of The President and continued to operate as a directorate reporting directly to the Permanent Secretary with its own budget line and ring-fenced funds for malaria commodities. In March 2021, it was proposed to be restricted to a sub directorate under the Directorate of Public Health. Malaria elimination still remains as a “legacy goal” of the ministry. It continues to have a separate budget line and has ring fence funds (IRS) under the budget line for commodities.

6.8.3 Availability and viability of programme governance and coordination

Monthly directorate meetings provide oversight and guidance in malaria programming. At the central level thematic technical working groups (Case Management, Vector control, SMEOR, SBCC) play a vital role in providing oversight and guidance. Provincial and District integrated review meetings provide oversight and guidance at sub national levels.

Task Teams meetings for specific areas (ex: IRS, LLINs campaigns, drugs and RDT commodities, MIS), separate from TWGs, are critical to coordinate partner spending and understand commitments.

The malaria programme has linkages with the Child Health and Safe motherhood units through participation in the technical working groups and direct collaboration. Other linkages involve Health Promotion unit, community health unit, clinical care department, M&E Unit and linkages with MSL to adjust commodity supplies for CHWs. The national malaria program has linkages with various stakeholders as follows:

1. Academia and research institutions – University of Zambia (UNZA), Tropical Diseases Research Centre (TDRC), Macha Research Trust (MRT) and other local and international institutions.
2. Bilateral and multilateral organizations – UNICEF, WHO, PMI, Global Fund
3. Non-governmental organisations (NGOs) – CHAZ, Akros, Isdell-Flowers, MAMAZ, ZINGO, PATH/Bill and Melinda Gates Foundation
4. Traditional and civic leaders
5. Private sector – Mining companies, Zambia Sugar,
6. GRID3 and Surveyor General’s office for campaign digitization
7. Zambia Statistics Authority
8. Line ministries: Education, Local government, etc.

Programme monitoring mechanisms

The programme employs various monitoring mechanisms at regional, national and sub-national levels as shown in **table 21**.

Table 21: Monitoring Mechanisms

| Mechanism | Frequency | Lead agency |
|--|-------------------------------|--|
| Mid-Term Review | Every 2.5 years | NMEC, WHO and Partners – All thematic groups |
| Directorate Meetings | Monthly | NMEC and partners –All thematic groups |
| Malaria score card | Quarterly | NMEC and ALMA- All thematic groups |
| National malaria program review | Annual, mid-term and end-term | NMEC |
| Provincial and district malaria review/planning meeting | Annual | Provincial and district health offices |
| Medium-term expenditure framework (MTEF) and data review meeting | Annual | MOH, Directorate of Budget and Planning |
| Performance review meeting | Quarterly | NMEC - SMEOR?? |
| End user verification | Quarterly | NMEC and PMI – CM, PSM |
| Routine HMIS and surveillance | Quarterly | MOH and NMEC M&E |
| Data quality audits | Quarterly | MOH and NMEC M&E |
| Periodic household surveys | variable | NMEC -SMEOR |
| Partner M&E requirements and site visits | Quarterly/annual | NMEC and partners |
| E8 situation room | Monthly | NMEC and E8 Secretariat – M&E |

6.8.4 Availability and viability of partnership and donor coordination mechanisms

The malaria programme receives support from various partners who are coordinated through the monthly directorate meeting and technical working groups. Monthly directorate meetings have proven viable especially during the COVID 19 virtual transition. Task Forces also play a critical role in coordination. Quarterly coordination meetings are held to support and coordinate

implementation. The Global Fund application and grant-making process, and the PMI malaria operational plan (MOP) processes are extensive and consultative exercises for coordinating partners and making funding decisions. Partners and donors also have separate implementation meetings for coordination among cooperating partners. These supplement the monthly directorate meetings. There has been some evolution in this process over the course of the strategic plan.

