Ministry of Health

Guidelines for Malaria Epidemic Preparedness and Response in Kenya

2ND EDITION

March 2020

DIVISION OF NATIONAL MALARIA PROGRAMME

Komesha Malaria
Okoa Maisha

Ministry of Health

Guidelines for Malaria Epidemic Preparedness and Response in Kenya

2ND EDITION

March 2020

Guidelines for Malaria Epidemic Preparedness and Response in Kenya

Published by:

Ministry of Health

Division of National Malaria Programme

P. O. Box 19982 KNH Nairobi - 00202, Kenya

Email: head.domc@domckenya.or.ke http://www.nmcp.or.ke

FOREWORD

Malaria epidemics re-emerged in Kenya in the 1990s. The epidemics are usually characterized by high morbidity and mortality within a considerably short period of time. Malaria epidemics usually disrupt health services and negatively affect socio-economic growth.

In Kenya, malaria epidemics occur in two epidemiological zones—the western highlands and the arid and semi-arid lowlands of northern Kenya and south-eastern parts of the country. The epidemics are associated with unusual climatic conditions, mainly high rainfall and sustained minimum temperatures around 18°C, which sustain vector breeding and longer survival of the malaria vectors.

Malaria epidemics usually occur among non-immune or semi-immune populations. The main objective of malaria epidemic preparedness and response is to reduce morbidity and mortality associated with malaria epidemics among the affected populations. This is achieved through early detection of epidemics and immediate implementation of control and preventive measures.

This is the third edition of the Guidelines for Malaria Epidemic Preparedness and Response in Kenya. It provides information designed to facilitate effective management of malaria epidemics in all epidemic-prone areas of the country. The guidelines are adaptable for use at all levels of care and provide mechanisms and approaches to contain malaria epidemics in all settings, including in complex emergencies. The guidelines are a reference document to guide the planning and implementation of malaria control interventions in epidemic situations.

The guidelines will be used by planners and policy makers at the national level, health managers at the county and sub-county levels, healthcare workers at the service delivery level, and partners. This document will also be useful to all partners and stakeholders involved in malaria control, including civil society organizations and donors.

I hope you will find these guidelines useful as you plan and implement interventions to prevent and respond to malaria epidemics in your areas of operation.

Dr Patrick Amoth

Ag. DIRECTOR GENERAL FOR HEALTH

ACKNOWLEDGEMENTS

Review of the malaria epidemic preparedness and response guidelines is an effort of the malaria programme in collaboration with various stakeholders. The Ministry appreciates the overall guidance and stewardship provided by members of the Malaria Epidemic Preparedness and Response committee, led by Dr Grace Ikahu, and the technical support provided by the Division of Disease Surveillance and Response, Division of National Public Health Laboratories, county teams from Garissa, Narok, Trans Nzoia, and Turkana, and partners (Population Services Kenya and MEASURE Evaluation).

This review would not have been possible without the funding provided by the United States President's Malaria Initiative (PMI) and the United States Agency for International Development (USAID). The Ministry is very grateful for this support.

Special thanks to the following reviewers for their valuable inputs: Dr Khoti Gausi and Dr Elizabeth Juma, World Health Organization (WHO) Inter-Country Support Team; Dr Onsongo, WHO Kenya Country Office; Dr Augustine Ngindu, Impact Malaria project; and Dr Abdinasir Amin, MEASURE Evaluation.

The Ministry appreciates all the members of the guidelines review team for their efforts and commitment throughout the review process.

Dr Pacifica Onyancha

Director of Medical Services/Preventive and Promotive Health

CONTENTS

FIGURES

TABLES

ABBREVIATIONS

CDH	county director of health
CHA	community health assistant
CHV	community health volunteer
DDSR	Division of Disease Surveillance and Response
DNMP	Division of National Malaria Programme
EPR	epidemic preparedness and response
IRS	indoor residual spraying
ITM	insecticide-treated material
ITN	insecticide-treated net
MOH	Ministry of Health
SBC	social and behaviour change
SCMOH	sub-county medical officer of health
SCPHEMC	sub-county public health emergency management committee
TFC	therapeutic feeding centre
TOT	training of trainers
WHO	World Health Organization

GLOSSARY OF TERMS

Action or epidemic threshold: Marks a specific increase in the number of cases at which an epidemic is confirmed so that control measures, such as case management, can be intensified

Alert threshold: An unexplained increase in number of cases. It provides an early warning to health staff and surveillance teams to launch an investigation of a possible epidemic and prioritise areas for intensified control measures in the event of an epidemic.

Confirmed malaria case: Any person who tests positive for malaria either by microscopy or rapid diagnostic test

Cyclone: A system of winds rotating inwards to an area of low barometric pressure. A tropical cyclone reaching 62km/h becomes a tropical storm. Cyclones do not form within 5 degrees of the equator and cannot hit Kenya directly, although the weather in Kenya is strongly impacted by the pressure of cyclones in the Indian Ocean.

El Niño: A fluctuation of sea surface temperatures in the Pacific Ocean

Epidemic preparedness: Constitutes all the measures put in place by health management teams to be able to effectively respond in the event of an epidemic

Epidemic preparedness and response plan: A document that outlines the activities to be carried out by health management teams to plan, prepare for, and respond to malaria epidemics to reduce morbidity and mortality

Epidemic response: Control measures that are triggered after an epidemic threshold is reported to have been reached for the particular health facility or catchment area. Malaria epidemic response activities aim at reducing excess morbidity and preventing mortality and preventing further spread of the infection.

Malaria epidemic: A sudden increase in malaria cases at a given place beyond what is expected to be normal at that particular time against a set threshold for that area

Malaria epidemic detection: The recognition of the beginning of an outbreak through the measurement of variations in local disease incidence

Malaria epidemic prediction: A process that uses epidemiological information in addition to climate and weather to determine whether conditions favourable for malaria will occur in the short term (three months)

Malaria forecasting: A process that uses climate and weather information to determine whether conditions that are favourable for malaria epidemics will occur in the medium term (six months)

Malaria outbreak: A greater number of cases of locally transmitted infection than would be expected at a particular time and place. A malaria outbreak is often synonymous with a malaria epidemic. However, conventionally, outbreaks are epidemics with small caseloads. An outbreak can also be defined as a sudden occurrence of malaria in areas that have never experienced the disease before or have eliminated it and are limited geographically.

Mean: The average of a data set calculated as the sum of the observed values divided by the number of observations

Median: The value of the variable in a data set that divides the set of observed values in half when arranged in ascending or descending order

Normalized Difference Vegetation Index: A simple graphical indicator that quantifies vegetation by measuring the difference between near-infrared (which vegetation strongly reflects) and red light (which vegetation absorbs) and assesses whether the target being observed contains live green vegetation

Post-epidemic evaluation: The final activity in an epidemic response, in which an evaluation and documentation of the preparedness and effectiveness of the response is conducted. The objective of post-epidemic evaluation is to provide experiences and lessons learnt, and to guide future preparedness and response actions

Standard deviation: The average of the absolute deviations of observed values from the mean

Suspected malaria case: Any person who has an illness suspected by a health provider to be malaria, generally on the basis of presence of fever, with or without profuse sweating, muscle pains, joint pains, abdominal pains, diarrhoea, nausea, vomiting, irritability, and refusal to feed

Threshold: In respect to malaria epidemics, the critical level at which the number of reported cases in a given time and space must be exceeded for a certain reaction or specific actions to be taken

Upsurge of malaria cases: Normal seasonal increases in the incidence of malaria, which should not be confused with epidemics

EXECUTIVE SUMMARY

Malaria remains a major public health problem in Kenya. Based on data from the routine health information system, malaria accounted for 19 percent of outpatient consultations in 2019. Malaria epidemics occur when the disease attacks vulnerable populations with little or no immunity. In such situations, people of all age groups are at risk of severe disease or death.

Epidemiology of malaria in the Kenya is largely determined by altitude, rainfall patterns, and temperature. Temperatures are highest in February and March and lowest in July and August. The country has four main malaria epidemiological zones: endemic zones around Lake Victoria and the coastal region along the Indian Ocean, seasonal malaria transmission in northern and south-eastern Kenya, malaria epidemic-prone areas in the western highlands, and low-risk areas around Nairobi. The populations most at risk of malaria epidemics are those living in the western highlands and seasonal transmission zones.

Factors that may precipitate a malaria epidemic fall into two categories: natural (climatic variations and natural disasters), and man-made (conflict and war, agricultural activities, infrastructural developments, and breakdown of malaria control measures). To a large extent, malaria epidemics can be predicted through a combination of meteorological information, local epidemiological data, and knowledge of human population dynamics. Thus, multi-sectoral actions by various stakeholders can help prevent epidemics from occurring. This is done through continuous monitoring, early detection, and prompt response, with recommended appropriate treatment and timely vector control methods to minimise the impact of upsurges and epidemics. These actions are broadly categorised as forecasting, prediction, and early detection. Forecasting uses climate and weather information to determine whether conditions that are favourable for malaria epidemics will occur in the medium term (six months). On the other hand, prediction is made in the short term (three months) using epidemiological information in addition to climate and weather information.

Malaria epidemic preparedness comprises all activities that should be undertaken for an effective response to epidemics. Implementation of ongoing malaria epidemic preparedness and response activities must be monitored at the community, health facility, sub-county, county, and national levels. The purpose of these guidelines is to enable county and national governments and all stakeholders to plan, prepare for, and respond to malaria epidemics, to reduce the morbidity and mortality associated with those epidemics.

