Government of the Republic of Zambia
Ministry of Health

MID-TERM REVIEW OF THE NATIONAL MALARIA ELIMINATION STRATEGIC PLAN (2017–2021)

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Executive summary

Malaria continues to be a major public health problem in Zambia. This is despite significant reductions in disease burden over the last decade. The Zambian Ministry of Health, through its National Malaria Elimination Program (NMEP) has made a bold decision to eliminate local transmission of malaria by the year 2021. This is guided by the National Malaria Elimination Strategic Plan 2017–2021 (NMESP) whose goals are to eliminate local malaria infection and disease, maintain a malaria free status and prevent reintroduction and/or importation of malaria into areas where the disease has been eliminated. These goals are envisioned to be achieved through the pursuit of the following specific objectives:

a) Increase the implementation rate of interventions from 36 percent in 2015 to 95 percent by 2018.
b) Reduce malaria incidence from 336 cases per 1000 population in 2015 to less than 5 cases per 1000 population by 2019.
c) Increase the malaria-free health facility catchment areas (HFCAs) from 0.5 percent in 2015 to 100 percent in 2021.
d) Reduce malaria deaths from 15.2 deaths per 100,000 in 2015 to less than 5 deaths per 100,000 population by 2021.
e) Achieve 100 percent malaria-free status by 2021.
f) Maintain 100 percent malaria-free status, following 2021.

The guiding principles of the elimination strategy are to lower transmission in high transmission areas, further reduce malaria in low transmission areas to elimination levels, and use surveillance data to direct programme implementation using the HFCA as the unit of intervention deployment/implementation. The programme deploys both preventive and curative interventions. The key preventive interventions are long-lasting insecticide treated nets (LLIN), indoor residual spraying (IRS) and intermittent presumptive treatment in pregnant women (IPTp). The curative interventions are prompt diagnosis and treatment of malaria at health facility and community levels. These interventions are supported by social and behaviour change communication (SBCC), monitoring and evaluation, and programme management. Additionally, research findings are also used to implement evidence-based programming. The programme has also adopted transmission "accelerators" such as mass drug administration (MDA) for community level parasite clearance in eligible HFCAs. This is in addition to reactive case detection triggered by index case identification at health facility and community level in low transmission areas.

The NMEP conducted a Mid-Term Review (MTR) of the elimination strategy in between February and May 2019. This period covered three phases of the MTR, which included planning, thematic desk reviews, and validation. The MTR was an evidence-based assessment of the implementation of the NMESP mid-way through the duration of the plan. The aim of the MTR was to assist the malaria programme in understanding the extent of the elimination strategy implementation and refocus the strategy if needed to achieve the set goals. The specific objectives of the MTR were to:

a) Assess the progress of the National Malaria Control Programme towards the epidemiological and entomological impact targets of the elimination strategy at mid-term.
b) Review the level of financing of the NMEP at mid-term.
c) Review the capacity of the NMEP to implement planned activities at mid-term.
d) Review the attainment of programme outcome targets at mid-term.
e) Define the programming implications of the lessons learned in the implementation of the elimination strategic plan for the remaining period to achieve the set goal of the plan.

The MTR process revealed that significant progress was made in reducing malaria mortality from 15.2 per 100,000 population in 2015 to 7 per 100 000 population in 2018, exceeding the target which was set at 9 per 100,000. Despite an upsurge experienced in 2016, progress has been made in reducing malaria incidence from 382 per 1000 population in 2016 to 311 per 1000 in 2018. However, this fell short of the target of 191 per 1000 in 2018. Entomological inoculation rates (EIR) dropped for both *An. gambiae* and *An. funestus* from 0.15 to 0.00 and 0.99 to 0.41 respectively. The NMEP has a financial gap of approximately US$100 million, primarily driven by integrated community case management and MDA. This is despite an increase in malaria funding from both government and partners. In order to increase advocacy and resource mobilization, the End Malaria Council (EMC) was established in the first half of 2019. Vector control coverage increased as evidenced by the proportion of households with at least one insecticide-treated net (ITN) and/or sprayed by indoor residual spraying (IRS) in the last 12 months which increased from 78 percent in 2015 to 84 percent in 2018 (MIS 2018). Additionally, the NMEP conducted a mass distribution campaign of long-lasting insecticide treated nets (LLINs), maintained coverage, and piloted and rolled out school based LLIN distribution. The coverage of intermittent presumptive treatment reduced due to stock-outs of sulphadoxine pyrimethamine (SP) to 43 percent for more than 3 doses. MDA coverage also remained low with coverage only in Southern and Western provinces. There was steady and good progress in SBCC indicators, however there was a need to understand the lack of progress on the indicator on prompt care seeking behaviour which dropped from 25% in 2015 to 22% in 2018. The NMEP has not yet rolled out enhanced surveillance to scale as per the elimination strategy with 13,414 CHWs trained in enhanced surveillance out of a targeted 19,000.

The MTR recommended that the progress made on reduction of malaria mortality be sustained. Additionally, it was also recommended that the NMEP adopt the use of incidence and not prevalence as an indicator of malaria burden for HFCAs. Taking note of the disparities on population estimates between official statistics and headcount, the MTR recommended that the NMEP adopt headcount to plan for programming and use official statistical population projection for estimation of key indicators. In order to achieve the intended targets, the NMEP should strengthen resource mobilisation. To increase efficiency, sustainability, and ownership, operational planning and management of malaria interventions should be decentralised to the provinces, districts, health facilities and communities. In order to improve access to vector control interventions eligible structures for IRS must be enumerated prior to the annual campaigns, community-based IRS should be implemented where applicable, and during mass LLINs distribution campaigns, the door to door approach should be used to distribute nets. To increase assess to prompt and effective diagnosis and treatment the programme should take advantage of the increased capacity to train community health workers (CHWs), accelerate CHW training and deployment to achieve saturation. As per elimination strategic plan, MDA should be scaled up to all eligible areas and referral treatment for severe malaria using rectal artesunate should be increased. The programme should collate the various data sets into a central repository to enhance programme implementation and ensure that the enhanced malaria surveillance package is scaled up.

The findings and recommendations of the MTR will input into the development of an updated Malaria Operational Plan and a National Malaria Elimination Strategy.

Foreword

The 2019 Mid-Term Review (MTR) of the National Malaria Elimination Strategic Plan (NMESP) 2017–2021 provides a good opportunity to assess progress made against set targets, identify key challenges hindering progress and recommend improvements for enhancing programme performance to assure impact.

The MTR was conducted by the Ministry of Health in collaboration with The Global Fund to Fight AIDS, Tuberculosis and Malaria (GF), the President's Malaria Initiative (PMI), PATH-Malaria Control and Elimination Partnership in Africa (MACEPA) and the World Health Organisation (WHO) between April and June 2019.

This MTR has revealed that the 2016 End Term Review recommendations were fully adopted and implemented, the implementation rate has increased from 36 percent in the previous strategic plan to 89 percent of activities planned in the period under review, and the malaria morbidity and mortality has declined. The malaria programme also reported notable progress on domestic resource mobilisation.

I am confident that Zambia, with partnership support and innovative approaches for leveraging resources, is well positioned to attain the malaria elimination targets.

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Acknowledgements

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Abbreviations

ACT	artemisinin-based combination therapy
AL	artemether-lumefantrine
ANC	antenatal care
CHW	community health worker
CSO	Central Statistical Office
DDT	dichlorodiphenyltrichloroethane
EIR	entomological inoculation rate
EMC	End Malaria Council
HBR	human biting rate
HFCA	health facility catchment area
HMIS	health management information system
iCCM	integrated community case management
IPTp	intermittent preventive treatment in pregnancy
IRS	indoor residual spraying
ITN	insecticide-treated net
kdr	knockdown resistance
LLIN	long-lasting insecticidal net
LSM	larval source management
MACEPA	Malaria Control and Elimination Partnership in Africa
MIS	malaria indicator survey
MOH	Ministry of Health
MRR	malaria rapid reporting
MTR	Mid-Term Review
NMEC	National Malaria Elimination Centre
NMEP	National Malaria Elimination Programme
NMESP	National Malaria Elimination Strategic Plan
PMI	President's Malaria Initiative
RAS	rectal artesunate
RDT	rapid diagnostic test
SBCC	social and behaviour change communication
SMEOR	surveillance, monitoring, evaluation and operations research
SP	sulphadoxine-pyrimethamine
TWG	technical working group
UNICEF	United Nations Children's Fund
WHO	World Health Organisation

Chapter 1: Introduction

1.1   Background: country profile and malaria situation

1.1.1   Country profile

Zambia is a land-locked country located in Africa, south of the Sahara. It covers a surface area of approximately 752,612 square kilometres, and shares borders with the Democratic Republic of Congo and Tanzania in the north, Malawi and Mozambique in the east, Zimbabwe and Botswana in the south, Namibia in the southwest, and Angola in the west. The country is divided into ten provinces and 116 districts with Lusaka district being the administrative capital. Lusaka and Copperbelt provinces are predominantly urban, while the rest of the provinces are mostly rural.

The country experiences two main seasons, the rainy season (November to April), and the dry season (May to October). The dry season is subdivided into the cool dry season (May to August), and the hot dry season (September to October). The modifying influence of altitude gives the country a pleasant subtropical climate. Rainfall varies over a range of 500 to 1400 millimetres annually. The average temperature in summer is 30°C and in winter it can get as low as 5°C. The highest rainfall is in the north, decreasing towards the south. The driest areas are in the river valleys, such as South Luangwa and lower Zambezi.

1.1.2   Malaria situation

Malaria is endemic in Zambia and transmission occurs year round with peak transmission during the rainy season, between November and April. Malaria is caused by the four main Plasmodium species that infect humans, namely *Plasmodium falciparum*, *Plasmodium malariae, Plasmodium ovale and Plasmodium vivax. Plasmodium falciparum* accounts for 98 percent of all infections and causes the severest form of malaria.