6.8.5 Delivery of appropriate inputs, outputs or services

The National Malaria Elimination Strategic Plan 2017-2021 was supported by two malaria operational plans, one for 2017-2019 and the second for 2019-2021. To guide the implementation of NMESP, the program developed a Malaria Monitoring and Evaluation (M&E) Plan and implementation guideline for different thematic areas. Below is a list of intervention guidelines which were developed during the performance period:

- Guidelines for Diagnosis and Treatment of Malaria in Zambia 2017 5th Edition
- Insecticide Resistance Management and Monitoring Plan in Zambia (IRMMP)
- Guidelines for Indoor Residual Spraying 2019
- Guidelines on the Distribution and Utilisation of Long-Lasting Insecticide –treated nets for Malaria Prevention 2017 Edition
- Guidelines for Larval Source Management 2019
- DDT guidelines for Indoor Residual Spraying 2019

6.8.6 Enablers and Constrainers

Enablers

- NMEC is positioned as a Directorate within the MoH
- Malaria is prioritized as a legacy goal by the Ministry of Health
- Creation of malaria elimination officers
- Strong and committed partnership
- Good linkages among the partners
- New partners approaching the program in an open manner, making it easier to align with existing plans

Constrainers

- Financial commitments have not matched the ambitions
- Staffing levels not fully realized as there are gaps between plans and current status at subnational and national levels. Some of the positions are only filled for administrative convenience (not confirmed) while other play dual roles.
- The central level NMEP staff include a mix of government and partner supported personnel thus presenting administrative or supervision challenges.
- COVID situation created a number of challenges (meetings, field work, shipping/supply chains)

6.8.7 Findings

- Benefitted by engaging with the regional bodies such as E8 and SADC
- Need for consistent partner support across provinces, it would be helpful to define what the support should be and make it consistent
- The various partner support to programs creates management challenge (different partners support different areas and variable magnitude).

- Implementation rate of the planned NMESP activities and MTR recommendations was low.

6.8.8 Conclusions

The National Malaria Elimination Program in Zambia is one of the strongest in the SADC region because of various contributing factors. These include continued political support and country ownership, evidence-based programming, and success in mobilising resources. Other key areas that have made its functionality a success include integration and decentralisation of malaria elimination at lower levels including community health worker network which facilitates community involvement and participation. Various tools, linkages, coordination and governance, program monitoring and partnerships have been developed to deliver services at all levels

6.8.9 Recommendations

1. Continue regular monthly Directorate meetings
2. Task Teams meetings for specific areas (ex: IRS, LLINs campaigns, drugs and RDT commodities, MIS), separate from TWGs, are critical to coordinate partner spending and understand commitments
3. To strengthen the portfolio of the NMEP there is need to complete appointments on the staff establishment (payroll) at various levels
4. Resource mobilisation to meet gaps in program needs e.g. for staffing and implementation support.

7.0 Programming implications of the lessons learned in the implementation of the NMESP 2017-2021

7.1 Lessons learned

Epidemiological and entomological impact

- Trained CVC will ensure quality data is generated.
- Timely and regular disbursement of funds will ensure smooth collection of mosquitoes for identification, quantification, testing and analyzing.
- Availability of equipment, supplies, PPEs and favourable conditions is key to quality collections.
- Need to form and operationalise the Data Management Committee
- The TAC process supports decision making in vector control

Financing

- Adequate funding key to increased level of implementation.
- Harmonised work plan at all levels important to achieve the 2-ones principle of partnership management namely One Plan and One monitoring and Evaluation Mechanism.
- Establishment of the End Malaria Council (EMC) and End Malaria Fund (EMF) has helped to expand domestic resource mobilisation.
- Government health expenditure (GHE) levels has implications on availability of funds trickling down to malaria programs.

LLINs

- Sufficient availability of ITNs within a household is essential for increased use among all household members.
- Sustaining high ITN coverage, between periods of mass distribution campaigns, is vital for malaria elimination.
- Mass ITN campaigns are one of the quicker ways of improving household net ownership.