1.0 INTRODUCTION

1.1 Geography, Climate, and Malaria Transmission

Kenya is situated in the eastern part of Africa. It borders Ethiopia to the north, Somalia to the northeast, Tanzania to the south, Uganda to the west, South Sudan to the northwest, and the Indian Ocean to the southeast. The country is administratively divided into 47 counties and 302 sub-counties. Eighty percent of the land area is arid or semi-arid, and only 20 percent is arable. The country has two main regions: lowlands and highlands. The lowlands include the coastal region along the Indian Ocean and the Lake Victoria region on the western side of the country. The highlands fall on both sides of the Rift Valley. The country generally has two rainy seasons, with the long rains occurring from March to May and the short rains from October to December. However, the trends, frequency, and intensity of the climatic patterns are changing, with the changing climate in the East African region. Temperatures are highest in February and March and lowest in July and August.

Malaria transmission and risk of infection across the different geographic regions in Kenya are largely determined by altitude, rainfall patterns, and temperature. The Lake Victoria and coastal regions have the highest burden of malaria in Kenya, with stable transmission throughout the year. Rainfall, temperature, and humidity are the determinants of the perennial transmission of malaria in this zone. Seasonal malaria transmission occurs in the arid and semi-arid areas in the northern and south-eastern parts of Kenya, which experience short periods of intense malaria transmission during the rainy season. Extreme climatic conditions like El Niño that lead to flooding can cause malaria epidemics with high morbidity due to the low immune status of the population in these areas. Malaria epidemics occur in the western highlands when climatic conditions favour sustained minimum temperatures around 18°C that sustain vector breeding, resulting in increased intensity of transmission.

1.2 Distribution of Malaria Vectors in Kenya

The country has continually collected information on malaria parasite species that cause infection to inform diagnosis and treatment. Ninety-two percent of malaria infections in Kenya are *P. falciparum*, 6 percent are *P. malariae*, and 2 percent are *P. ovale*. Some malaria infections are a result of more than one of these species (mixed infections) (National Malaria Control Programme, Kenya National Bureau of Statistics, & ICF International, 2016). Several vectors are responsible for malaria transmission in the country. These vectors are found in different ecological environments. Recent entomological surveillance data show that *An. funestus* is emerging as the main vector in the highland epidemic-prone areas, *An. arabiensis* is predominantly found in arid and semi-arid areas, and *An. gambiae s.s* is widespread across the country (Division of National Malaria Programme, [DNMP], 2019). In some areas, *An. coustani*, a secondary vector, is now becoming a major vector and contributing substantially to malaria transmission (Mwangangi, et al., 2013).

1.3 Factors That May Contribute to Malaria Epidemics

Epidemics occur when the equilibrium between the rate of infection and the immunity of a population in a given area is disrupted or where prevention and treatment services are interrupted. This may be a consequence of both man-made and natural factors (World Health Organization [WHO], 2018). Man-made factors may be due to socio-economic activities, such as agricultural irrigation, dam construction, mining, road construction, and clearance of forested areas. These activities may create favourable breeding sites for mosquitoes, hence increasing the risk of infection. Other man-made factors may be due to breakdown of health services, leading to the deterioration of prevention and treatment services. Man-made factors may also be due to conflicts that lead to the migration of non-immune people to areas with high malaria transmission.

Natural factors that contribute to malaria epidemics include natural disasters and climatic variations. Natural disasters, such as earthquakes or cyclones, may lead to changes in habitat, thus increasing the risk of transmission of infections in non-immune populations. Climatic conditions, such as unusual increases in rainfall and temperature, affect the development of mosquitoes and malaria parasites. Increasing temperature accelerates the rate of mosquito larval development and the frequency of blood feeding by adult females on humans, and it reduces the time it takes the malaria parasites to mature in female mosquitoes. Increased rainfall creates additional breeding sites for mosquitoes, thus increasing their numbers and the risk of transmitting malaria.

Information on potential factors that may contribute to epidemics can be obtained from meteorological offices (for climatic data), local authorities and humanitarian agencies (for population movement and displacement), and relevant government ministries and the private sector (for infrastructure and development activities). The identification of any factor that may lead to malaria epidemics requires heightened malaria surveillance and forecasting by both county and sub-county health management teams.

1.4 Malaria Epidemics in Kenya

Malaria epidemics usually occur in the western highlands and the arid and semi-arid regions in Kenya. The epidemics are characterised by high morbidity and mortality and are associated with unusual climatic conditions, mainly high rainfall and temperatures that are suitable for vector breeding. Malaria epidemic preparedness and response (EPR) remains a priority in disease surveillance and response, with the main objective of reducing morbidity and mortality during epidemics through early detection and response.

1.4.1 History of Malaria Epidemics in Kenya

The first documented malaria case in Kenya dates back to 1888. However, the first malaria epidemic was recorded in 1918 in the western highlands, mostly at altitudes between 1,500 and 2,000 meters above sea level. The second major epidemic was reported in 1926 and was closely followed by another one in 1928 (Chataway, 1929). These epidemics shaped the view of malaria as a health issue that has social and economic implications. The epidemics also called for interventions that attracted financing, legislation, and involvement of other government arms and other stakeholders.

The resurgence of malaria epidemics in the late 1990s was as a result of El Niño. Malaria prevalence in the country during this time increased, from 20 percent to about 60 percent, with an estimated case fatality rate of about 7.5 percent (Githeko & Ndegwa, 2001). Malaria epidemics have continued to be reported in recent years, notably in December 2015–March 2016 in refugee camps located in Turkana County. In September and October 2017, malaria upsurges were reported in nine counties: Baringo, Isiolo, Mandera, Marsabit, Samburu, Tana River, Turkana, Wajir, and West Pokot. More than 2,000 adults and children were diagnosed with the disease.

As a result of these epidemics, 50 fatalities occurred and more than 400 people were hospitalised. Marsabit was the worst affected county, with 26 reported deaths and 1,300 adults and children diagnosed with malaria (Mulambalah, 2018). The situation was aggravated by a health workers' strike at the time that disrupted service delivery. In 2019, malaria epidemics were reported in Baringo and West Pokot.

Malaria risk maps modelled from countrywide survey data (Ministry of Health [MOH], 2016) show evidence of changing malaria epidemiology, with more areas likely to become unstable and prone to epidemics. It is therefore necessary to intensify malaria surveillance and constantly sensitise the regions on EPR.

1.5 Malaria EPR in Kenya

Malaria EPR is one of the strategies under the surveillance objective of the Kenya Malaria Strategy (2019–2023) (MOH, 2019). The Surveillance, Monitoring, Evaluation, and Operational Research unit in the DNMP is responsible for the development of guidelines, manuals, tools, training, and planning for EPR in Kenya. The Division of Disease Surveillance and Response (DDSR) is nationally responsible for surveillance and response for all epidemic-prone diseases. Malaria EPR is geared towards preparedness and timely and effective response to avoid occurrence of malaria epidemics, thus reducing excess morbidity and mortality during epidemics. Epidemic preparedness is undertaken at all levels of the health system through the following measures (WHO, 2018):

- Compiling data to establish or update thresholds
- Continuously monitoring the number of confirmed malaria cases reported weekly
- Early detection of epidemics through monitoring thresholds
- Strengthening the capacity of health workers to analyse and verify data
- Ensuring that adequate emergency stocks are available and can be transported to epidemic areas
- Ensuring prompt response with recommended appropriate treatment and timely vector control methods to minimise the impact of outbreaks and epidemics

A total of 127 sub-counties spread across 26 counties in the western highlands and seasonal transmission zones of Kenya are classified as malaria epidemic-prone areas (MOH, 2016). Figure 1 shows the 26 epidemic-prone counties in Kenya. A list of 127 epidemic-prone sub-counties is provided in Annex 1. Epidemic monitoring thresholds established for all epidemic-prone sub-

counties are updated annually and routinely monitored for early detection and prompt response to malaria epidemics in Kenya.

Figure 1. Epidemic Prone and Non-epidemic Prone Counties in Kenya

1.6 Epidemic Management Cycle

The EPR cycle generally shows the sequence of events before, during, and after a disease outbreak (Figure 2). At the end of an epidemic, the cycle indicates that the disease outbreak management team should carry out an evaluation of the whole process and review the successes, gaps, and areas for improvement. The cycle starts with forecasting and ends at the post-outbreak phase.

Figure 2. Epidemic Management Cycle

1.7 Purpose of the Guidelines

The first Kenya malaria EPR guidelines were developed in 2011. Since then, many changes have occurred, including devolution of health services and expansion of areas likely to experience malaria epidemics. The purpose of these guidelines is to enable the national and county governments and all stakeholders to plan, detect, prepare for, and respond to malaria epidemics to reduce associated morbidity and mortality.