The species of mosquitoes responsible for malaria transmission in Zambia are members of the *Anopheles gambiae* complex and the *Anopheles funestus* group. The main vector species are *Anopheles gambiae* s.s.*, Anopheles funestus* and *Anopheles arabiensis*.

The National Malaria Elimination Programme (NMEP) has identified five malaria transmission intensity levels with a set of intervention packages for each level. These levels range from no local transmission (level 0) to very low (level 1), low (level 2), low to moderate (level 3), and high (level 4), (i.e., greater than 500 per 1000 population per year, as outlined in Table 1). The country undertakes a stratification exercise annually for all health facility catchment areas (HFCA), the most recent of which is depicted in Table 1.

Table 1. Transmission intensity levels and proposed intervention packages and actions in Zambia.

LEVEL	MALARIA INDICATOR	INTERVENTION PACKAGE/ACTIVITIES	ACCELERATOR
LEVEL 0	0 cases, no local transmission	No malaria, maintenance of malaria-free zone • High quality surveillance and vigilance • Vector control and case management • Epidemic Preparedness package • Case investigation capacity maintained • Chemoprophylaxis	
LEVEL 1	1–49 cases/1,000 population/yr; Typical range <1% parasite prevalence	Very-Low malaria transmission • High quality surveillance • Vector control (possibly enhanced) • Community and facility-based case management • Case and foci investigation	• Mass drug administration
LEVEL 2	50–199 cases/1,000 population/yr; Range 0.5%–<5% parasite prevalence	Low malaria transmission • Build high quality surveillance • Vector control (possibly enhanced) • Community and facility-based case management • Establish case and foci investigation capacity	• Mass drug administration
LEVEL 3	200–499 cases/1,000 population/yr; Range 5%–<15% parasite prevalence	Moderate malaria transmission • Improve quality surveillance • Vector control (possibly enhanced) • Facility-based case management; build community case management and outreach • Establish case and foci investigation capacity	• Mass drug administration (may be considered for specific areas with case investigation capacity) • Enhanced vector control if relevant
LEVEL 4	>500 cases/1,000 population/yr; Range >15% parasite prevalence	High malaria transmission • Build quality surveillance • Vector control to high coverage (100% coverage of IRS or sustained high coverage of LLINs) • Facility-based case management; begin to build community case management and outreach • Prepare for case and foci investigation capacity	• Prepare for mass drug administration • Enhanced vector control if relevant

1.1.3 Mid-Term Review process

By 2019, the National Malaria Elimination Strategic Plan (NMESP) 2017–2021 was due for mid-term review to enable the programme to conduct an evidence-based appraisal of the malaria situation and programme performance with the purpose of strengthening the programme for better results and impact. The Mid-Term Review (MTR) evaluated the systems used to deliver interventions and proposed solutions for bottlenecks and barriers. The Zambian NMEP used this process in mid-2019 to reset the malaria agenda in the medium term.

1.1.3.1 Review objectives

The objectives of the MTR were to:

a) Assess the progress of the NMEP towards the epidemiological and entomological impact targets of the NMESP at mid-term.
b) Review the level of financing of the NMEP at mid-term.
c) Review the capacity of the NMEP to implement planned activities at mid-term.
d) Review the attainment of programme outcome targets at midterm.
e) Define the programming implications of the lessons learned in the implementation of the NMESP for the remaining period to achieve the set goal of the plan.

1.1.3.2 Review phases

The MTR involved the following phases, Phase 1 (planning), Phase 2 (thematic desk review), and Phase 3 (validation). Phase 4 (programme strengthening) will be undertaken upon adoption of this report.

i.   Phase 1 - planning phase
      This phase involved the following steps:
      • Appointment of the Task Team to coordinate the MTR process.
      • Development of a concept note.
      • Development of the roadmap and resource mobilisation plan for the MTR process.

ii.   Phase II - thematic desk review
       The thematic desk review involved the following steps:
       - Creation of thematic groups.
       - Holding a desk review retreat.
       - Production of a thematic analysis report.
       - Submission of thematic analysis report to external reviewers.

iii.   Phase III: validation
       This phase involved the following steps:
       - Validation and building upon thematic review reports through national level consultations and sub-national field visits conducted by internal and external reviewers.
       - Retreat to review findings and recommendations and to consolidate the MTR draft report.

iv.   Phase IV: programme strengthening
       This phase will be completed after the preparation of this report and will involve the following steps:
       - Adoption of the MTR report.
       - Updating of the NMESP.
       - Development of a malaria policy document.
       - Dissemination of the MTR report.
       - Development of a NMEP Operational Plan 2019–2021.

Chapter 2: Overview of the NMESP 2017–2021[1]

The goal of the NMESP is to interrupt malaria transmission, eliminate infections, and maintain zero transmission locally. This will be achieved through:

- Strengthening the capacity to plan and implement budgets, execute payments on schedule, and to rapidly reallocate or mobilise funds to deal with unexpected events.
- Sustaining the national political support, technical and operational capacity, and financial resources for malaria elimination.
- Ensuring the collection and use of timely evidence to guide programme implementation and assess outcomes and impact.

2.1   Vision, mission, goal and objectives

Vision: To attain a malaria-free Zambia.

Mission: To facilitate equity of access to quality-assured, cost-effective malaria prevention and control interventions close to the household.

Goal: 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.

 Objectives:
- Increase the implementation rate of interventions from 36 percent in 2015 to 95 percent by 2018.
- Reduce malaria incidence from 336 cases per 1000 population in 2015 to less than 5 cases per 1000 population by 2019.
- Increase the malaria-free HFCAs from 0.5 percent in 2015 to 100 percent in 2021.
- Reduce malaria deaths from 15.2 deaths per 100,000 in 2015 to less than 5 deaths per 100,000 population by 2021.
- Achieve 100 percent malaria-free status by 2021.
- Maintain 100 percent malaria-free status following 2021.

Assumptions around implementation and changes in prevalence

 Implementation is assumed to be completed according to the following schedule:
- 2017: Routine work, continuing efforts to increase use of long-lasting insecticide treated nets (LLINs) and indoor residual spraying (IRS) at 30 percent coverage nationally.
- 2018: IRS at 50 percent coverage in epidemiological level 2 through 4, and mass drug administration (MDA) at 80 percent coverage in level 2; case investigation scale-up in places eligible for MDA next year, and ongoing case investigation in level 0 through 2.
- 2019: IRS at 50 percent coverage in level 2 through 4 and MDA at 80 percent coverage in level 2; case investigation scale-up in places eligible for MDA next year, and ongoing case investigation in levels 0 through 2.
- 2020: IRS at 50 percent or higher coverage in levels 1 through 3; ongoing case management and investigation in lower-level catchments to drive towards elimination.
- 2021: IRS sustained at high coverage, ongoing identification and treatment of cases, almost all

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[1] Pg. 9 and 37 of the NMESP 2017 to 2021

catchments reach elimination.
- It is assumed that the combination of IRS and MDA will result in 85 percent annual decreases in prevalence, with IRS at 50 percent coverage resulting in 65 percent declines in prevalence and Component D coverage resulting in 35 percent declines in coverage. Catchments are assumed to move into elimination after one year of exposure to Component D.

Chapter 3: Progress towards the epidemiological and entomological impact

3.1   Epidemiological impact at mid-term

The NMESP set the following targets:
- Reduce malaria prevalence to less than 5 percent in 50 percent of HFCAs by end of 2018.
- Reduce deaths by 20 percent of 2015 baseline by end of 2018.
- Reduce malaria incidence from 336 cases per 1000 population in 2015 to less than 5 cases per 1000 population by 2019.
- Reduce malaria deaths by 30 percent of 2015 baseline by end of 2019.
- At least 50 percent of HFCAs report, zero locally transmitted cases by end of 2019.

The NMEP Operational Plan 2017–2019 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   Progress on epidemiological targets of the NMESP

Zambia has made progress in reducing the malaria mortality rate, a trend which has continued for the past decade. The rate reduced from 15.2 deaths per 100,000 population in 2015 to 7 deaths per 100,000 in 2018 representing a 55 percent reduction, which exceeded the target of 20 percent by end of 2018. Additionally, prevalence reduced from 17 percent in 2015 (MIS) to 9 percent in 2018. Equally malaria incidence rate reduced from 336 per 1000 population in 2015 to 312 per 1000 in 2018 (HMIS). However, the target of 191 per 1000 population for 2018 has not been achieved as shown by Table 2.

Table 2. Targets and achievement on malaria incidence and mortality (2015–2019).

Key performance indicators	Baseline 2015	Achievement 2016	Target 2017	Achievement 2017	Target 2018	Achievement 2018	Target 2019
Malaria incidence (clinical & confirmed) per 1000 population	336	382	325	374	191	311	115
Inpatient malaria deaths per 100,000 persons	15.2	11	10	8.4	9	7	8

3.1.2   Assessment of appropriateness of impact indicators

The NMESP 2017–2021 and the Monitoring and Evaluation Plan, outline indicators to measure impact. Epidemiological impact indicators include; incidence rate, mortality rate and prevalence rate. These indicators 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.

3.1.3   Trends in malaria cases

In 2016 and 2017, malaria cases increased from the 2015 baseline but declined in 2018, however this was still slightly higher than 2015. This is shown in Table 3.

Table 3. Malaria Cases 2015 to 2018.

Year	2015	2016	2017	2018
Malaria Cases	5,204,596	6,077,713	6,128,691	5, 248,366

(Source: HMIS 2015 -2018)

3.1.4   Parasite species distribution

The predominant parasite species remains *Plasmodium falciparum* at 98 percent. The other three species are *P. vivax*, *P. malariae* and *P. ovale*, which collectively constitute 2 percent.

3.1.5   Malaria transmission risk map and stratification

The source for risk or burden data for stratification purposes in Zambia, is the health management information system (HMIS) and the malaria rapid reporting system (MRR) through the National Malaria Elimination Centre (NMEC). In addition, a combination of modelled spatial population estimates, and HFCA boundaries developed from facility locations and population density are used to develop risk maps. Figure 1 shows the stratification in 2018.