IRS

- Involvement of traditional and influential leaders in mobilisation and community engagement leads to high coverage due to low refusal rates.
- IRS implementation before the onset of the rains, leads to high coverage.
- Early release of funds leads to timely procurement of IRS commodities and implementation of IRS.
- Adherence to COVID-19 guidelines opened opportunities for innovation such as outdoor recruitment and training.
- Deployment of Community Based IRS Delivery Model helped to improve IRS acceptance and coverage
- Inclusion of NHCs in spray teams leads to improved community acceptance of IRS and easy navigation to all the villages within the target community.
- Use of bicycles in terminal period of the campaign reduces the cost of transport which is a major cost driver.
- Provision of airtime to spray personnel (Team leaders, Supervisors and storekeepers) improves communication.

Chemoprophylaxis (IPTp)

- Since IPTp is delivered via ANC, any disturbances in ANC attendance disrupts IPTp delivery.
- There is need for close collaboration between malaria program and MNCH to ensure optimal ANC attendance.
- Commodity security (for SP) is key to sustain high IPTp3 coverage.

Case Management (diagnosis and treatment)

- Gaps in commodity supply has direct consequences on capacity to early detect and appropriately treat malaria.
- Deployment of the trained CHWs has potential to improve prompt access to malaria treatment and prevent incidence of severe malaria, especially in remote areas.

PSM

- Forecasting and quantification approaches have a bearing on the accuracy of the quantity of commodities.
- Maintenance of recommended buffer stock is critical especially in times of surges or interruption in supply chains.
- Monitoring performance of the PSC is required.

SBCC

- Knowledge does not always translate into behaviour change.
- Need to begin to assess effectiveness of the messaging
- Information needs may vary hence targeting populations becomes critical
- Inconsistent partner coordination especially at subnational level.
- Other thematic areas working in isolation results in reduced uptake of interventions because of inconsistent messaging and lack of SBC representation in all TWGs.
- Lack of standardized tools for SBC reporting hampers impact measurement of SBC interventions
- Need to balance advocacy around ending malaria with more traditional malaria control messaging in higher burden areas
- Messaging needs to better reflect the national strategic plan approach of appropriate intervention packages based on the five malaria transmission risk levels (0-4) in Zambia
- For motivation, regularly recognize active and impactful traditional leaders, companies, district/facility officers and CHWs.
- Need standardization of malaria materials across partners and coordinated by NMEC

EPR

- EPR is paramount to sustain the gains for malaria elimination. The failure to respond to sudden malaria surges eroded the gains that were made towards malaria elimination. Most of the facilities that were in level 1 and 2 slid back to level 3 and 4.
- As long as EPR is not explicitly framed in strategic plans for malaria, no outcome targets will be set and contingency plans will not be in place to respond to malaria epidemics. In

the absence of planning, no funds will be committed to respond to malaria epidemics preparedness and response.

SMEOR

- No harmonized malaria reporting systems (e.g., Ministry of Health through the HIA1,2&4 reports, NMEC using MRRS and ZNPHI through IDSR) therefore no consistency.
- Inbuilt thresholds in the malaria surveillance platforms would easily flag suspected epidemics.
- Explicitly set measurable targets and indicators in all intervention areas which will be easily tracked to quantify progress.
- Intensify data quality audits at community level with the experience learned from the drop-in reporting rates and also rise in malaria cases.
- Harmonised health facility assessments for malaria are required to inform planning.

Program management

- Low funding levels, disruptions in procurement and supply constrain attainment of NMESP targets.
- The COVID pandemic (and any such future health threats) requires the malaria program to innovate and adapt in line with prevailing national and global guidance to continue providing essential services but also ensure safety of health care workers and the people they serve.
- Human resource capacity strengthening and ensuring the trained staff have access to essential commodities and supplies is key to facilitate implementation of activities at all levels.
- Partnership coordination is critical for efficient service delivery.