1.8 Target Audience

These guidelines are intended for use by the following:

- Community health units
- Health facilities
- Sub-county health management teams

- County health management teams
- DNMP
- MOH
- Other government ministries and agencies
- Research and academic institutions
- Other stakeholders in malaria control, including, but not limited to, partners, nongovernmental organisations, United Nations agencies, and community-based and civil society organisations

1.9 Organisation of the Guidelines

These malaria EPR guidelines are organised and focused on the following actions:

- Forecasting, prediction, and early detection
- EPR
- Monitoring and evaluation of malaria EPR
- Management of malaria in complex emergencies

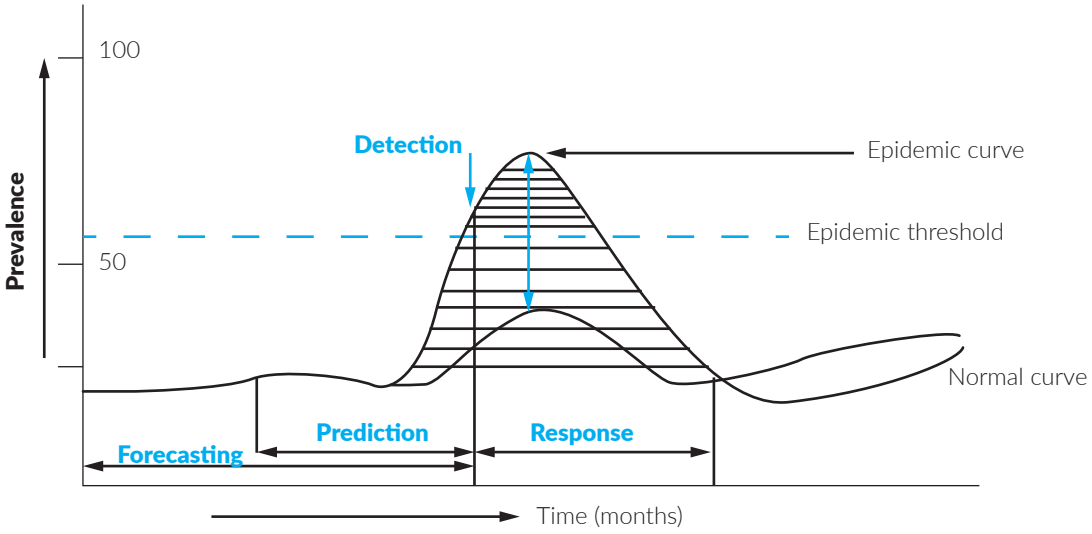
Each of these areas is covered and described in detail in the subsequent chapters.

2.0 PREDICTION AND EARLY DETECTION OF MALARIA EPIDEMICS

2.1 Prediction of Malaria Epidemics

Long-range forecasting is a process that uses climate and weather information to determine whether conditions that are favourable for malaria epidemics will occur within a lead time of three to six months (Lynch, 2005). Use of epidemiological information as well as weather and climate prediction to detect potential malaria epidemics constitutes malaria early warning systems (Figure 3). Information on climate and weather patterns, such as heavy rains, high temperatures, and humidity in areas prone to epidemics or mass movement of non-immune populations to malaria endemic areas, provides an early warning on possible malaria epidemics. In the eastern Africa region, El Niño has been largely associated with malaria epidemics. Forecasts may indicate or suggest the occurrence of malaria at normal or above normal levels.

Figure 3. Model of forecasting, prediction, detection, and response



2.2. Forecasting and Predicting Malaria Epidemics in Kenya

Meteorological data are key in forecasting malaria epidemics. The Kenya meteorological department performs seasonal forecasting, providing three months of data for rainfall amounts, temperature, and relative humidity. The department also provides monthly or 10-day data for rainfall amounts, temperature, and relative humidity. In highland areas where mosquito breeding sites are numerous, temperature is the most important parameter to monitor to forecast and predict malaria epidemics. In lowlands and arid/semi-arid areas where temperature is always high, rainfall is the most important factor to monitor to predict malaria epidemics.

All relevant meteorological data shall be compiled, analysed, interpreted, and documented at the national or county level. The information generated shall then be disseminated to all levels

and stakeholders to trigger preparedness activities when and where necessary. The DNMP shall ensure that the information on epidemic forecasting and risk assessment is made available to the county and sub-county levels. The county director of health (CDH) responsible for public health services must ensure that this information is disseminated to all health facilities and other relevant departments.

Monitoring of prolonged increase in temperature associated with El Niño at the country or regional level is another important source of forecasting information. In some instances, it is important to consider remote sensing information, such as the Normalized Difference Vegetation Index.

2.3 Early Detection and Confirmation of Malaria Epidemics

Malaria epidemic detection involves recognition of the beginning of an outbreak through the measurement of variations in local malaria incidence (Figure 3). The objective of early detection is to provide a basis for identifying an unusual increase in malaria cases and localities where the cases are clustered. Rapid and appropriate response should then be initiated to contain and control the epidemic to reduce morbidity and mortality. The main method for the early detection of malaria epidemics is monitoring epidemic thresholds. Other parameters for early detection include the following: unusual increases in the number of patients referred with fever from the community level; unusually high test positivity rate by microscopy or rapid diagnostic tests among febrile patients; unusual increases in the uptake of antimalarial drugs from health facilities and other outlets (e.g., private pharmacies); and increases in the demand for antimalarial drugs and blood transfusions, suggesting an increase in the proportion of patients progressing to severe malaria.

Other possible indicators of an imminent epidemic include an unexpected increase in absenteeism in schools and workplaces and an unusual increase in the workload of health facilities. The CDH shall ensure that the weekly reporting of malaria through the surveillance monitoring system is undertaken by all facilities. A monthly review of the availability of diagnostics, antimalarials, and other commodities is equally important.

2.4 Use of Surveillance and Epidemic Thresholds in Early Detection

Surveillance is the ongoing systematic collection, analysis, and interpretation of health data for decision making. It includes timely dissemination of resulting information to those who need it for action (Ministry of Public Health and Sanitation , 2012). Surveillance is essential for planning, implementation, and evaluation of public health practice. The goal of surveillance in the context of malaria EPR is to detect epidemics promptly in areas with seasonal transmission or with large non-immune populations at risk.

Malaria epidemics are usually detected using epidemic thresholds, which are markers that give indications of an increase in the number of cases of malaria above what is usually expected. The threshold is an epidemic management tool based on weekly confirmed malaria data. It provides an early warning to increase preparedness and trigger response within a short lead time. Threshold setting is based on values derived from weekly confirmed malaria cases for the five years preceding the year of interest. Thresholds are used as an evidence-based tool to predict and detect epidemics in areas that are epidemic prone.

There are two types of malaria thresholds: alert threshold and action/epidemic threshold. The alert threshold suggests to the health worker that further investigations are needed, and the action/epidemic threshold is reached when there is a steady increase above the alert threshold. The alert threshold is generated by calculating the third quartile of the number of cases per week for at least five years. In Kenya, the action/epidemic threshold is generated by calculating the mean +1.5 standard deviation of the number of cases per week for at least five years (Ministry of Public Health and Sanitation , 2012). Malaria epidemic thresholds are determined at the health facility level using weekly malaria surveillance data. The CDH shall ensure that the health facilities update their epidemic thresholds on an annual basis. Incidence of cases above the threshold should signify an outbreak and prompt the health facility or the CDH to institute appropriate actions. Annex 2 provides a detailed description of the process of calculating thresholds.

2.5 Strengthening Disease Surveillance During Epidemics

The following activities should be implemented to strengthen surveillance activities during epidemic periods:

- Daily line listing of cases detected
- Continuous collection, processing, and analysis of data in the area affected by the epidemic
- Close monitoring of trends of malaria cases and deaths in the area of the epidemic
- Daily data compilation, processing, and analysis by the sub-county disease outbreak management team before transmission of the data to the county and national levels
- Giving feedback given to the health facilities, emergency treatment centres, community health units, and any other entities generating data related to the epidemic
- Conducting review meeting to monitor the progress of epidemic containment

2.6 Use of Entomology for Early Detection of Malaria Epidemics

The presence of mosquitoes that transmit malaria is a key indicator of potential active transmission of malaria parasites. Monitoring and analysis of factors that influence vector breeding is therefore an important element of an early warning system for malaria epidemics. Entomological assessments are aimed at identifying vector components that portend increased epidemic risk. These include increased vector density, longevity, and human-vector contact (Table 1).

Table 1. Entomological indicators for malaria

No.	Indicator	Definition
1.	Larval occurrence, density, and occupancy	▪ Larval occurrence: The presence or absence of larvae in a breeding habitat ▪ Larval density: Average number of larvae per dip ▪ Larval occupancy: The percentage of positive larval habitats
2.	Species composition and geographical distribution	▪ Species composition: The type of malaria vectors present in an area ▪ Geographical distribution: The extent to which the malaria vectors are distributed in terms of space
3.	Feeding and resting location	▪ Feeding: Refers to when/time malaria vectors bite, where they bite (indoors or outdoors), and source of blood meal (human, cattle, birds) ▪ Resting location: Refers to where the vector rests before and after feeding—indoors or outdoors
4.	Human biting rate	▪ Number of vectors biting an individual over a fixed period of time
5.	Human blood index	▪ Proportion of blood-fed mosquitoes that fed on human blood
6.	Resistance frequency and status	▪ Resistance frequency: Refers to number of times the resistance genes occur in mosquitoes ▪ Resistance status: Underlying genes responsible for resistance—a vector's ability to resist and survive the effects of the insecticide and impact of resistance on malaria transmission
7.	Resistance mechanism and intensity	▪ Resistance mechanism: Refers to ways through which insecticide resistance occur—target site, metabolic and behavioural resistance ▪ Resistance intensity: Quantitative metric for the measurement of the strength of observed resistance
8.	Entomological inoculation rate	▪ Measure of exposure to infectious mosquitoes. Usually interpreted as the number of infective bites received by an individual during a season or annually.