Figure 1. Malaria Incidence by health facility catchment area 2018.*

Cases per 1,000 (2018)
- Level 0 (0-5)
- Level 1 (5-50)
- Level 2 (50-200)
- Level 3 (200-500)
- Level 4 (500+)
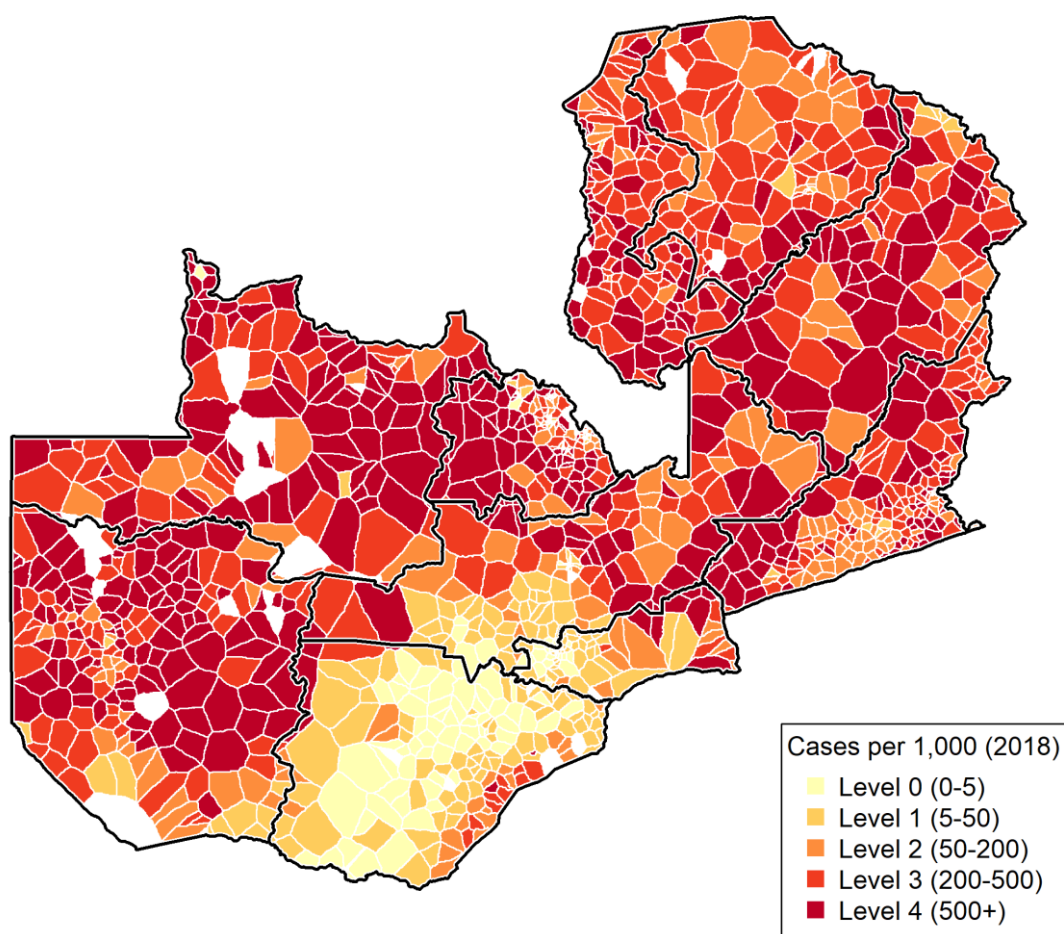
* White areas in Figure 1 indicate a lack of data, either reported malaria burden or population denominators

3.2 Entomological impact at midterm

The NMEP assesses the following entomological indicators: vector species composition, distribution, feeding, resting, seasonality, susceptibility to insecticides, resistance mechanisms, sporozoite rates, parity, insecticide decay rates, larval density and habitant occupancy.

These indicators allow the NMEP to measure entomological impact.

3.2.1 Entomological Inoculation Rates

A reduction in entomological inoculation rates (EIRs) has been documented in *An. gambiae* s.l. and *An. funestus* in Zambia. Figure 2 provides a summary of EIRs in sprayed (intervention) and unsprayed (control) areas of Luapula, Muchinga, Eastern, Central and Northern provinces.

Figure 2. Entomological inoculation rates (EIR) in major vectors of malaria in Luapula, Eastern, Central and Northern Zambia (November 2017 to March 2018).
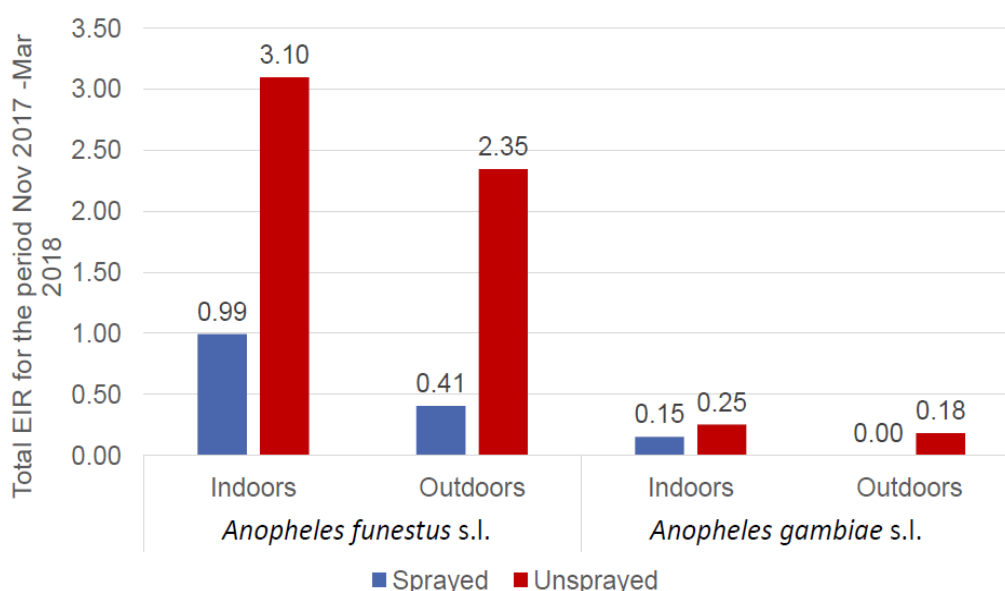
- Total *An. funestus* s.l. indoor EIR was three times lower at the sprayed sites
- Total *An. funestus* s.l. outdoor EIR was more than five times lower

3.2.2 Changes in vector behaviour

The main vectors for malaria in Zambia are *An. funestus s.s., An. gambiae s.s.* and *An. arabiensis. Anopheles gambiae* s.s. and *An. funestus* s.s. are highly endophagic (feed indoors) and anthropophagic (feeds on humans), while *An. arabiensis* is considered zoophagic (feeds on animals) and exophagic (feeds outdoors). Mixed blood meal sources of humans and animals are increasingly being documented with *An. gambiae* s.s. and *An. funestus* s.s. feeding on human and goat in Luapula Province while *An. arabiensis* was found feeding on humans, goats, and cow in Southern Province. Traditionally the three vector species bite humans between 22:00 and 04:00 hours. Observations from Southern Province suggest behaviour modification in *An. funestus* biting outdoor between 18:00 and 21:00 hours.

3.2.3 Trends of malaria vector bionomics

The primary species are *An. funestus* s.s.*, An. gambiae* s.s. and *An. arabiensis. An. funestus* is the predominant species across the country except in Southern Province where predominant species is *An. arabiensis* and Copperbelt Province where the predominant species is *An. gambiae s.s.*

Secondary vectors include *An. coustani, An. squamosus* and *An. rufipes* in Southern and Western provinces. The programme recently updated the vector distribution map as shown Figure 3.

Figure 3. Malaria vector distribution map.
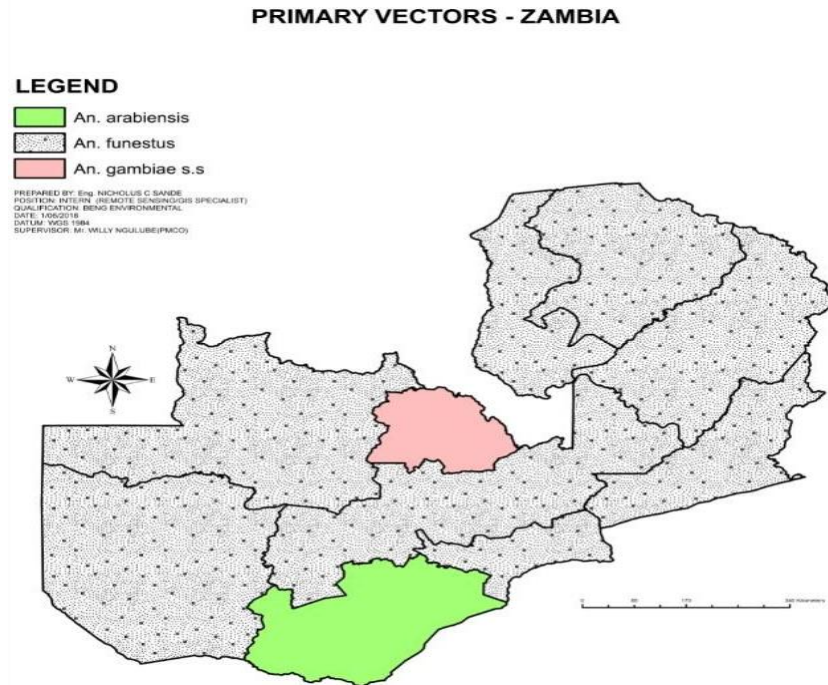
Vector species composition

Vector species composition in the study areas comprises the sibling species *An. funestus* group and *An. gambiae* s.l. as shown in Figure 4. There was no significant change in the sibling species with the species complexes/groups from November 2017 through March 2018. In southern Zambia, the same species of Anopheles mosquitoes have been documented with a decline in proportions of *An. funestus* s.s. and an increase in *An. arabiensis*.