7.2 Future strategic directions recommended

- ❖ Malaria elimination is still the goal in line with the global malaria elimination strategy.
- ❖ In view of the Zambia NMEP capacity to generate quality information, country level information will be key to inform the strategic direction and operations as the country reaffirms its commitment to a malaria free Zambia.
- ❖ Review ambition levels using lessons learned from implementing NMESP 2017-2021.
- ❖ The NMEP to set up realistic targets taking cognisance of the current capacity (finances, HR, systems, etc.) of the programme in Zambia and lessons learned from implementing the just ended strategic plan.
- ❖ Update the technical strategy where relevant and appropriate changes in tactical approach.
- ❖ Implement strategies to improve financing levels commensurate with programme needs including strengthening financial management systems, expanding domestic and external sources of funding
- ❖ Expand internal sources of funding to not only improve predictability of funding but also sustain malaria elimination efforts.
- ❖ Given the increase in Constituency Development Funds (CDF) and in line with the implementation of the decentralisation policy under the new government, explore expanding the role of local government in malaria elimination.

- ❖ Expand external partner support as there is need to continue to improve financing levels for procurement, technical assistance and operations.
- ❖ Strengthen CSO and private sector engagement at various levels.
- ❖ The program will maintain and continue to engage with the various local and international partners through a coordinated and transparent manner.
- ❖ Adaptation of innovations in service delivery and technology as more tools and approaches become available.

- ❖ Breakthroughs in malaria vaccines present an opportunity to expand the package of malaria interventions.

- ❖ Recognising the expansion of iCCM, ensure community level commodity security as a priority while improving PSM at all levels.

- ❖ Harmonise the incentive/enabler package for CHWs.
- ❖ Expand and sustain, entomologic surveillance sites across the country, building on the IRMM system.
- ❖ Identify and incorporate entomological indicators in the new MSP
- ❖ Improve the resilience of the program to external shocks (e.g. natural disasters, disease outbreaks, social/political disruptions, etc.) so as to avoid disruptions in the delivery of malaria services
- ❖ Strengthen PSM by improving forecasting and quantification to improve availability of essential malaria commodities including forecasting for outbreaks.
- ❖ Develop a national contingency plan for malaria epidemics.
- ❖ Vector control interventions require a change in strategy as well as improving delivery.
- ❖ Case management strategy to be maintained but improve delivery.
- ❖ Explore collaborations with stakeholders to improve blood transfusion services as part of improving capacity to manage severe malaria.
- ❖ Roll out MDA in elimination settings.
- ❖ Ensure equity in service delivery by addressing gender, youth, people with disabilities (WDs) and track progress in inclusivity.
- ❖ Address financial and social barriers for access to malaria prevention and treatment interventions.
- ❖ Harmonize the malaria reporting systems, clarify roles of stakeholders and harmonise data collection tools.
- ❖ Review and update an OR agenda in support of the new strategic plan.
- ❖ Shift from a communications strategy to a comprehensive SBC strategy
- ❖ Strengthen programmatic approach and financing of SBCC to improve appropriate utilisation of malaria prevention and control interventions.
 - There is need for SBC to be incorporated into all thematic areas for improved uptake of interventions with consistent messaging and better service delivery with provider behaviour.
 - Ensure consistent SBC representation in all TWGs
 - Target priority populations with specific campaigns

- ❖ Tailor malaria messages and activities based on burden, mirroring the transmission intensity and intervention package table with one that details appropriate SBC activity(ies) and metrics.