Monitoring mosquito behaviour in areas that are experiencing epidemics is useful to determine control measures. In localities with identified clustering of cases, identification of vector breeding sites will be required. Elimination of the breeding sites is part of the response interventions. This can be achieved through larval source management or environmental modifications. The entomological inoculation rate is useful to measure the impact of vector control interventions, such as indoor residual spraying (IRS), larviciding, and the use of insecticide-treated nets (ITNs). Entomological surveillance shall be undertaken at the county and sub-county levels by the Division of Vector Borne and Neglected Tropical diseases, DNMP, and the Kenya Medical Research Institute.

2.7 Use of Social, Cultural, Economic, and Natural Events to Predict Malaria Epidemics

Community events, such as religious pilgrimages or conflicts, may result in the movement of vulnerable people into malaria endemic areas or setting up of displacement camps that expose people to infective mosquito bites. Economic activities, such as nomadic pastoralism and forest invasion, can also cause movements into areas with higher malaria risks. Economic activities that result in environmental degradation, including mining, construction works, and farming, may increase vector breeding sites. Natural events, such as increased rainfall and flooding, also promote vector breeding. Other natural calamities that destroy human settlements, such as fires, earthquakes, hurricanes, mudslides, and wind, may displace people into temporary settlements with inadequate vector control measures. Monitoring these social, cultural, economic, and natural events provides useful information in predicting malaria epidemics.

2.8 Roles and Responsibilities of Health System Levels in Malaria Epidemic Forecasting, Prediction, and Detection

Given its specialised nature, epidemic forecasting should be done at the national level, at which the appropriate skills, technology, and information exist. Prediction and detection are better done at the county, sub-county, and facility levels, where information on local disease incidence is available. Table 2 summarises the roles and responsibilities of the different health system levels in epidemic forecasting, prediction, and detection.

Table 2. Roles and responsibilities of health system levels in forecasting, prediction, and early detection

Level	Roles and responsibilities	Responsible person
Community	▪ Detect suspected cases of malaria using lay case definitions ▪ Detect and report signals that predict malaria outbreaks, such as flooding, population movements, disruption of settlements, natural disasters, increased vector density, and increased biting ▪ Sensitise communities on the signals and symptoms of malaria ▪ Refer cases with fever	Community health volunteers (CHVs)

Level	Roles and responsibilities	Responsible person
Health facility	▪ Use standard case definition to detect suspected malaria cases ▪ Generate malaria epidemiological data ▪ Analyse epidemiological data ▪ Disseminate analysed outputs to the community and sub-county ▪ Submit weekly epidemiological data to the sub-county disease surveillance coordinator using weekly reporting form (MOH 505) ▪ Develop and monitor health facility thresholds to detect malaria epidemics	Health facility in-charge
Sub-county	▪ Ensure that the weekly reporting of malaria through the surveillance monitoring system is undertaken by all health facilities ▪ Review availability of malaria case reporting and prediction tools (MOH 505, risk maps, threshold charts) ▪ Analyse epidemiological data, interpret data, and respond based on the interpretation ▪ Use and disseminate malaria epidemic risk maps to inform preparedness and target response ▪ Ensure that health facilities update their epidemic thresholds on an annual basis ▪ Ensure that health facilities are trained on malaria epidemic prediction and detection	Sub-county medical officer of health (SCMOH)

Level	Roles and responsibilities	Responsible person
County	▪ Monitor and supervise sub-counties' epidemiological data collection activities ▪ Direct pre-outbreak response based on meteorological information ▪ Ensure that sub-counties are trained on malaria EPR ▪ Support and supervise sub-county EPR activities ▪ Ensure the availability of malaria epidemic prediction and detection tools, including standard case definition charts, thresholds, and data reporting tools ▪ Be responsible for the outbreak notification and declaration	County director of public health
National	▪ Compile, analyse, and interpret epidemiological and meteorological data ▪ Produce seasonal malaria epidemic risk maps ▪ Disseminate malaria epidemic risk maps to counties, sub-counties, and partners ▪ Build capacity on using forecasting and prediction information to detect outbreaks ▪ Support the counties in forecasting, prediction and detection of malaria epidemics ▪ Undertake entomological assessment in epidemic-prone sub-counties	Head, DNMP

3.0 EPIDEMIC PREPAREDNESS AND RESPONSE

3.1 Epidemic Preparedness

Epidemic preparedness constitutes all the measures put in place by health management teams to enable effective response in the event of an epidemic. Such measures include the establishment of effective surveillance systems, development of EPR plans, and placement of essential malaria commodities.

3.2 Epidemic Preparedness Activities

Preparedness activities should be stratified by level due to their different roles and responsibilities. The broad preparedness activities include the following:

- Developing and updating EPR plans. These outline what should be done in the event of an epidemic and should detail the resources that would be required.
- Building capacity on epidemic detection and response. All health workers should be trained on how to set and monitor thresholds to detect an epidemic and how to initiate response measures.
- Coordinating epidemic control measures. Increases in numbers and the risk of progression to severe disease or death in an epidemic situation require the coordination of the different players to ensure prompt and effective management of resources and treatment of cases as well as to meet the heightened surveillance needs.
- Providing emergency supplies for malaria epidemics. Ensuring adequate supply of antimalarial commodities is critical for effective case management and prevention of onward transmission during epidemics.

Table 3 summarises the broad epidemic preparedness activities across the different levels.

Table 3. Specific preparedness activities at community, health facility, sub-county, county, and national levels

Activity	Levels				
	Community	Health facility	Sub-county	County	National
1. Development and updating of EPR plans	Incorporate malaria EPR activities in the community health unit annual work plan.	Incorporate EPR activities in the health facility annual work plan. Allocate budget for health emergencies, including malaria outbreaks. Conduct simple analysis and graphing of weekly data. Notify the sub-county health management team upon reaching alert and action thresholds.	Develop malaria-specific EPR work plans. Allocate budget for health emergencies. Coordinate EPR annual work planning at the community and facility levels.	Consolidate sub-county-specific EPR plans. Coordinate planning for EPR with county-level stakeholders. Conduct entomological assessment. Correlate epidemiological data with relevant indicators, such as meteorological data, population movement, or socio-economic activities.	Use long-range forecasting information for preparedness in epidemic-prone areas. Develop EPR guidelines. Coordinate EPR planning at the national level.
2. Capacity building	Sensitise community members on epidemic response activities. Train CHVs on epidemic response.	Train healthcare workers on malaria EPR.	Constitute sub-county rapid response teams Train health workers on rapid response to malaria outbreaks. Hold trainings of trainers (TOTs) on targeted epidemic response activities (e.g., focalised IRS).	Constitute county rapid response teams. Train the sub-county teams on rapid response to malaria outbreaks. Hold TOTs on targeted epidemic response activities (e.g., focalised IRS).	Constitute a national rapid response team. Train county teams on EPR, including TOTs for focalised IRS.

Activity	Levels				
	Community	Health facility	Sub-county	County	National
3. Coordination	Identify community malaria focal persons (community health assistants [CHAs]).	Identify facility malaria focal person (facility in-charge). Establish a facility outbreak committee.	Identify sub-county malaria focal person (sub-county malaria control coordinator). Establish a sub-county public health emergency management committee. Map out sub-county malaria EPR stakeholders.	Identify county malaria focal person (county malaria control coordinator). Establish a county public health emergency management committee. Map out county malaria EPR stakeholders.	Coordinate and ensure intersectoral collaboration. Mobilise resources and engage with partners to support EPR. Identify national malaria EPR focal person (programme head). Establish an EPR working group or subcommittee that meets regularly under the Surveillance, Monitoring, Evaluation, and Operational Research unit. Map out national malaria EPR stakeholders.

Activity	Levels				
	Community	Health facility	Sub-county	County	National
4. Emergency commodities for malaria epidemics	Quantify malaria commodities for CHVs.	Forecast and quantify malaria emergency commodities (e.g., antimalarials, rapid diagnostic tests, laboratory reagents, insecticides for IRS) (see Annexes 3 and 4).	Consolidate quantification of emergency orders from all facilities. Forward the combined list of emergency commodity requirements to the county for procurement from the Kenya Medical Supplies Authority/ MOH.	Review emergency quantification orders from sub-counties and forward to the Kenya Medical Supplies Authority. Quantify emergency commodities and logistics management.	Ensure that emergency stocks of medicines are available and can be transported to the epidemic area. Ensure timely forecasting and quantification of malaria commodities.

3.3 General Considerations for Epidemic Prevention

The purpose of epidemic prevention is to avert or reduce excess morbidity and mortality due to malaria. The main strategy for malaria prevention is timely vector control and effective case management.

When an epidemic is predicted, the following should be done:

- Undertake active monitoring of malaria cases (line listing) and trends to identify transmission foci (see line listing form in Annex 5).
- Undertake entomological surveys.
- Undertake focalised IRS one month before onset of the outbreak in high-risk areas based on surveillance data. There should be a coverage of at least 80 percent of the identified foci.
- Ensure adequate stock of malaria commodities.
- Undertake community sensitisation on the use of mosquito nets and early treatmentseeking behaviour (within 24 hours of onset of fever).

3.3.1 Roles and Responsibilities of Health System Levels in Malaria Epidemic Prevention

Epidemic prevention should be conducted at all levels of the health system. Table 4 outlines the roles and responsibilities of the different levels in epidemic prevention.