Figure 4. Vector species composition from Luapula, Muchinga, Eastern, Central and Northern Provinces of Zambia (November 2017 to March 2018).
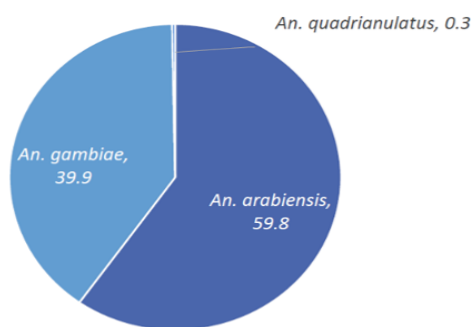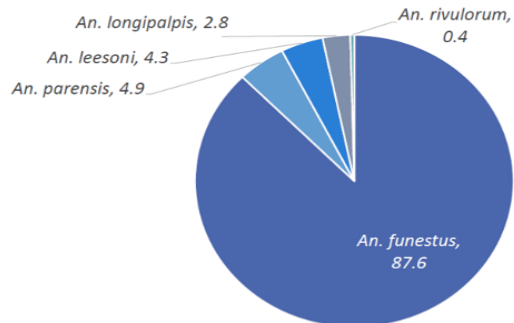
Human biting density

The indoor human biting rate (HBR) of *An. funestus* s.l. in the sprayed sites was 62 percent lower than the control during the pre-spray period. During the period 0 to 5 months after IRS, the average indoor HBR of *An. funestus* s.l. in the sprayed sites (6.41 bites/person/night) was about 66 percent lower than the indoor HBR in the control sites (18.9 bites/person/night). Figure 5 summarises the HBR of *An. funestus* in intervention and control sites.

Figure 5. Biting rate of *An. Funestus* s.l. collected by human landing catches in intervention and control sites (August 2017 to July 2018).
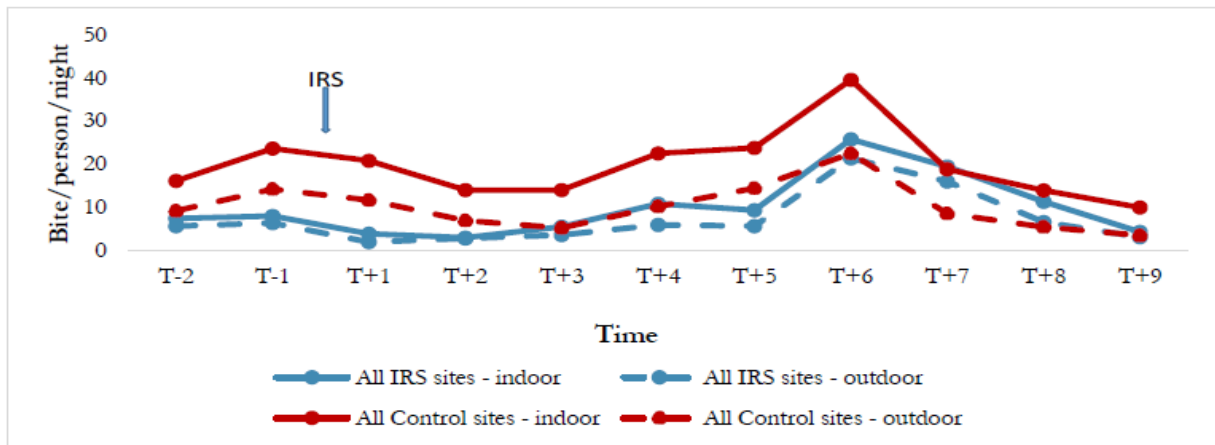
The mean HBR of *An. Gambiae* s.l. was low before IRS—0.02 bites/person/night indoors and 0.01 bites/person/night outdoors in the sprayed sites, and 0.1 bites/person/night indoors and outdoors in the control sites. Figure 6 provides the total HBR of *An. Gambiae* s.l. for all the control and sprayed sites from August 2017 to July 2018 which were similar.

Figure 6. Biting rate of *An. Gambiae* s.l. collected by human landing catches in intervention and control sites (August 2017 to July 2018).
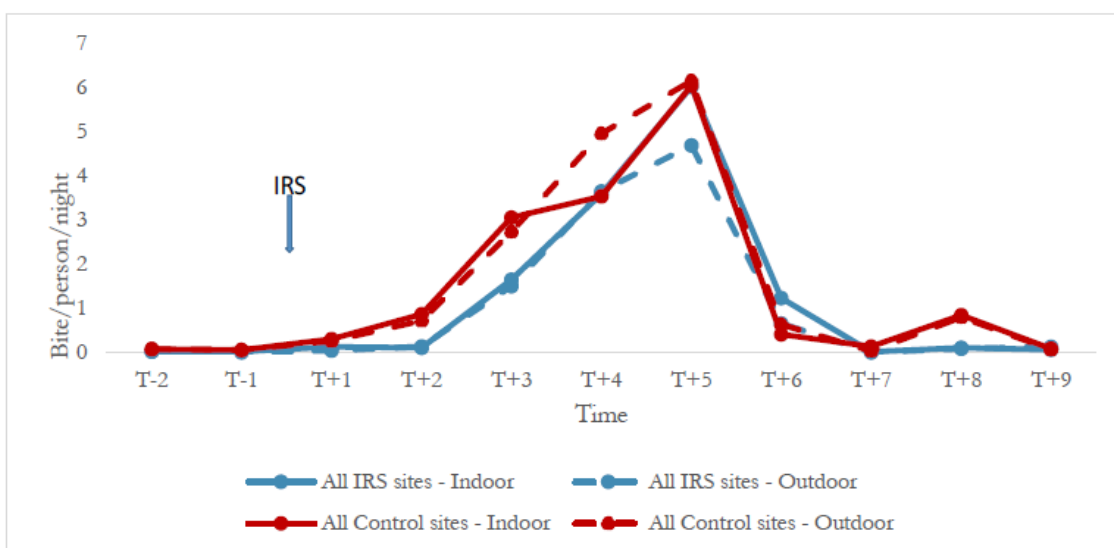
3.2.4   Insecticide resistance: status and mechanisms

Since the 1970s, Zambia has used various insecticides starting with organochlorines (dichlorodiphenyltrichloroethane (DDT)), followed by pyrethroids, carbamates and organophosphates. Resistance to pyrethroids and organochlorines was documented in 2010 and to carbamates in 2012. From 2014 to date, both *An. gambiae* s.l. and *An. funestus* have shown high susceptibility to the organophosphate (pirimiphos methyl). Since 2017, it has been documented that *An. gambiae* s.l. and *An. funestus* susceptibility to DDT and bendiocarb has been restored in some parts of the country such as Southern, Northern, Central, Eastern and Luapula provinces as shown in Figure 7. Resistance to pyrethroids and carbamates continues to be documented in *An. gambiae* s.l. and *An. funestus* in some areas of country.

Figure 7. Susceptibility of *Anopheles funestus* in Luapula, Muchinga, Eastern, Central and Northern provinces (August 2017 to July 2018).
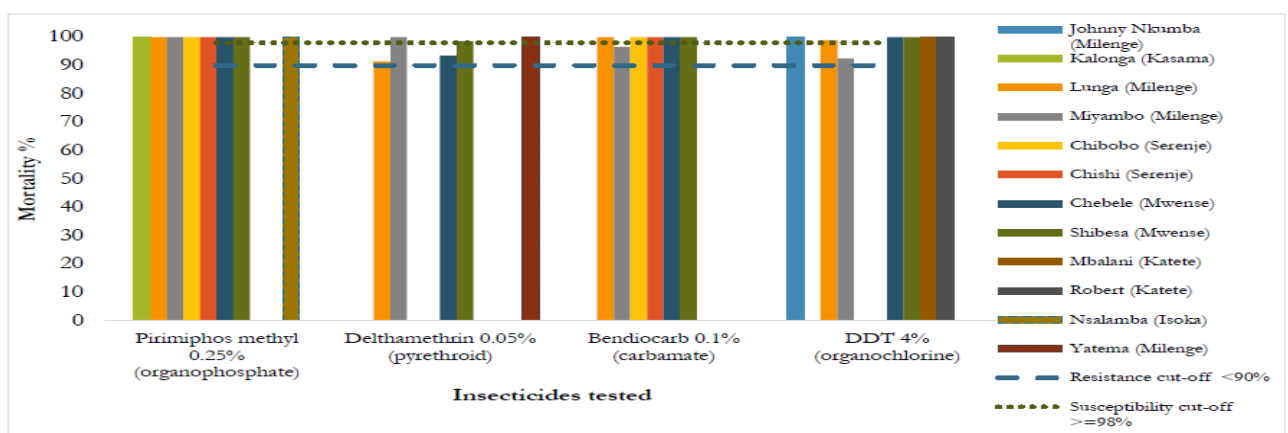
The susceptibility data of *An. gambiae* s.l. and *An. funestus* from Luapula and Muchinga provinces has shown complete susceptibility to neonicotinoids (Clothianidin) as summarised in Figure 8 below.