- ❖ Standardise/Improve tools for SBC reporting and impact measurement and incorporate global best practices/existing tools
 - Apart from the MIS there is need to support other SBC studies to guide the programme on effective implementation.
 - Adopt global best practices and toolkits for measuring impact of our SBC interventions, beginning at the design stage
 - Expand scope of indicators (e.g., include IRS, IPTp), and with a more behavior-focus, and set realistic targets
 - Trial regular collection, analysis and visualization of SBC data for decision makers so as not to wait for the next MIS or DHS.
 - With data malarial partners or cell service providers, use current technology for inexpensive (or corporate sponsorship) survey collection and analysis
- ❖ Improve the tracking and reporting of SBC interventions at all levels, from service delivery points to central level
- ❖ Improve the resilience of the program to external shocks (e.g. natural disasters, disease outbreaks, social/political disruptions, etc.) to avoid disruptions in the delivery of malaria services.
- ❖ In order to strengthen the capacity of the NMEP to implement activities, there is need to improve staffing, financing, infrastructure and equipment at various levels.

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9.0 Annexes

Annex I: Timelines for the MPR Process March 2021 to January 2022

| S/N | Item | Dates |
|------------|--|---------------|
| 1 | Develop concept note | March 2021 |
| 2 | Submit concept for approval | March 2021 |
| 3 | Thematic Desk reviews | November 2021 |
| 4 | Retreat 1 | December 2021 |
| 5 | Validate Field Findings | January 2022 |
| 6 | Retreat 2 – To Consolidate findings | January 2022 |
| 7 | Retreat 3 - MPR Report -finalisation | February 2022 |
| 8 | Submit MPR | February 2022 |
| 9 | Aide Memoir (Developed, approved and signed) | February 2022 |

Annex II: List of Sampled Validation Sites

| Province | Validation Team Members | Sites – District (Health Facilities) |
|---------------|--|---|
| Central | Dr Wajilovia Chilambo Malaria Field Officer NMEC Dr. Anthony Yeta Assistant Director (TS) NMEC Mr. Teddy Wakunuma P/MEO PHO Ms. Maileny Ndubakwenda SBCC NMEC Mr. Dingani Chinula Malaria Specialist E4H Mr. Yohane Phiri Project Assistant E4H | - Kabwe (Kasanda Urban Health Centre, Railway Surgery, Bwacha, Kawama) - Mumbwa (Nangoma Mission Hospital, Chiwena Rural Health Centre, Shimbizhi Rural Health Centre, Kabwanga Rural Health Centre) |
| Luapula | Mr. Alex Chilabi – Principal Malaria Control Officer, Larval Source Management, NMEC Mr. Tedious Chimombe- Pharmacist/Logistician, NMEC Mr. Mateyo Moyo- Chief Environment Health Officer, Provincial Health Office Dr. Mulakwa Kamuliwo | - Mansa District Health office (Fimupulu RHC, Katangwe RHC, Mwela RHC and Mwanguni RHC) - Chembe District Health Office (Chembe RHC, Lukola RHC, Kundamfumu RHC and Fikombo RHC) |
| Lusaka | Ms. Thandi Makawa, NMEC Ms. Ketty Sichelwe, NMEC Dr. John Banda, GF PMU | - Lusaka District Health Office (Chawama Hospital, Matero Hospital, Chilenje Hospital, Chelstone Hospital) - Luangwa District Health Office (Feira HC, Mandombe HC, Luangwa HC, Mphuka HC) |
| Muchinga | Mr. Kentzo Mumba – Chief Vector Control Officer (NMEC) Mr. Bernard Mwansa- Chief Environmental Health Officer (PHO-Chinsali) Mrs. Martha Mulenga – Logistic Officer (NMEC) | - Chinsali District Health Office (Lubwa Mission Health Centre, Chinsali HAHC and Nkula Health post) - Mpika District Health Office (Kamwanya Health Post, Mpika Urban Health Centre and Tazara Health Post) |
| Southern | Dr. Emmanuel H. Kooma, Vector Control Specialist NMEC Ms. Pauline Wamulume, SBCC Officer, NMEC Mr. Wilson Kapenda, Senior Health Promotion Officer, MOH | - Choma District Health Office (Sikalongo RHC, Hampande UHC, Masuku Terminal RHC) - Zimba District Health Office (Nakowa RHC, Zimba Mission Hospital, Muzya RHC) |
| Eastern | Dr. Stephen Bwala – Case Management Officer, NMEC Mr. Japhet Chiwaula- Principal Biostatistician, NMEC Mr. Jacob Chirwa- Biomedical Scientist, NMEC | - Lundazi District Health office (Chijemu RHC, Kapichila RHC, Lundazi UHC, and Mwase Lundzi RHC) - Chipata District Health Office (Makungwa RHC, Katandala RHC, Katambo RHC and Madzimoyo RHC) |
| North Western | Mr. Willy Ngulube – Principal Malaria Control Officer, NMEC Mr. Joseph Mponda - Logistician, Global Funds - GF-PMU) - MOH. | - Solwezi – Nkulumazhiba RHC and Maheba RHC - Mishindano – St Dorothy Mission |
| Northern | Mr. Ignatius Banda - NMEC Mr. Reuben Zulu - NMEC Mr. Alex Kulungwe | - Kasama District (Chisanga Urban Health Centre, Location Urban Health Centre, Mwamba Rural Health Centre and Lukupa Rural Health Centre) - Mbala District (Chilongoma Urban Health Centre, Kaluluzi Health Post, Kawimbe Rural Health Centre and Tulemane Urban Clinic) |
| Copperbelt | Mr. Moonga Hawela - MOH -NMEC Ms. Mercy M. Ingwe – MOH – NMEC Mr. Kingsley Kapemfu – Copperbelt PHO | - Ndola (Chipokota Mayamba, Kabushi, Kawama, New Masala) - Mufulira (Luansobe, Chibolya, Mufulira council clinic) |
| Western | Mr. Donald Mukumbuta – NMEC Mr. Deovelant Daka - PMU Mr. Emmanuel Phiri – PHO Ms. Precious Moonde – DHO Senanga Mr. Mabvuto Nyirenda – DHO Mongu | - Mongu - Simulombe Health Centre - Senanga – Litambya and Itufa RHC |
| National | Dr. Mutinta Mudenda Ms. Victoria Kalota, Dr. Caroline Phiri, Dr. Paul Psychas, Ms. Jennifer Somtore, Dr. Todd Jennings | - Lusaka - PS Technical Services, MOH |