Table 4. Roles and responsibilities in epidemic prevention

Level	Roles and responsibilities
Community (CHAs)	To undertake: ▪ Social and behaviour change (SBC) and community sensitisation ▪ Community-based disease surveillance for malaria ▪ Active case search ▪ Referral of suspected cases
Health facility (facility in-charge)	To undertake: ▪ Surveillance ▪ Training of CHVs on malaria prevention ▪ Vector control (ITN distribution) ▪ SBC (health talks and interpersonal communication on prevention and adherence to treatment)
Sub-county (SCMOH)	To undertake: ▪ Training of health workers on malaria case management ▪ Vector control (ITNs and IRS) ▪ Surveillance, monitoring, and evaluation ▪ Data analysis ▪ Quantification and ordering of malaria commodities
County (County Department of Health)	To supervise: ▪ Case management training ▪ Vector control using ITNs, promotion of ITN use, and focalised IRS. ▪ SBC strategies in community sensitisation activities and coordination of stakeholders. ▪ Surveillance (monitor trends of confirmed malaria cases and basic entomology). ▪ Quantification of commodities and logistics management. ▪ Data analysis and use for decision making

Level	Roles and responsibilities
National (DNMP)	To coordinate: ▪ Case management training, distribution of antimalarials and commodities for diagnosis ▪ Vector control (coordinate distribution of ITNs and focalised IRS) ▪ Advocacy and resource mobilisation for EPR ▪ Surveillance (data flow systems, analysis, interpretation of data, and alerting malaria epidemic-prone areas to take action) ▪ Formulating, changing, and updating of policies ▪ Formulating SBC messages for dissemination

3.2 Epidemic Response

Epidemic response depends on the stage at which the epidemic is detected. The aim of response is to reduce transmission and mortality by treating those who are infected and preventing new infections (WHO, 2018). A rapid assessment should be conducted to confirm that an unusual increase in the number of fever cases is due to malaria. Rapid assessment can be conducted at different phases, as follows: to assess preparedness for a predicted epidemic (pre-epidemic phase), to confirm a suspected epidemic (epidemic phase), or at the end of an epidemic to assess response (post-epidemic phase). Examples of checklists for rapid assessment are given in Annex 8.

3.2.1 Rapid Assessment and Confirmation of Epidemic

The sub-county MOH should convene a sub-county rapid response team to carry out a rapid assessment of the situation. The rapid assessment team should comprise a clinician, an epidemiologist/disease surveillance officer, an entomologist, and a trained laboratory officer to verify cases in the field.

The purpose of the rapid assessment is to:

- Verify the source of information
- Confirm the outbreak
- Determine the extent of the epidemic
- Establish the approximate population at risk of the epidemic
- Define the type and extent of interventions
- Identify priority activities
- Plan the implementation of activities

The local capacity of the affected region to respond to an epidemic should be assessed by determining the following: the available personnel and their level of training and experience; stock levels of malaria commodities, equipment, and other supplies; access to health services; availability of referral services; and other supporting factors, such as transport mechanisms, communication systems, and security machinery. This information should be relayed to relevant stakeholders for support and mobilisation of additional resources. Stakeholders include the affected communities, county and sub-county administration, local authorities, implementing partners, MOH at both national and county levels, other line ministries, and international organisations.

3.2.2. Epidemic Notification and Declaration

Notification of a suspected malaria outbreak is triggered when alert threshold for a particular locality/population in a specified time is reached. A rapid investigation is carried out to establish and confirm malaria cases. If the rapid assessment team determines that there is an epidemic, the Cabinet Secretary for Health/Director General of Health/Director of Promotive and Preventive Health/County Executive Committee Member for Health/Chief Officer of Health should declare the occurrence of the outbreak to the general public. For the epidemics occurring in the United Nation refugee camps, declaration is done by the United Nations.

3.2.3 Mobilisation of Resources

The DDSR should review the rapid assessment report and determine the resources needed to respond to the epidemic in the affected areas. The DDSR should then rapidly mobilise the resources required from the county, regional depots, and national emergency buffer stocks and distribute them immediately to the affected areas. Additional resources may be mobilised from WHO and other partners.

Resources required for epidemic response include the following:

- Personnel: clinicians, epidemiologists, public health officers, nurses, disease surveillance officers, malaria control coordinators, entomologists, health promotion/education officers, health management information system staff, laboratory personnel, local health partners, and CHVs
- Laboratory equipment and supplies: microscopes, reagents, and other consumables (Annex 4)
- Vector control commodities, equipment, and supplies: long-lasting insecticidal nets, IRS equipment, insecticides, protective equipment
- Logistics: transport to the affected areas, referral logistics, transportation of emergency commodities, fuel, security
- Emergency response funds

3.2.4 Response Activities

The aim of malaria epidemic response is to reduce transmission and mortality by treating those who are infected and preventing new infections. Access to early diagnosis and effective treatment of all malaria patients will minimise mortality. Response activities include the following:

- Case management
- Advocacy, community mobilisation, and health education
- Vector control
- Cross-cutting interventions during malaria epidemics (e.g., increased surveillance)

3.2.5 Strengthening Malaria Case Management During Epidemics

The sub-county MOH and the sub-county public health emergency management committee (SCPHEMC) should immediately strengthen the capacity of health personnel in both public and private health facilities to conduct early diagnosis and appropriate treatment of malaria cases according to the national guidelines for the diagnosis, treatment, and prevention of malaria. The SCMOH should ensure an uninterrupted supply of effective antimalarials and other ancillary and laboratory supplies, including blood transfusion supplies. Annex 7 outlines the drugs, supplies, and other materials required for the management of malaria in an epidemic situation. Temporary treatment centres and outreach clinics should be established to increase coverage of and access to health services.

After an epidemic has been confirmed, the following treatment options should be adopted in consultation with the SCMOH:

- Testing of suspected cases and treatment of all persons who test positive for malaria
- Strengthening the referral system to ensure that malaria cases have access to appropriate management at all times. The staff in the peripheral facilities must understand the criteria for referral and remain conversant with emergency treatment necessary before referral. This should include the following:
    - Initiation of pre-referral treatment with intra-muscular artesunate or rectal artesunate in children under six years of age (intra-muscular quinine may be used in the absence of intra-muscular artesunate)
    - Management of fever by the administration of antipyretics and use of other mechanical methods in children under five years of age
    - Initiation of transportation for the referred patients

3.2.6 Community Mobilisation and Health Education

Community mobilisation and health education activities should be initiated, focusing on the following:

- How to recognise signs and symptoms of malaria disease using lay case definitions
- Importance of testing suspected cases and treatment of confirmed malaria cases as per the current treatment guidelines
- Where to access appropriate treatment for malaria
- How to prevent malaria and access malaria control services and commodities

In addition, targeted SBC messages and information, education, and communication materials should be distributed with messages on the following:

- Early treatment-seeking for suspected cases
- Personal protection with recommended insecticide-treated materials (ITMs) (e.g., ITNs)
- Other appropriate vector control measures (e.g., IRS where feasible)
- Environmental control to minimise mosquito breeding sites

Repeated verbal communication should be emphasised as a means of obtaining full understanding of SBC messages.

3.2.7 Strengthening Vector Control Activities During Epidemics

Appropriate vector control interventions based on the integrated vector management policy guidelines should be implemented. These include targeted distribution of ITNs to households in the affected areas. Focalised IRS can be done where feasible (i.e., existence of trained spray operators, right spray equipment, and availability of effective insecticide based on local entomological surveillance data). For IRS to be effective, the coverage rate should reach more than 85 percent. IRS can be conducted within two weeks of epidemic onset. Vector surveillance should be conducted to determine effectiveness of the IRS. Affected communities should be encouraged to undertake domestic environmental management and modifications activities to control mosquito breeding and biting at the community level.

3.2.8 Strengthening Disease Surveillance During Epidemics

Routine surveillance should be strengthened during the epidemics, including line listing and analysis of cases. Close monitoring of cases, deaths, and trends should be done at all health facilities in the affected areas. Data should be compiled daily, and processed and analysed by the SCPHEMC before being transmitted to the county and national levels. Feedback should always be given to the health facilities, treatment centres, and other entities generating data during the epidemic.

3.2.9 Coordination of Epidemic Response Activities

The SCMOH, in liaison with the SCPHEMC and the sub-county disaster committee, should coordinate response activities supported by their county health management teams and the DDSR at the national level. The DNMP, through the DDSR, should provide strategic advice to the county and sub-county epidemic response teams. Response teams at all levels should do the following:

- Meet weekly to review the epidemic situation and morbidity and mortality trends
- Examine stock levels and flow of resources as well as constraints in the overall containment of the epidemic
- Use emerging information to re-plan response activities
- Frequently brief the community and local partners through various media (e.g., press releases/ radio/TV, public barazas, interviews, and reports on the epidemic situation)

4.0 MONITORING AND EVALUATION OF MALARIA EPIDEMIC PREPAREDNESS AND RESPONSE

4.1 Monitoring Malaria Epidemic Preparedness and Response

Monitoring and evaluation is an integral component of enhancing the tracking of input, process, and output indicators effective for management (prevention and containment) of malaria epidemics.

Monitoring of ongoing malaria epidemic preparedness and response activities should be implemented at community, health facility, sub-county, county, and national levels. Process indicators should be measured to ensure that all activities are implemented as planned and to identify problems and challenges faced during the implementation.