Figure 8. Susceptibility status of *An. Funestus* s.l. and *An. gambiae* s.l. collected from Isoka and Mwense to SumiShield (Clothianidin) in February 2018.
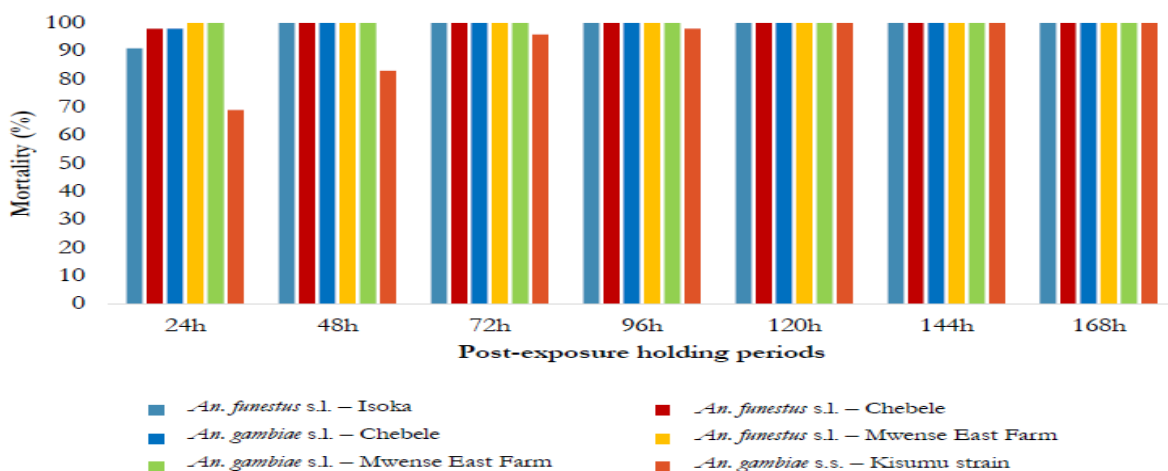
In Zambia two resistance mechanisms; target site (knockdown resistance (kdr)) and metabolic (p450 enzyme) have been documented. West kdr resistance has been documented in *An. gambiae* s.s. and cytochrome p450 monooxygenases in *An. funestus* populations*.

The country has developed the Insecticide Resistance Management and Mitigation Plan and continues to monitor mechanism of insecticide resistance. The findings above are based on data generated from a limited number of sentinel sites. There is a need to expand these sites to get a full epidemiological profile.

3.2.5 Appropriateness of entomological impact indicators
The entomological impact indicators are appropriate. These include entomological inoculation rates, sporozoite rates, vector density and human biting rate.

3.2.6 Conclusions and recommendations
Epidemiological impact

Conclusions:
a) Significant progress was made in reducing the malaria mortality from 15.2 per 100,000 population in 2015 to 7 per 100,000 population in 2018, exceeding the target which was set at 9 per 100,000.
b) Following an upsurge experienced in 2016, progress has been made in reducing malaria incidence from 382 per 1000 population in 2016 to 311 per 1,000 in 2018. However, this fell short of the target of 191 per 1000 in 2018.
c) The review was unable to obtain data on prevalence by HFCA because it would require surveys at HFCA level. National malaria indicator surveys (MIS) provide provincial level estimates but does not provide HFCA prevalence.
d) Furthermore, the reliability of both incidence and mortality rate indicators are somewhat hampered by challenges with population denominators which are known to have often discrepancies between official Census estimates and local head counts conducted by health officials.

Recommendations:
a) Sustain progress in reducing malaria mortality.
b) An urgent need to address the contributing factors that led to not achieving the target.
c) The NMEP should use incidence by HFCA as an indicator.
d) The NMEP should use head count for programme implementation and Central Statistical Office (CSO) population for indicator estimates.

Entomological impact
Conclusions
a) The following changes have been documented:
   - Reduction in EIR.
   - Vector species composition: suppression of *An. funestus* and an increase in *An. arabiensis.*
   - Biting behaviour: *An. Funestus* has changed its biting behaviour from indoor to outdoor.
   - Changes in insecticide resistance profile of malaria vectors.

Recommendations
a) Increase fully operational sites for entomological surveillance.

Chapter 4: Programme capacity to implement planned activities

4.1 Adoption of the recommendations from the End Term Review of the National Malaria Strategic Plan 2011 to 2016

All eight recommendations from the End Term Review were adopted and were fully implemented.

1. Elevate the NMEP from a sub-Directorate to a full Department/Directorate.
2. Ensure adequate staffing structure for the programme that responds to the malaria elimination needs.
3. Develop innovative mechanisms to improve domestic investments in malaria control including mobilising funds from the corporate/private sector.
4. Establish a mechanism for meaningful engagement with partners (e.g., WHO, UNICEF, PMI, DFID) to discuss malaria elimination issues on a regular basis.
5. Strengthen the capacity of the malaria elimination programme to generate, interpret and use data for evidence-based decision making and action (harmonise the different reporting systems).
6. Strengthen broad-based partnerships for better impact (harness comparative advantage).
7. Integrate partner projects fully within national plans and operations.
8. Translate the renewed commitment to increased domestic funding for malaria control activities.

4.2 Implementation rate of planned NMESP activities

The objective set forth in 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 MTR findings show that 89 percent of the planned activities for the period under review were implemented.

Figure 9 shows performance by intervention, implementation was as follows:

Figure 9. Summary performance by strategic action

Strategic Action 1:	**Strengthen capacity of the National Malaria Elimination Programme to implement planned activities**	**80**
Strategic Action 2:	**Strengthen the management of malaria cases**	**64**
Strategic Action 3:	**Strengthen IRS implementation capacity in all eligible HFCAs**	**86**
Strategic Action 4:	**Strengthen entomological surveillance**	**30**
Strategic Action 5:	**Strengthen larval source management**	**47**
Strategic Action 6:	**Improve ownership and use of ITNs**	**69**
Strategic Action 7:	**Strengthen the surveillance system at all levels (19,000 CHWs, 2,400 health facilities, 106 districts, 10 provinces and national levels)**	**33**
Strategic Action 8:	**Strengthen monitoring and evaluation**	**71**
Strategic Action 9:	**Strengthen operational research**	**49**
Strategic Action 10:	**Strengthen the capacity to implement social behavioural change**	**28**

Chapter 5: Effectiveness of the health system in delivering malaria services

5.1 Programme management system

The strategic plan calls for:

- Strengthening the capacity to plan and implement budgets, execute payments on schedule, and to rapidly reallocate or mobilise funds to deal with unexpected events.
- Sustaining the national political support, technical and operational capacity, and financial resources for malaria elimination.
- Use of timely evidence to guide programme implementation.

5.1.1 Programme structure/management systems

In 2017 the National Malaria Control Centre was elevated to a Directorate and renamed as National Malaria Elimination Centre (NMEC). The elevation to a Directorate has strengthened the capacity to plan and implement budgets, execute payments on schedule, and to rapidly reallocate or mobilise funds to deal with unexpected events. The NMEC is led by a Director and assisted by two Assistant Directors: Technical and Programme Management. There has been an increase from 40 (13 technical) to 52 (29 technical) staff at central level. At the district level, the position of Malaria Elimination Officers has been approved. However, at the provincial level there continues to be an administratively designated malaria focal point.

5.1.2 Programme governance and coordination

To strengthen governance and coordination, the NMEC has introduced monthly directorate meetings, harmonised the malaria work plan across partners and developed an online management tool to enable more transparent reviews of progress throughout the year. Technical working groups (TWGs) have been streamlined to vector control, case management, and surveillance, monitoring, evaluation and operations research (SMEOR). They are meeting on a quarterly basis. The Mid-Term Expenditure Framework technical updates have been restructured to reflect national, provincial, district, health facility and community levels following the NMEC work plan model. Coordination at sub-national level has been strengthened through re-energising and/or creation of Malaria Task Forces at provincial, district and community levels. At the national level task teams are created as need arises to address specific programmatic needs.

5.1.3 Enablers and constraints

Enablers:

- Existence of a separate malaria budget line within the national budget.
- Timely disbursement of The Global Fund to the principal recipients (MOH and Churches Health Association of Zambia) upon retirement.
- An established malaria programme structure and management system with core staffing is in place.
- Established and functional TWGs.
- Existence of viable coordination mechanisms, including partner coordination.
- A five-year strategic plan (2017–2021), operational plan (2017–2019), business plan (2018–2020) and national guidelines are available to guide programme implementation.
- An electronic management tool has been established to harmonise malaria work plans among all partners in the NMEP and track programme implementation and key performance indicators at all levels.
- Existence of the End Malaria Council (EMC) for resource mobilisation.

Constraints:

- Funding gap for planned interventions.
- Delayed retirement of funds by sub-recipients (provinces and districts) of The Global Fund, leading to delayed disbursements.
- Inadequate staff at all levels of the health care system.
- Inadequate equipment, including vehicles, at all levels.
- Over centralisation of programme implementation within the NMEP.

5.1.4   Conclusions and recommendations

Conclusions:

a. The National Malaria Elimination Business Plan 2018–2020 estimated a gap of approximately US$100 million. The drivers were integrated community case management (iCCM) and MDA (Business Plan, p. 22).
b. Planning and implementation of some activities still concentrated at a central level.

Recommendations:

a. Strengthen resource mobilisation.
b. Decentralise operational planning and management to the provinces and districts.
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5.2   Programme financing analysis

5.2.1   Trends of budgetary allocation to the health sector within national budget

Government allocation to the health sector increased by 40 percent from ZMW 5.8 billion (8.9 percent of the total national budget) in 2017 to ZMW 8.4 billion (9.3 percent of the total national budget) in 2019.

5.2.2   Trends of budgetary allocation to malaria programming within the health sector

Government funding to the NMEP increased from 0.7 percent (US$0.7 million of US$99.3 million) in 2017 to 47 percent (US$14.3 million of US$175.1 million) in 2019 of the total annual financing needs.

5.2.3   Trends of partner financial contributions to malaria programming

Zambia continued to benefit from partner support. PMI provided support through funding projects approximately US$25m per year (2015–2017), increased to $30m per year (2018–2019). The Global Fund provided a US$69 million grant covering 2018–2020 and an additional US$12 million portfolio optimisation fund. PATH/MACEPA (Bill & Melinda Gates Foundation funding) provided US$6 million per year. In addition to country technical support, the WHO has also committed a total of US$500,000 per year.