Note: In each of the sampled sites, apart from the district and facility level, further consultations were held with Community Health Workers, Community Health Assistants and community members.

Annex III: Core Task Team Members

- **NMEC**
 - Dr. Mutinta Mudenda
 - Dr. Busiku Hamainza
 - Dr. Anthony Yeta
 - Dr. Stephen Bwalya
 - Ms. Pauline Wamulume
 - Ms. Thandi Makawa
 - Dr. Emmnauel Kooma
 - Mr. Japhet Chiwaula
- **PMI – Dr. Paul Psychas**
- **PMI – Ms. Jennifer Somtore**
- **PMI-E4H - Mr. Dingani Chinula**
- **MACEPA - Dr. John Miller**
- **PAMO+ - Dr. James Banda**
- **WHO- Dr Freddie Masaninga**
- **GF/PMU – Dr. John Banda**
- **Consultant - Dr. Pascalina Chanda-Kapata**

Annex IV: Key Reference Documents

- Updated national malaria control database and maps;
- Malaria control documents:
- National malaria control strategy;
- Malaria Mid-term review report;
- Annual national malaria control business plans;
- GFATM proposals and reports;
- District annual malaria operational/business plans; partners plans and reports;
- Other malaria project plans and reports;
- Reports of technical support missions; Reports of supervisory visits;
- Malaria technical policies, guidelines and tools;
- Published articles and literature;
- Reports of surveys, studies, researches and other sources of data;
- National policies & frameworks relevant to malaria control
- Zambia National Health Strategic Plan;
- Medium Term Expenditure Framework (MTEF);
- Zambia Demographic Health Surveys;
- Population census reports);
- Hard and electronic copies of guidelines and tools for field interview