The indicators for malaria EPR should be monitored to ensure that all activities are implemented as planned. Challenges faced during the implementation should be identified and appropriate remedies applied. Table 5 shows the indicators for malaria EPR as stated in the Kenya Malaria Strategy 2019–2023.

Table 5. Indicators for EPR in the Kenya Malaria Strategy 2019–2023

Input indicators	Amount of funds available for malaria EPR activities EPR guidelines
Process indicators	Number of EPR planning and review meetings held Number of health workers trained on malaria EPR
Output indicator	Proportion of reported epidemics responded to within two weeks
Outcome indicator	Proportion of targeted sub-counties reporting malaria threshold data weekly

Monitoring of malaria EPR indicators should be done across all levels of the health system. Table 6 shows the indicators that should be monitored across the different levels and stages of EPR.

Table 6. Indicators for monitoring and evaluation of malaria EPR

Level	Components of EPR			
	Preparedness	**Prevention**	**Early detection**	**Response**
Community	Number of functional community health units, CHVs, and CHAs Proportion of CHVs and CHAs trained on community case management for malaria in epidemic-prone areas Number of CHVs trained on identification of potential mosquito breeding sites Number of CHVs trained on malaria vector surveillance	Number of CHVs oriented on SBC messaging for malaria	Number of CHVs reporting monthly malaria data	Number of suspected malaria cases at community level diagnosed and treated as per guidelines during epidemics Number of malaria cases referred to the health facility during epidemics Number of households reached with targeted malaria SBC messages during epidemics Number of households that received targeted ITNs during epidemics Number of households protected through focalised IRS in targeted epidemic-prone areas Number of potential mosquito breeding sites identified

Level	Components of EPR			
	Preparedness	**Prevention**	**Early detection**	**Response**
Health facility	Proportion of health workers trained on malaria EPR Number of health facilities adequately stocked with malaria commodities Number of health facilities with EPR guidelines	Availability of appropriate SBC messages Number of ITNs distributed to pregnant women and children under one year of age	Availability of updated weekly malaria trend graphs Availability of updated weekly malaria thresholds at sentinel sites	Availability of adequate buffer stocks during epidemics Availability of malaria line listing during an epidemic Proportion of suspected malaria cases that test positive during an epidemic Percentage of patients with confirmed malaria correctly managed within 24 hours of onset of symptoms, as per the national guidelines Percentage of patients with severe malaria correctly managed within 24 hours of onset of symptoms, according to the recommended guidelines Number of deaths due to malaria during the epidemic Case fatality rate during the epidemic

Level	Components of EPR			
	Preparedness	**Prevention**	**Early detection**	**Response**
Sub-county	Proportion of functional community health units Proportion of health facilities in epidemic-prone sub-counties with an updated EPR plan Proportion of health facilities with malaria EPR guidelines Proportion of health workers in the sub-county trained on malaria epidemic preparedness Proportion of facilities with adequate malaria commodities Proportion of facilities with diagnostic services Proportion of health facilities with a disease outbreak response plan Proportion of healthcare workers trained on vector surveillance	Number of ITNs routinely distributed in the sub-county Proportion of health facilities with appropriate malaria SBC messages	Number of epidemics detected and reported within one week of onset Number of malaria sentinel health facilities and entomology sentinel sites in the subcounty Number of sentinel health facilities with set and up-to-date malaria thresholds Proportion of sentinel health facilities reporting timely weekly malaria thresholds	Proportion of health facilities with adequate buffer stocks Proportion of health facilities with diagnostic capacity (i.e., commodities, equipment, and personnel) Proportion of health facilities reporting stockouts of antimalarial commodities during the epidemic Proportion of epidemic episodes responded to within two weeks of onset Proportion of suspected malaria cases tested during the epidemic Number of confirmed malaria cases reported during the epidemic Malaria test positivity rate Number of deaths due to malaria Case fatality rate during the epidemic

Level	Components of EPR			
	Preparedness	**Prevention**	**Early detection**	**Response**
County	Proportion of epidemic-prone sub-counties with trained EPR teams Proportion of epidemic-prone sub-counties with updated EPR plans Proportion of sub-counties with EPR guidelines Proportion of sub-counties with adequate malaria commodities Proportion of sub-counties holding monthly data review meetings Availability of county emergency kit	Proportion of sub-counties with appropriate malaria SBC messages Number of ITNs routinely distributed in sub-counties	Proportion of epidemic-prone sub-counties with set and up-to-date malaria thresholds Proportion of epidemic-prone sub-counties reporting timely weekly malaria threshold data Availability of an updated malaria risk map in the county Number of sub-counties with sentinel facilities	Proportion of sub-counties with rapid response teams Proportion of sub-counties with adequate buffer stocks Proportion of detected epidemics responded to within two weeks of onset Proportion of sub-counties that submitted timely weekly line lists of cases during the epidemic Proportion of suspected malaria cases tested during the epidemic Number of confirmed malaria cases recorded during the epidemic Malaria test positivity rate Number of deaths due to malaria Case fatality rate during the epidemic Proportion of assessed rechecked slides concordant at county malaria reference laboratories during the epidemic

Level	Components of EPR			
	Preparedness	**Prevention**	**Early detection**	**Response**
National	Availability of a budget allocated for malaria epidemic response Proportion of targeted counties with EPR plans Availability of national EPR guidelines Number of EPR review and planning meetings held Number of EPR subcommittee meetings held Availability of buffer stocks for emergencies at the central level (i.e., Kenya medical supplies authority)	Proportion of counties with appropriate pre-designed malaria SBC messages Number of ITNs routinely distributed in epidemic-prone counties	Availability of malaria epidemic risk maps Number of malaria epidemics detected	Number of rapid assessments conducted Proportion of malaria epidemics responded to within two weeks of onset Proportion of counties with adequate buffer stocks Proportion of suspected malaria cases tested during epidemics Number of confirmed malaria cases during epidemics Malaria test positivity rate during epidemics Number of deaths due to malaria during epidemics Case fatality rates during epidemics Proportion of assessed rechecked slides concordant at national malaria reference laboratories Entomological inoculation rate

5.0 Post-Epidemic Evaluation

A post-epidemic evaluation is an assessment conducted to document the successes and failures of interventions and indicate whether the early warning, detection, and response systems had the expected impact on the burden of malaria. The objective of post-epidemic evaluation is to improve preparedness and response in the event of another epidemic. A post-epidemic team comprising relevant personnel from the county and national levels should be constituted to assess the event retrospectively. The assessment addresses the impact, response, verification, early detection, early warning, and forecasting, in that order (WHO, 2018). Table 7 provides a detailed checklist of post-epidemic assessment activities. A post-epidemic evaluation report should be written to document the findings and should be disseminated to the relevant entities and stakeholders. A format for the post-epidemic report is outlined in Annex 6.

Post-epidemic evaluation should measure the indicators specific to the preparedness and response activities, in addition to other relevant indicators articulated in the malaria monitoring and evaluation plan. These may include the following:

- Malaria case fatality rate during the epidemic
- Proportion of out-patient and in-patient malaria cases during the epidemic
- Percentage of health facilities reporting no stockouts of antimalarial commodities following the onset of the epidemic
- Coverage of focalised IRS where it is implemented as a response to the epidemic

Table 7. Checklist for post-epidemic evaluation activities

Level	Components of EPR			
	Preparedness	Prevention	Early detection	Response
Community	Were community systems for malaria available in the affected area? Were community health workers (CHVs and CHAs) available in the affected area? Were CHVs and CHAs treating and referring fever cases?	Were mosquito nets available and used by households in the affected area?	Were there reports of any deaths due to malaria in the affected community? Were there reports of other sudden occurrence of unexplained disease?	Were the communities involved in dissemination of information on the epidemic?

Level	Components of EPR			
	Preparedness	Prevention	Early detection	Response
Health facility	Did the health facilities in the affected area collect adequate surveillance data during the epidemic (e.g., testing rate, test positivity rate)? Were the health workers in the affected area trained on malaria case management?	Were ITNs routinely distributed at health facilities in the affected area? Were there diagnostic commodities for malaria? Were there adequate anti-malarial drugs?	Did the health facilities use surveillance data to draw charts against the set thresholds to detect the outbreak?	What action was taken immediately after detection? Were there sufficient stocks of antimalarials and other medical supplies to respond to the epidemic? Were the current treatment guidelines available in the health facilities?

	Preparedness	Prevention	Early detection	Response
Sub-county	Did the health facilities in the affected area have EPR plans? Did the sub-county have an EPR plan? How many health workers were trained on epidemic preparedness? What proportion of facilities had adequate EPR resources (antimalarials, diagnostic services, and other supplies)? Did the sub-county have an effective communication system with the facilities and communities? Did the sub-county have an outbreak response plan? What proportion of health facilities had a disease outbreak response plan?	Was there distribution of insecticide treated nets in the sub-county? Did the sub-county have appropriate SBC messages?	What proportion of health facilities in the affected areas had updated surveillance graphs to detect epidemics? How was the notification made to the sub-county? What was the time lag between notification? and response? If more than two days, what were the reasons? How was the epidemic verification process done? What was the time lag of communication between the sub-county, county, and national levels?	Were there sufficient stocks and medical supplies available for rapid distribution to the affected facilities? Were there sufficient diagnostic facilities? Were there sufficient personnel to handle the epidemic? Was there effective communication between the facilities and the sub-county level? What was the lag time between the epidemic detection and field response? Were there stockouts of antimalarial commodities during the epidemic? Were there vector control activities during the epidemic? How well were the activities executed? How many malaria cases were treated during the epidemic? How many deaths due to malaria were reported during the epidemic?