Against Malaria Foundation provided 3,023,550 LLINs for the 2017 mass campaign. Additional support has been received from Southern Africa Development Community E8, Isdell-Flowers Cross Border Malaria Initiative, mining companies and Zambia Sugar.

5.2.4   Conclusions and recommendations

Conclusion

During the period under review, malaria funding both from government and partners has shown some increase but the resource gap for achieving the goals remains. The EMC, an intersectoral body has been established with a mandate for advocacy and to mobilise resources. In the first half of 2019 it has established a secretariat and is beginning to pursue innovative financing.

Recommendation
The NMEP should continue to harness and explore innovative mechanisms to improve domestic investments in malaria elimination.

5.3 Malaria vector control

Integrated vector management is recommended for controlling vector borne diseases. IRS and LLINs, are the core interventions in Zambia. These are complemented by larval source management (LSM), entomological surveillance and monitoring. Zambia is also exploring other vector control innovations such as baited traps.

5.3.1 Policies and guidelines

The NMEP has a policy of effective universal vector control coverage with the key primary malaria prevention interventions: LLINs and IRS. The current NMEP guidance for LLIN and IRS campaign planning is to cover 50 percent of the population with LLINs, and 50 percent with IRS, allowing for a 10 percent overlap in order to minimise gaps. Additional interventions such as LSM will be deployed where applicable. In this regard, the programme has already developed guidelines for all vector control interventions.

5.3.2 Progress in vector control indicators

Progress in vector control indicators is shown in Table 4 below.

Table 4: Intervention coverage indicators.

Indicators	2015 Baseline	2018 Target	MIS 2018 results
Percent of HHs with at least one insecticide-treated net ITN	74	100	80
Percent of HH members who slept under ITN the previous night	53	80	64
Percent of HHs with at least one ITN per sleeping space	62	100	47
Percent of pregnant women who slept under an ITN the previous night	N/A	100	71
Percent of children ages 0–59 months who slept under an ITN the previous night	56	100	69
Percentage of women of reproductive age group who slept under an ITN the night before	58.2	80	NA
Percentage of households with an ITN-to-Sleeping space ratio of at least 1:1, among household with at one ITN	63.9	100	N/A
Percentage of households with at least one ITN and/or sprayed by IRS in the last 12 months	78	100	84
Proportion of structures sprayed against the eligible structures	35	90	55
Proportion of the population protected with IRS against the total population	N/A	50	52.5
Percent of HHs receiving IRS in the previous 12 months	28	N?A	35

Source: MIS 2015 & 2018
HH = households; ITN = insecticide-treated net; IRS = indoor residual spraying

5.3.3   Progress in ITN coverage and use 2015-2018

In 2017 and 2018, the NMEP organised the country's largest-ever ITN distribution campaign, with the aim of universal coverage. According to the MIS 2018, 80 percent of households reported owning at least one ITN. In 45 percent of households, all members reported sleeping under an ITN:

- National ITN ownership, increased from 74 percent in 2015 to 80 percent in 2018. The ITN ownership in rural areas was 86.9 percent and in urban areas 72.0 percent. Rural areas also reported a slightly higher average number of ITNs per household than urban areas due to the emphasis of distribution channels towards areas with more malaria.

- ITN usage rates among children under five increased from 56 percent in 2015 to 69 percent in 2018, with Muchinga Province having the highest usage of ITNs in this age group at 86.5 percent and Copperbelt Province had the lowest at 52.1 percent. The proportion of children under five that slept under an ITN was higher in rural areas (77.2 percent) than urban areas (56.5 percent), likely due to greater availability of ITNs in rural areas.

- The percentage of pregnant women who slept under an ITN was 71 percent in 2018. This indicator was not captured in 2015 but was 51 percent in 2012.

- The percentage of household members who slept under an ITN the previous night was 53 percent in 2015 increasing to 64 percent in 2018
- The percentage of households with at least one ITN per sleeping space was 62 percent in 2015 dropping to 47 percent in 2018.
- The programme continues to diversify the distribution channels for LLINs to enable more consistent coverage of LLINs between periods of mass campaigns. During the first half of the strategic plan implementation period, trainings and rollout of school-based distributions began. LLIN have continued to be distributed through antenatal care (ANC) and well child visits.

5.3.4   Progress on IRS

IRS campaigns are conducted annually. Since 2015, there has been some increase in the percent of targeted structures sprayed. Refer to Table 4 for more detail.

Table 5. IRS coverage 2015 to 2018.

Year	Total eligible structures	Targeted structures	Sprayed structures	Percent of targeted structures sprayed	Percent of total eligible structures	Population protected	Percent of total population protected.
2015*	-	1,493,794	1,339,775	90%	-	5,930,141	92% of the targeted population
2016*	-	1,760,122	1,655,542	94%	-	6,737,918	94% of the targeted population
2017	3,281,046	2,331,898	1,915,821	82%	58%	7,800,704	55%
2018	3,281,046	1,958,905	1,798,995	92%	55%	7,451,289	52.5%

*In 2015 and 2016, IRS targeted only the districts with high burden of malaria. As such the coverage rates were computed against the targeted structures in these high burden districts.

5.3.5 Progress on larval source management

During the period under review, LSM guidelines and training manual were developed. In addition, LSM was integrated into the harmonised iCCM training. This facilitated the training of 4800 community health workers (CHWs), potentially benefitting 3,600,000 Zambians. LSM is being implemented by some local authorities, Mining Companies and Zambia Sugar in their localities. Funding for LSM at scale remains challenging.

5.3.6 Progress in entomological sentinel surveillance and insecticide resistance monitoring

During the period under review, 12 sites were added to the 10 already existing. Three of the new sites are yet to be fully functional. Data from the sentinel sites has informed resistance patterns and the Insecticide Resistance Management and Mitigation Plan. Refer to Figure 3.

5.3.7 Progress in capacity building on vector control interventions

During the period under review, the NMEP has built capacity at the national, provincial, district, facility and community levels to support vector control interventions through decentralisation of vector control programming to the provinces and districts.

With regards to LLINs, community-based volunteers and village headmen were trained to conduct household registration and point distribution during the 2017 to 2018 LLIN mass campaign. Provincial and district staff were also trained in data management.

Prior to each IRS campaign, spray operators and community mobilisers are trained. Additionally, central, and selected provincial, district and community level personnel have been trained in mapping and enumeration of structures using satellite technology.

Capacity for entomological surveillance has been built at national, provincial and in selected districts with sentinel sites through training of environmental health personnel and community health workers in entomological surveillance.

5.3.8 Enabling factors and constraints to implementation

Enablers:
- Availability of vector control guidelines (ITNs, IRS, LSM, DDT).
- Existence of Insecticide Resistance Mitigation and Monitoring Plan.
- Regulatory oversight in place from Zambia Environmental Management Agency.
- Availability of projects and partners supporting the implementation of ITN and IRS, including The Global Fund, PMI, MACEPA, the Against Malaria Foundation, mining companies and others.

Constraints:
- Discrepancy between CSO and head count population estimates.
- Cost of enumerating eligible structures for IRS.
- Inadequate storage for vector control commodities at all levels.
- Competing socioeconomic activities (e.g., caterpillar harvesting communities and shifting cultivation) during IRS campaigns.
- Limited choices of WHO recommended insecticides for vector control.
- High cost of insecticides.

5.3.9   Conclusion and Recommendations

Conclusion:
a. NMEP has achieved milestones for vector control (2017 and 2018) as outlined on page 37 of the NMESP. Percentage of households with at least one ITN and/or sprayed by IRS in the last 12 months increased from 78 percent in 2015 to 84 percent in 2018 (MIS 2018).
b. The NMEP managed to implement a LLIN mass distribution campaign as planned, maintained coverage, and piloted and rolled out school-based distribution.

Recommendations:
a. Sustain achievements for vector control and accelerate towards target.
b. Use enumeration to determine number of eligible structures for IRS.
c. Conduct IRS in a timely manner
d. Use head count population to estimate LLIN need for mass campaigns.
e. Use door to door distribution of LLINs during mass campaigns.
f. Implement community-based IRS where applicable.
g. Mobilise resources for storage facilities for vector control commodities.

5.4   Case management, malaria in pregnancy and mass drug administration

Case management
In Zambia, case management coverage has greatly improved. The national objective is to ensure that 100 percent of all suspected malaria cases in all HFCAs receive parasitological (microscopy or rapid diagnostic test (RDT)) analysis and 100 percent of confirmed malaria cases receive prompt (within 24 hours), effective antimalarial treatment according to National policy. In order to achieve universal coverage of case management, Zambia provides services at facility and community level (iCCM).

Malaria in pregnancy
The NMEP has developed malaria in pregnancy policy based on WHO recommendations. The package of interventions for prevention of malaria in pregnancy consists of free LLINs at first ANC visit and monthly administration of intermittent preventive treatment in pregnancy (IPTp) with sulphadoxine-pyrimethamine (SP) after the first trimester until delivery, and overall prompt diagnosis and treatment of malaria.

Mass drug administration
MDA consists of administering a full therapeutic course of antimalarial medicine (irrespective of the presence of symptoms of infection) to a defined population living in a defined geographical area (except for whom the medicine is contraindicated) at approximately the same time and often repeated at intervals (Ref: WHO, MDA for *p. falciparum* malaria a practical field manual). Zambia uses dihydroartemisinin piperaquine as the drug of choice for MDA and it is administered twice a year, for two years consecutively. The programme started implementing MDA in Southern Province in 2014 and further scaled up to Western Province in 2017.

5.4.1   Policies and guidelines

The detection of malaria infection is based on thorough clinical assessment of the suspected patient followed by blood examination with RDTs or microscopy. RDTs are available at the community level and at all health facilities, while microscopy is available in all hospitals and in some health centres.