Annex V: List of Stakeholders

| Name | Designation | Organisation | Mobile Number | Email | Thematic Area |
|--------------------|-----------------------------|---------------------|----------------------|-------------------------|--|
| Dr Mutinta Mudenda | Director | NMEC | 0971584486 | mmutinta@yahoo.com | All thematic areas |
| Dr Anthony Yeta | Assistant Director (TS) | NMEC | 0966763570 | anthonylyeta@yahoo.com | Diagnosis and treatment, Malaria commodities procurement supply management, Malaria prevention and treatment in pregnancy and Malaria Vector Control |
| Dr Busiku Hamainza | Ag. Assistant Director (PM) | NMEC | 0977941761 | bossbusk@gmail.com | Program Management, SBCC , Epidemic and emergency preparedness and response, Epidemiology, surveillance, monitoring, evaluation and response |
| Dr JJ Banda | Senior Advisor | PATH | 0965436129 | jbanda@path.org | Policy, Strategy and Management |
| Dr EH Kooma | Vector Control Specialist | NMEC | 0973977780 | emmanuel.kooma@mail.com | Vector Control/SBCC/EPR |
| Dr Oliver Lulembo | Consultant | PMI | 0973996470 | Lulemboo@gmail.com | Capacity to implement, Outcome targets attainment & Recommendations |
| Ignatius Banda | Surveillance Officer | NMEC | 0977808896 | blestbanda@gmail.com | SMEOR/EPR/SBCC |

| Name | Designation | Organisation | Mobile Number | Email | Thematic Area |
|---------------------------|-----------------------------------|---------------------|----------------------|---------------------------------|---|
| Dr Mohamed Bayoh | Entomology Technical Manager | PMI VectorLink | 0966071174 | mohamed_bayoh@pmivectorlink.com | Vector Control/SMEOR |
| Kafula Silumbe | Senior Program Manager | PATH | 0969774238 | ksilumbe@path.org | SMEOR, Vector Control or Program Management |
| Kochelani Saili | Research Scholar/ Entomologist | icipе/NMEC | 0966-699456 | kochelani.saili@gmail.com | Malaria vector Control |
| Victoria Kalota | Project Coordinator/S TA | PMI IM | 0978778468 | vkalota@mcd.org | Diagnosis and treatment/Program Management |
| Dr Caroline Phiri-Chibawe | Chief of Party | PAMO Plus | 0977778854 | cchibawe@path.org | Malaria prevention and treatment in pregnancy or program management |
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Annex VI: Expenditure by Partners and major intervention areas

| Cost Driver/Activities | Amount for Commodities (USD) | Amount for operations (USD) |
|--|-------------------------------------|------------------------------------|
| 2017 LLINs Mass Campaign | | |
| AMF | 5,140,035.00 | |
| GF | 6,040,345.18 | 2,903,019.72 |
| GRZ | | |
| PMI | 1,769,742.50 | |
| | | |
| 2020 LLINs Mass Campaign | | |
| AMF | 13,287,551 | |
| GF | 20,801,650.89 | |
| GRZ | 0 | |
| PMI | 3,087,200 | |
| | | |
| LLIN continuous distribution | | |
| GF | | |
| 2017 | 0 | 0 |
| 2018 | 633,271.18 | 0 |
| 2019 | 965,082.14 | 34,303.85 |
| 2020 | 0 | 0 |
| 2021 | 0 | 519,013.44 |
| PMI | | |
| 2017 | | |
| 2018 | 2,280,000 | 700,000 |
| 2019 | 2,000,000 | 730,000 |
| 2020 | | |
| 2021 | 2,124,000 | 350,000 |
| | | |
| Toyota Zambia | 19,761 | |
| | | |
| Indoor Residual Spraying | | |
| Global Fund/GRZ | | |
| 2017 Actelic | 11,670,750.00 | 5,765,750.00 |
| 2018 Actelic | 12,141,073.00 | 3,237,111.00 |
| 2019 Clothianidin based (Sumishield + Fludora Fusion) | 10,504,684.50 | |
| 2019 DDT | 2,125,676.00 | 8,539,623.66 |
| 2020 DDT | 6,030,764.60 | |
| 2020 Clothianidin based (Sumishield + Fludora Fusion) | 7,843,120.75 | 4,053,435.40 |
| 2021 Clothianidin based (Sumishield + Fludora Fusion) | 9,736,253.75 | 8,807,241.07 |
| FQML | | |
| 2020 | | 172,430 |
| PMI (figures include both operational and commodity cost) | | |
| 2017 | 8,294,500 | |
| 2018 | 11,950,000 | |
| 2019 | 8,264,500 | |