	Preparedness	Prevention	Early detection	Response
County	Did the affected sub-counties have trained and functional EPR teams? What proportion of the sub-counties had updated EPR plans? What proportion of targeted sub-counties had adequate malaria commodities? Was the frequency of supportive supervision to the sub-counties affected by the epidemic? Did the county hold meetings for the malaria coordination stakeholders?	Was there targeted distribution of ITNs in the county? Did the county have appropriate pre-designed malaria SBC messages?	What proportion of sub-counties had updated surveillance structures in place? Did the county have an updated malaria risk map? Did the affected sub-counties send timely reports on the epidemic?	Did the county health management team conduct supportive supervision to the sub-counties affected by the epidemic? Did the county conduct review meetings during and after the epidemic? Were situation reports shared to the next level and with other stakeholders during the epidemic? Were quality assurance services undertaken?
National	Was there a budget allocated for malaria epidemic response? Were there adequate EPR resources (effective antimalarial drugs, commodities, and logistics) What proportion of targeted sub-counties had EPR plans? Were EPR planning meetings held?	Were appropriate SBC messages developed and disseminated to the counties? Were ITNs procured? Were the ITNs distributed to the counties?	Has a national malaria epidemic risk map been developed? What proportion of malaria epidemics detected was responded to within two weeks of onset?	Was there timely communication on epidemic risks from the sub-county, county, and national levels? How effective was the national support in responding to the epidemic? Was there adequate budget allocated for the epidemic response? Did the national level conduct review meetings during and after of the epidemic? Were situation reports shared with the counties and other stakeholders during the epidemic? Was quality assurance undertaken?

6.0 MANAGEMENT OF MALARIA IN COMPLEX EMERGENCIES

6.1 Definition of a Complex Emergency

Complex emergencies are defined as situations affecting large civilian populations, occasioned by war or civil strife, food shortages, and population displacement. *P. falciparum* malaria can be rapidly fatal and is a priority during the acute phase of an emergency to prevent excess morbidity and mortality (WHO, 2013).

6.2 Background

Malaria control in complex emergencies poses a major challenge in many settings. Complex emergencies often result in breakdown of existing health services and programmes, displacement of health workers and field staff, movement of non-immune people to endemic areas, and concentrations of people, often already in poor health, in high-risk, high-exposure settings. As a result, everyone may be at risk of contracting the disease, with higher case fatality rates.

In Kenya, natural calamities and political unrest have displaced populations, leading to malaria outbreaks. Kenya hosts some of the largest refugee camps in the world (i.e., Dadaab and Kakuma). Malaria outbreaks have occurred in these refugee camps, often coinciding with increased influx of population into the camps. Malaria upsurges have also been reported in parts of Baringo County as a result of health services breakdown due to insecurity. Whenever such epidemics occur, mobilising resources to manage the cases and reduce the number of deaths requires unique strategies that respond to the complex situation.

6.3 Situations Leading to Complex Emergencies

- Several situations can lead to complex emergencies, including the following:
- Civil unrest
- Tribal/ethnic conflicts
- War
- Disasters (natural or man-made) (e.g., drought, floods, cyclones, fires, landslides)

These situations often result in large populations of internally displaced persons and refugees.

6.4 Factors that Contribute to Increased Malaria Burden in Complex Emergencies

- Several factors contribute to increased malaria burden in populations affected by complex emergencies. These include the following:
- Breakdown of health services and malaria control programmes
- Ongoing conflict that limits access to effective treatment
- Movement of non-immune population from non-malarious or low-transmission areas to areas of high transmission

- Weakened immunity because of multiple infections and malnutrition
- Increased exposure to *Anopheles* mosquitoes due to poor or absent housing
- Environmental deterioration, resulting in increased vector breeding sites
- Lack of intervention tools to prevent human-vector contact

Managing malaria epidemics in complex emergencies is therefore more difficult than managing epidemics in stable situations. Although malaria epidemics do not always occur in complex emergencies, it is important to include malaria in the assessment, planning, implementation, and monitoring of the overall response to complex emergencies.

6.5 Malaria Prevention in Complex Emergencies

Intervention tools used in complex emergencies include vector control through IRS, personal protection against mosquito bites using ITMs, and intermittent preventive treatment during pregnancy to avert severe anaemia and low birth weight. The strategies for malaria prevention will change during the different phases of a complex emergency, and it is important for field workers to know what to do during the different phases. Complex emergencies often evolve rapidly and unpredictably, and dividing the emergencies into phases can help guide how humanitarian aid should be implemented. These phases broadly consist of acute and chronic phases.

6.5.1 Acute Phase

- In the acute phase, the decision is made to institute malaria prevention and control interventions. Key factors to be considered include the following:
- Whether there is risk of transmission
- Type of housing, mobility, and sleeping arrangements in the affected areas
- Behaviour of the local vector

IRS may be difficult to implement in mobile populations, but ITNs or other ITMs may be appropriate, and aerial spray, such as fogging, may be considered in settlements. If the population is not accustomed to the use of bed nets or the shelter is very basic, ITMs, such as curtains, tents, hammock nets, blankets, top sheets, and clothing, may be more acceptable and feasible than nets.

Priority in this phase should therefore be prompt and effective treatment of all malaria episodes. Where possible, treatment should be complemented with intervention tools that reduce human-vector contact for targeted individuals or priority vulnerable groups at high risk of severe malaria and death, such as children under five years of age and pregnant women. IRS may be considered in well-organised settings, such as transit camps.

6.5.2 Chronic Phase

As the situation in a complex emergency improves, it moves to the chronic phase. The population becomes less mobile, and the possibility of using longer-term approaches, such as ITNs or other ITMs and IRS, should be explored. Improvement in the security situation, access,

and reduced mobility may also present opportunities for providing information and education about personal protection methods to the population.

Other ITMs that may be used, depending on availability, include hammock nets, tents, insecticide-treated plastic sheeting, blankets, top sheets, clothing, and curtains. Carrying out appropriate source reduction strategies through environmental manipulation and modification to get rid of mosquito breeding sites should also be explored.

Table 8 summarises key considerations to make before making decisions on ITN distribution in complex emergency situations.

Table 8. Distribution of ITNs by phase of emergency and level of malaria transmission

Phase of emergency	Recommendations
Acute phase emergencies in malaria-endemic areas	Use ITNs for all beds/patients in hospitals and therapeutic feeding centres (TFC), and provide ITNs to the households of TFC patients on discharge. Distribute ITNs to pregnant women and children under five years of age provided that the following two preconditions are met: ITNs have been stockpiled in advance. The community is used to using ITNs.
Acute phase emergencies in low malaria risk areas	Use ITNs only in clinical settings (TFC beds, hospital beds). Distribute ITNs to pregnant women and children under five years of age.
Chronic phase emergencies in malaria-endemic areas	(a) Ensure that ITN distribution for the acute phase emergency is met. (b) Extend ITN coverage to the entire households of pregnant women and children under five years of age, with catch-up distribution schemes through antenatal care, immunisation programmes, and primary healthcare. (c) Distribute ITNs through regular catch-up distribution schemes to people with known HIV infection or strong clinical suspicion of AIDS in most vulnerable groups. If supplies remain after a, b, and c have been completed, extend ITN distribution to the affected population in general.
Chronic phase emergencies in low malaria risk areas	Interventions are the same as those for chronic phase emergencies in malaria-endemic areas.

6.6. Diagnosis and Treatment of Cases in Complex Emergencies

In large epidemics in complex emergency situations, it may be impossible to confirm every case by malaria rapid diagnostic test or microscopy. Therefore, in the acute phase, mass treatment of malaria and fever cases with artemisinin-based combination therapy is appropriate as a strategy for reducing mortality, as long as malaria has been established as the cause of the epidemic and a consensus has been reached on a clinical case definition of malaria. Random sampling of one in five cases using a malaria rapid diagnostic test should be done periodically to determine the positivity rate. Everyone with a positive parasitaemia result for malaria should be treated immediately, regardless of symptoms. Priority should be given to pregnant women and children under five years of age because they are at particularly high risk of severe disease and death.

Treatment should follow the existing national malaria treatment guidelines. Pre-referral treatment of severe cases can be improved by using intramuscular artesunate to cover the period of transport to a hospital. If there is a high caseload of severe cases in in-patient facilities, management can be simplified by using intramuscular artemether.

In complex emergencies, the sub-county health management team should ensure that:

- There are sufficient treatment points to allow the affected population to easily access treatment.
- The treatment centres should provide effective diagnosis and case management by providing sufficient resources. Annex 7 provides a list of resources required.
- Access to prompt treatment should be provided to all but with an emphasis on treatment to vulnerable groups.