Treatment for malaria is based on national treatment guidelines adapted from WHO guidelines. The current first-line therapy for the treatment of uncomplicated *P. falciparum* malaria is artemether-lumefantrine. Injectable artesunate is used for complicated malaria with quinine as an alternate. For severe malaria patients between 6 months to 6 year old who are unable to immediately access parenteral treatment (from hard-to-reach areas), pre-referral intervention with rectal artesunate (RAS) at the community level. In the first trimester, pregnant women with malaria are treated with quinine and artemether-lumefantrine after the first trimester.

5.4.2 Progress on case management, malaria in pregnancy and MDA indicators

Table 6 shows progress toward key performance indicators on case management, malaria in pregnancy and MDA.

Table 6. Progress for indicators

Key performance indicator	2015 Baseline	2017 Target	2017 Achieved	2018 Target	2018 Achieved
Proportion of patients with suspected malaria who receive parasitological diagnosis by RDT and/or microscopy	80%	100%	90%	100%	98%
Proportion of patients with confirmed malaria who receive an antimalarial	92%	100%	97%	100%	100%
Proportion of women who received 3+ doses of intermittent preventive treatment during ANC visits during their last pregnancy	53%	100%	53%	100%	52%
Proportion of HFCA in level two where MDA was conducted	_	-	17% 53/319	80%	13% 57/454

Source: Key Performance Indicators from NMESP 2017–2021, Targets from NMEOP 2017–2019, Achievements from HMIS 2017 & 2018, RDT = rapid diagnostic test; ANC = antenatal care; HFCA = health facility catchment areas; MDA = mass drug administration

5.4.3 Progress in case management

There was progress of proportion of suspected malaria cases receiving parasitological diagnosis from a baseline of 80% in 2015 to 96% in 2018 (HMIS). The proportion of children under five with fever who took an antimalarial drug which was an artemisinin-based combination therapy
(ACT) increased from 92% in 2015 to 96% in 2018 (MIS 2018).

5.4.3.1 Progress in integrated community case management of malaria

The NMEP has developed an integrated curriculum incorporating surveillance into iCCM training. This has been scaled up from 3600 CHWs in 2017 to approximately 9000 CHWs in 2018 across the country. This has resulted in 22 percent of febrile children accessing antimalarial drugs from CHWs (MIS 2018).

5.4.3.2 Progress in management of severe malaria

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. The NMEP has built capacity in the use of injectable artesunate for the management of severe malaria in all eligible health facilities. The NMEP piloted and then adopted the use of RAS as a pre-referral treatment for children aged 6 months to 6 years.

5.4.4 Progress in malaria in pregnancy indicators

The IPTp uptake for three doses with SP has improved from 60.8 percent in 2015 (MIS 2015) to 67 percent in 2018 (MIS 2018) against the target of 100 percent as per National Strategic plan.

5.4.5 Progress in MDA indicator

In the period under review, MDA has been expanded from 60 HFCAs in 2016 to 173 HFCAs in 2018. This is shown in Table 7.

Table 7. Number of health facility catchment areas (HFCA) that implemented mass drug administration (MDA).

Province	Year	Number of HFCA	Population covered of those reached (%)	Total number reached at household	Total number treated of those reached	Total population (as provided by districts)
Southern	2014,2015 and 2016 overlapped	60	93.0%	262,759	243,957	330,983
	2017	34	97.1%	187,936	182,577	202,599
	2018	24	92.8%	179,142	166,262	208,392
Western	2017	19	96.1%	60,780	58,416	70,746
	2018	36	95.5%	81,453	77,779	90,870

5.4.6 Enabling factors and constraints to implementation of case management, malaria in pregnancy and MDA

Enablers:
- Availability of updated tools, guidelines and policies.
- Increased capacity to train CHWs.
- Availability of ACTs and RDTs at all levels.

Constraints:
- Low availability of injectable artesunate from November 2018 until May 2019.
- Low availability of SP for IPTp in the period under review.

5.4.7. Conclusion and Recommendations

Conclusions:
a. 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).
b. The NMEP has built capacity for case management at community level but saturation has not yet been achieved (NMESP Pg. 12).
c. The rollout of pre-referral treatment using RAS has commenced.

 Recommendations:
a. Taking advantage of the increased capacity to train CHWs, accelerate CHW training and deployment to achieve saturation.
b. Implement pre-referral treatment with RAS to scale.
c. Scale up MDA according to NMESP (pg. 37).

d.   Mobilise resources to ensure malaria commodity security.
e.   Continue to monitor the efficacy of the key antimalarial drugs used for treatment.
f.   Ensure that the National Malaria Reference Laboratory has full functionality to support malaria quality assurance and control.

5.5 Social and behaviour change communication

Social behaviour change communication (SBCC) has been used in malaria programmes to positively influence behaviours (acceptance, demand and use). A National Malaria Elimination Communication Strategy has been developed on the premise that communication is a cornerstone to malaria interventions. The strategy aims to guide districts and communities on appropriate and effective communication approaches, messages, materials and community engagement activities. It also aims to promote uptake of proposed intervention packages and actions based on transmission intensity levels.

5.5.1   Policies and guidelines

The national malaria communication strategy is anchored on the following guiding principles:

*   To complement, strengthen, and facilitate the demand, acceptance and ownership of the elimination interventions outlined in the NMESP.
*   To identify the relevant health promotion and SBCC activities appropriate for an area's transmission intensity.
*   To move communities from acceptance to participation to ownership of the country's elimination agenda.
*   To expand malaria messaging to include more than the high-risk populations of pregnant mothers, caregivers, and children under five.

5.5.2   Progress on SBCC indicators

During the period under review, use of ITNs among children under five, pregnant women and household members increased. However, the programme recorded a decline on indicators related to prompt care seeking behaviour. This is shown in Table 8.

Table 8. Progress on indicators

Indicator	MIS 2015 baseline	MIS 2018
Percentage who sought treatment from a facility provider same day or next day	31.2	19.7
Percentage of children under five who slept under an ITN	56	69
Percentage of pregnant women who slept under an ITN	58	71
Percentage of household members who slept under an ITN	53	64

5.5.3   Enabling factors and constraints to implementation of SBCC

Enablers:

*   Availability of policies and guidelines - (National Malaria Elimination Communication Strategy 2017–2021).
*   Specific budget line for SBCC in the Government of the Republic of Zambia budget ("Yellow Book").
*   Availability of Senior Health Education Officers at provincial level.
*   Existence of District Health Promotion Officers and Malaria Elimination Officers.

- Accessibility of various platforms for SBCC at all levels (religious, political, traditional, civil society etc.).

Constraints:
- Inadequate funding for regular and sustained implementation of SBCC activities at all levels.

5.5.4 Conclusion and recommendations

Conclusion:
a) Making steady and good progress however, there is a need to understand lack of progress in prompt care seeking behaviour.

Recommendation:
a) Prioritise SBCC within the budget.

5.6   Procurement and supply chain management

The purpose of procurement and supply chain management is to ensure efficient and effective availability of and accessibility to key malaria commodities at all levels. Key commodities which will be procured by the unit include: anti-malarial drugs, LLINs, insecticides for IRS, personal protective clothing and laboratory consumables.

5.6.1   Policies and guidelines

The procurement and supply management objective is to coordinate the forecasting, quantification, and procurement of all malarial commodities and supplies to ensure that 100 percent of health facilities report no stock-out of anti-malarial commodities.

5.6.2   Progress on procurement and supply management indicators

During the period under review there were no critical shortages of ACTs and RDTs, however, there remain to be challenges with availability of SP. Injectable quinine and tablets stocked out due to policy shift for use of policy shift of injectable artesunate. The policy to scale up RAS came into effect in the first quarter of 2019 as a result stocks were not yet available.

There is a pipeline in place to monitor stock availability and planned replenishments. However central stockouts have occurred at varying times during the review period. Quantification of malaria commodities remains a challenge given the lack of robust and reliable consumption data.

Procurements in 2017 through mid-2019 were done as shown in Tables 9–11.

Table 9. Anti-malaria commodities procured, Zambia, 2017–2019.

Item	2017 Planned procurement	2017 Procured	2018 Planned procurement	2018 Procured	2019 Planned procurement	2019 Procured	Comment on stockouts
AL 1*6	5,552,618	7,258,740	3,781,882	5,802,474	5,523,199	0	No stock out from 2016 – 2019 March
AL 2*6	2,484,066	2,813,460	2,829,292	8,384,218	2,823,241	0	Central stock out in October 2016. No stock out from 2017 – 2019 February
AL 3*6	2,484,066	1,713,000	3,506,870	6,667,630	3,500,040	3,498,040	No stock out from 2016 – 2019 April
AL 4*6	4,091,403	4,864,290	5,500,970	8,836,630	4,864,290	0	Central stock out in June 2016. No stock out from 2017 – 2019 April
Artesunate injection	806,910	400,000	171,165	0	300,000	100,000	Central stock out from September to December 2018 but overstocked in facilities. Central stock out in March 2019
SP	7,039,297	8,671,000	8,497,074	1,429,000	55,538,058	0	Central stock out in March 2016, March – October 2018 and from February to April 2019

Quinine injection	345,818	72,000	9,659	0	141,714	0	Central stock out in February – March 2016, January – March 2017 and December 2017 – March 2019.
Quinine tablet	50,876	3,707,000	17,888	0	76,310	0	Central stock out in March 2016 and from December 2017 – April 2019
mRDTs	20,571,795	25,735,550	27,273,713	17,868,550	36,176,975	4,951,700	No stock out from 2016 -2019
Rectal artesunate	-	-	-	-	500,578	0	NO funding commitment

Source: Pipeline

AL = artemether-lumefantrine; SP = sulphadoxine pyrimethamine; mRDT = malaria rapid diagnostic test

Table 10. Insecticides procured from 2017 to 2018.

Year	Planned insecticides	Insecticides procured	Planned set of PPEs	Set of PPEs procured	Planned pumps	Pumps procured
2017	731,715	475,000	6000 sets	1700 sets	1200	200
2018	945,954	255,846	7500 sets	6829 sets	2300	893
Total	1,677,669	730,846	13500 sets	8529 sets	3500	1093

PPE = personal protective equipment

Table 11. Long-lasting insecticide treated nets (LLINs) procured from 2017 to2018.