| Cost Driver/Activities | Amount for Commodities (USD) | Amount for operations (USD) |
|---|-------------------------------------|------------------------------------|
| 2020 | 8,575,000 | |
| 2021 | 8,300,000 | |
| Mass Drug Administration | | |
| MACEPA | | |
| 2017 | 1,236,000 | 253,600 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| GRZ | 0 | 0 |
| 2020 | 0 | 0 |
| 2021 | 0 | 0 |
| | | |
| TECHNICAL ASSISTANCE(Consultancy) | | |
| ALMA | 0 | 50,000 |
| RBM | 0 | 10,000 |
| WHO | 0 | 10,000 |
| RESEARCH | | |
| AFRO II | 0 | 300,000 |
| PRO-ACT | 0 | 1,000,000 |
| PMI - Net Durability Study, EMLIP, Forecasting ACTs and RDTs, in 2018 | 0 | 1,000,000 |
| PMI - Net Durability Study,2019 | 0 | 10,000 |
| PMI DCHI assessment | 0 | |
| ATSB | 0 | |
| MIS 2018 | | |
| PMI | 0 | 400,000 |
| GF | 0 | 83,192.30 |
| GRZ | 0 | 25,714 |
| | | |
| MIS 2021 | | |
| GF | 0 | 289,500.51 |
| GRZ | 0 | 47,380 |
| PMI | 0 | 400,000 |
| | | |
| Antimalarial drugs (ACTs) | | |
| GRZ | | |
| 2017 | 3,318,265 | |
| 2018 | 3,489,178 | |
| 2019 | 3,533,688 | |
| 2020 | 98,504 | |
| 2021 | | |
| | | |
| PMI | | |
| 2017 | 4,830,834 | |
| 2018 | 3,800,000 | |
| 2019 | 2,400,000 | |
| 2020 | | |
| 2021 | 4,349,500 | 5,303,000 |
| | | |
| GF | | |
| 2017 | 1,937,326 | |
| 2018 | 9,500,221 | |

| Cost Driver/Activities | Amount for Commodities (USD) | Amount for operations (USD) |
|-------------------------------|-------------------------------------|------------------------------------|
| 2019 | 3,467,997 | |
| 2020 | 3,467,997 | |
| 2021 | 3,016,027 | |
| RDTs | | |
| GRZ | | |
| 2017 | 0 | |
| 2018 | 0 | |
| 2019 | 1,635,941 | |
| 2020 | 0 | |
| 2021 | 0 | |
| | | |
| PMI | | |
| 2017 | 3,434,281 | |
| 2018 | 967,330 | |
| 2019 | 740,000 | |
| 2020 | 2,599,103 | |
| 2021 | 3,713,500 | |
| | | |
| GF | | |
| 2017 | 8,815,841 | |
| 2018 | 2,201,107 | |
| 2019 | 2,357,009 | |
| 2020 | 8,454,034 | |
| 2021 | 3,794,850 | |