Year	Programme	Planned procurement	procured
2017	Mass campaign	7,001,868	10,077,036
2018	ANC/EPI	1,336,982	1,336,982
2018	School	210,000	289,326
Total		8,548,840	11,703,344

ANC = antenatal care; EPI = Expanded Programme on Immunization

5.6.3   Enablers and constraints

Enablers:

- Existence of medical stores hubs in various provinces.
- Rollout of electronic logistics management information system at health facility level.
- Distribution of "storage in the box" to some facilities.
- Presence of established logistics supply chain management systems.

Constraints:

- Delayed release of funds for procurement.
- Inadequate storage space at all levels (national and sub-national levels).
- Limited resources for procurement of some anti-malarial commodities.
- Limited distribution capacity of Medical Stores Limited to all health facilities.

5.6.4   Conclusion and Recommendations

Conclusion:

a) Procurements were done according to plan (including buffer stock) for LLINs, RDTs in 2017 and artemether/lumefantrine for most pack sizes in both 2017 and 2018. However, procurements for insecticides and RDTs in 2018 were less than what was planned. There remains to be challenges with availability of SP.

Recommendations

a) Adequate funding commitments and timely disbursement of funds will greatly improve the procurement performance.
b) Scale up "storage in a box" to more health centres.
c) Ensure that facilities being built have adequate storage space

5.7 Surveillance, monitoring, evaluation and operational research

Malaria SMEOR is fundamental for tracking progress on the implementation of malaria control and elimination activities. SMEOR provides a framework for the malaria programme indicators, data sources, description of information flows and reporting, data analysis, and feedback for decision-making. The surveillance, monitoring and evaluation system uses routine data as the main source of malaria data through the MOH HMIS. The HMIS is supported by the District Health Information System 2 platform for collecting and reporting malaria information on a monthly basis from communities and health facilities to district and province levels where it is consolidated and transmitted electronically to the national level. To this effect CHWs have been identified as an additional resource for granular and sensitive real time surveillance at community level. The routine data collection system is complemented by household population–based surveys such as the Zambia Demographic and Health Surveys and the MIS. Additionally, research is conducted for informing policy and decision making for evidence-based programme implementation.

5.7.1 Policies and guidelines

SMEOR is anchored on the following guiding principles:

- To provide timely and sound evidence to guide the implementation and policymaking process for malaria elimination in Zambia.
- To strengthen capacity to monitor and evaluate the performance of malaria programmes.
- To conduct research for evidence-based programming.

5.7.2 Progress on SMEOR indicators

During the period under review, the following was achieved:
- The reporting rate increased from 71.3 percent in 2015 to 92.3 percent in 2018. Timeliness of reporting also increased from 36 percent on time in 2015 to 55.6 percent on time in 2018.
- Classification of local and imported cases currently being conducted in Western and Southern provinces.
- The programme developed a monitoring and evaluation plan to track the implementation of the 2017 to 2021 NMESP.
- The programme has adopted the MMR to complement the national HMIS. Currently the MRR system has been rolled out to scale only in two provinces (Western and Southern) however, there is need for scale up to the remaining eight provinces.
- Currently 13,414 CHWs were trained in enhanced surveillance out of a targeted 19,000.
- 6694 CHWs out of the 13,414 trained CHWs are reporting in the MRR system.
- 1025 health facilities out of a targeted 2400 are reporting in the MRR system.
- 41 districts out of a targeted 117 are reporting in the MRR system.
- The programme conducted 50 percent of the planned number of data quality audits.
- 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 sixth MIS to assess the coverage and performance of key interventions.
- Reporting of routine distribution of LLINs in the HMIS is suboptimal.

5.7.3 Enablers and constraints

 Enablers:
- The national surveillance reporting system (HMIS) exists and the indicators, baselines, and targets are adequate.
- The web-based District Health Information System 2 is available and rolled out to all districts in the country.

- The reporting tools, namely registers and health service delivery aggregation forms (HIA 1 and 2), are available at facility level.
- A MRR system using mobile phone exists.
- All districts have District Health Information Officers for routine reporting.
- 2018 MIS results are available to inform programming.
- A strategic operational research agenda is in place.

Constraints:
- Lack of common understanding of malaria data elements and definitions in HMIS.
- HMIS does not differentiate in-patient malaria cases from severe malaria cases.
- Lack of correlation between logistics and malaria burden data.
- Inadequate resources for full implementation of SMEOR activities.
- Discrepancy between CSO and head count population.

5.7.4   Conclusion and Recommendations

Conclusion:
a) Enhanced surveillance has been rolled out but not to scale.
b) Population denominators are negatively affecting stratification which guides planning key interventions.
c) Reporting of routine distribution of LLINs continues to be suboptimal.

Recommendations:
a) The NMEP should use head count for programme implementation and CSO population for indicator estimates.
b) Roll out the enhanced malaria surveillance package to scale.
c) Collate the data sets into a central repository to enhance programme implementation.
d) Institutionalise data quality audit and reviews at district level.

Chapter 6: Programming implications of the lessons learned implementing the NMESP

6.1   Lessons learned implementing the NMESP

Epidemiological impact:
- Significant progress was made in reducing the malaria mortality from 15.2 per 100,000 population in 2015 to 7 per 100,000 population in 2018, exceeding the target which was set at 9 per 100,000.
- Following an upsurge experienced in 2016, progress has been made in reducing malaria incidence from 382 per 1000 population in 2016 to 311 per 1000 in 2018. However, this fell short of the target of 191 per 1000 in 2018.
- The review was unable to obtain data on prevalence by HFCA because it would require surveys at HFCA level. The national MIS provides provincial level estimates but does not provide HFCA prevalence.
- Furthermore, the reliability of both incidence and mortality rate indicators are somewhat hampered by challenges with population denominators which are known to have often discrepancies between official Census estimates and local head counts conducted by health officials.

Entomological impact:

The following changes have been documented:
- Reduction in EIR.
- Vector species composition (suppression of *An. funestus* and an increase in *An. Arabiensis).*
- Biting behaviour (*An. funestus* has changed its biting behaviour from indoor to outdoor).
- Changes in insecticide resistance profile of malaria vectors.

Programme management system:
- The National Malaria Elimination Business Plan 2018–2020 estimated a gap of approximately USD US$ 100 million. The drivers were iCCM and MDA (Business Plan Pg. 22).
- Planning and implementation of some activities still concentrated at the central level.

Programme financing analysis:
- During the period under review, malaria funding both from government and partners has shown some increase but the resource gap for achieving the goals remains.
- The EMC, an intersectoral body has been established with a mandate for advocacy and to mobilise resources. In the first half of 2019 it has established a secretariat and is beginning to pursue innovative financing.

Malaria vector control:
- NMEP has achieved milestones for vector control (2017 and 2018) as outlined on Pg. 37 of the NMESP. Percentage of households with at least one ITN and/or sprayed by IRS in the last 12 months increased from 78% in 2015 to 84% in 2018 (MIS 2018).
- Managed to implement a LLIN mass distribution campaign as planned, maintained coverage, and piloted and rolled out school-based distribution.

Case management, malaria in pregnancy and mass drug administration:
- 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).
- The rollout of pre-referral treatment using RAS has commenced.

Social and behaviour change communication:
- Making steady and good progress however, there is a need to understand lack of progress in prompt care seeking behaviour.
- Procurements were done according to plan (including buffer stock) for LLINs, RDTs in 2017 and Artemether/lumefantrine for most pack sizes in both 2017 and 2018. However, procurements for insecticides and RDTs in 2018 were less than what was planned.
- Challenges still remain with the availability of SP.

Surveillance, monitoring, evaluation and operations research:
- Enhanced surveillance has been rolled out but not to scale.
- Population denominators are negatively affecting stratification which guides planning key interventions.
- Reporting of routine distribution of LLINs continues to be suboptimal.

6.2   Future strategic directions

Epidemiological impact:
- Sustain progress in reducing malaria mortality.
- Address the contributing factors that led to not achieving the target.
- Use incidence by HFCA as an indicator.
- Use head count for programme implementation and CSO population for indicator estimates.

Entomological impact:
- Increase fully operational sites for entomological surveillance.

Programme management system
- Strengthen resource mobilisation.
- Decentralise operational planning and management to the provinces and districts.

Programme financing analysis:
- Continue to harness and explore innovative mechanisms to improve domestic investments in malaria elimination.

Malaria vector control
- Sustain achievements in vector control and accelerate towards target.
- Use enumeration to determine number of eligible structures for IRS.
- Use head count population to estimate LLIN need for mass campaigns.
- Use door to door distribution of LLINs during mass campaigns.
- Implement community-based IRS where applicable.
- Mobilise resources for storage facilities for vector control commodities.

Case management, malaria in pregnancy and mass drug administration:
- Take advantage of the increased capacity to train CHWs, accelerate CHW training and

deployment to achieve saturation.

- Implement pre-referral treatment with RAS to scale.
- Scale up MDA according to NMESP (pg. 37).
- Mobilise resources to ensure malaria commodity security.
- Continue to monitor the efficacy of the key antimalarial drugs used for treatment.
- Ensure that the National Malaria Reference Laboratory has full functionality to support malaria quality assurance and control.

Social and behaviour change communication (SBCC):
- Prioritise SBCC within the budget.
- Adequate funding commitments and timely disbursement of funds will greatly improve the procurement performance.
- Scale up "storage in a box" to more health centres.
- Ensure that facilities being built have adequate storage space.

Surveillance monitoring, evaluation and operations research:
- Use head count for programme implementation and CSO population for indicator estimates.
- Roll out to scale the enhanced malaria surveillance package.
- Collate the data sets into a central repository to enhance programme implementation.
- Institutionalise data quality audit and reviews at district level.