6.7 Assessment and Planning for Epidemic Response in Complex Emergencies

Assessment in a humanitarian emergency context is used primarily to determine the level of malaria risk and the capacity to respond. The following guiding principles can be used for the assessment, planning, and selection of malaria control activities:

- Maximise the use of existing information at international, national, subnational, and community levels
- Carry out rapid surveys if existing information is inadequate or inaccessible
- Link malaria control interventions to current effective national policies
- Use available local expertise to assist with the selection of malaria control options
- Involve affected populations in decision making and action

6.8 Essential and Desirable Information

In an emergency, information about the demographics of affected populations, local malaria parasites, vectors, malaria endemicity, transmission, and response capacity is critical in planning and implementing control measures. General information is needed to:

- Identify current health priorities and potential health threats
- Assess the capacity and resources available to respond
- Collect baseline information for monitoring and evaluating the effectiveness of planned interventions

Malaria-specific information that must be collected should include the following:

- Population size
- Whether the area has high or low malaria transmission
- Proportion of malaria cases (suspected and confirmed) at the health facility and severity of disease (parasite species, mortality, anaemia, low birth weight, spontaneous abortions, and stillbirths)
- Types of dwellings and locations in relation to breeding sites
- Vector species and seasonal density changes
- Vector behaviour (feeding habits, biting time, host preference, location, and resting habits [i.e., inside or outside])
- Availability of antimalarials and insecticides
- Staff capacity and availability, and accessibility of health services and potential partners

6.9 Community Participation

Community participation and health education are often seen as being of low priority in humanitarian emergencies. In conflict-affected areas, reaching populations, especially internally displaced persons, poses multiple challenges, including access to the displaced persons and security threats. In spite of this, community participation and health education are essential for the success of malaria control interventions in humanitarian emergencies. Successful prevention and preparedness require the active involvement of communities in malaria control programmes. SBC programmes should be in place before an emergency occurs. Following the onset of an emergency, key messages and risk communication strategies need to be ready for rapid implementation. Affected communities should be involved in SBC activities.

6.10 Sources of Information

Basic information on malaria in the country can often be found in the national malaria strategic plan, reports of recent malaria programme reviews, WHO annual World Malaria Reports, the Roll Back Malaria Partnership, country facts, country-specific Malaria Operational Plans of the U.S. President's Malaria Initiative, Global Fund country grant portfolios, contingency information vector ecology profiles from the U.S. Armed Forces Pest Management Board (https://www.acq.osd.mil/eie/afpmb/), and information on national registration status and vector-borne disease data from major WHO Pesticide Evaluation Scheme-approved pesticide manufacturers.

REFERENCES

Chataway, J.H.H. (1929). Report on the malaria epidemic in the Lumbwa Reserve (August, 1928). *Kenya and East African Medical Journal, 5*, 303-9.

Division of National Malaria Programme. (2019). Unpublished data.

Githeko, A.K., & Ndegwa, W. (2001). Predicting malaria epidemics in the Kenyan highlands using climate data: A tool for decision makers. *Global Change and Human Health, 2*(1), 54-63.

Lynch, C. (2005). Forecasting malaria epidemics. *Humanitarian Exchange Magazine, 31.*

Ministry of Health (MOH). (2016). *The epidemiology and control profile of malaria in Kenya: Reviewing the evidence to guide the future of vector control.* Nairobi, Kenya: National Malaria Control Programme, MOH.

Ministry of Health (MOH), National Malaria Control Programme. (2019). *Kenya malaria strategy 2019–2023.* Nairobi, Kenya: MOH.

Ministry of Public Health and Sanitation. (2012). *Technical guidelines for integrated disease surveillance and response in Kenya, 2nd edition.* Nairobi, Kenya: Ministry of Public Health and Sanitation.

Mulambalah, C.S. (2018). An evolving malaria epidemic in Kenya: A regional alert. *CHRISMED Journal of Health and Research, 5*, 162.

Mwangangi, J.M., Muturi, E.J., Muriu, S.M., Nzovu, J., Midega, J.T. & Mbogo, C. (2013). The role of *Anopheles arabiensis* and *Anopheles coustani* in indoor and outdoor malaria transmission in Taveta District, Kenya. *Parasites & Vectors, 6*, 114.

National Malaria Control Programme (NMCP), Kenya National Bureau of Statistics (KNBS), and ICF International. (2016). *Kenya malaria indicator survey 2015.* Nairobi, Kenya, and Rockville, Maryland, USA: NMCP, KNBS, and ICF International.

World Health Organization (WHO). (2013). *Malaria control in humanitarian emergencies: An inter-agency field handbook, 2nd edition.* Geneva, Switzerland: WHO.

World Health Organization (WHO). (2018). *Malaria surveillance, monitoring & evaluation: A reference manual.* Geneva, Switzerland: WHO.

GUIDELINE REVIEW TEAM

NAME	ORGANIZATION
Abduba Dabassa	Division of National Malaria Programme
Absalom Kuya	Turkana County
Ahmedin Omar	Division of National Malaria Programme
Anastacia Muange	Division of Disease Surveillance and Response
Andrew Wamari	Division of National Malaria Programme
Angela Ng'etich	Population Services Kenya
Beatrice Machini	Division of National Malaria Programme
Bryan Ateka	Trans-Nzoia County
Catherine Kilonzo	Field Epidemiology and Laboratory Training Programme
Charles Chege	Division of National Malaria Programme
Christine Wayua	Division of National Malaria Programme
Daniel Wacira	USAID/PMI
David Gikungu	Kenya Meteorological Department
Debora Ikonge	Division of National Malaria Programme
Dickson Kigwenai	Narok County
Edward Ole Tankoi	Narok County
Francis Njoroge	Garisa County
Fredrick Ouma	Field Epidemiology and Laboratory Training Programme
Grace Ikahu	Division of National Malaria Programme
Jacinta Omariba	Division of National Malaria Programme
Jacinta Opondo	Division of National Malaria Programme
Jackline Kisia	Division of National Malaria Programme
Jackson Njoroge	Division of Disease Surveillance and Response
James Kiarie	Division of National Malaria Programme
James Sang	Division of National Malaria Programme
Jared Oure	Amref Health Africa
Joan Manji	Kenya Medical Supplies Authority
Joel Karagoi	Division of National Malaria Programme
Joseph Nzou	Garissa County
Joy Gakenia	Division of National Malaria Programme
Kiambo Njagi	Division of National Malaria Programme
Lenson Kariuki	Division of National Malaria Programme
Paul Kiptoo	Division of National Malaria Programme
Phillip Bett	Trans-Nzoia County

NAME	ORGANIZATION
Phillip Ngere	Division of Disease Surveillance and Response
Regina Kandie	Division of National Malaria Programme
Rosebella Kiplagat	Division of National Public Health Laboratories
Salome Onyando	Population Services Kenya
Samuel Kigen	Division of National Malaria Programme
Samuel Lokemer	Turkana County
Sophie Githinji	MEASURE Evaluation
Stephen Aricha	Division of National Public Health Laboratories
Stephen Munga	Consultant
Welby Chimwani	Division of National Malaria Programme
Yusuf Suraw	Division of National Malaria Programme

ANNEX 1. LIST OF EPR COUNTIES AND SUB-COUNTIES

BARINGO COUNTY
Baringo Central
Baringo North
Marigat
Mogotio
Koibatek
Tiaty
BOMET COUNTY
Bomet Central
Bomet East
Chepalungu
Konoin
Sotik
BUNGOMA COUNTY
Cheptais
Mt Elgon
Tongeren
ELGEYO MARAKWET
Keiyo North
Marakwet East
Keiyo South
Marakwet West
EMBU COUNTY
Mbeere North
Mbeere South
Runyenjes
GARISA COUNTY
Balambala
Dadaab
Fafi
GARISSA
Hulugho
Ijara
Lagdera

MARSABIT COUNTY
Laisamis
Moyale
North Horr
Saku
MERU COUNTY
Igembe Central
Igembe South
NANDI COUNTY
Aldai
Chesumei
Emgwen
Mosop
Nandi East
Tinderet
NAROK COUNTY
Narok East
Narok North
Narok South
Narok West
Transmara East
Transmara West
NYAMIRA COUNTY
Borabu
Manga
Masaba North
Nyamira
Nyamira North
SAMBURU COUNTY
Samburu Central
Samburu East
Samburu North

ISIOLO COUNTY
Garbatulla
Isiolo
Merti
KAJIADO COUNTY
Kajiado Central
Kajiado East
Kajiado North
Kajiado West
Loitokitok
KAKAMEGA COUNTY
Likuyani
Lugari
KERICHO COUNTY
Ainamoi
Belgut
Bureti
Kipkelion East
Kipkelion West
Sigowet Soin
KISII COUNTY
Bobasi
Bomachoge Borabu
Bomachoge Chache
Bonchari
Kitutu Chache North
Kitutu Chache South
Nyaribari Chache
Nyaribari Masaba
South Mugirango
KITUI COUNTY
Kitui Central
Kitui East
Kitui Rural

TANA RIVER COUNTY
Bura
Galole
Garsen
THARAKA NITHI COUNTY
Tharaka North
Tharaka South
TRANS NZOIA COUNTY
Cherangany
Endebess
Kiminini
Kwanza
Saboti
UASIN GISHU COUNTY
Ainabkoi
Kapseret
Kesses
Moiben
Soy
Turbo
TURKANA COUNTY
Kibish
Loima
Turkana Central
Turkana East
Turkana North
Turkana South
Turkana West
WAJIR COUNTY
Eldas
Tarbaj
Wajir East
Wajir North
Wajir South
Wajir West

Kitui South
Kitui West
Mwingi Central
Mwingi North
Mwingi West
MANDERA COUNTY
Banissa
Kutulo
Lafey
Mandera East
Mandera North
Mandera South
Mandera West

WEST POKOT COUNTY
West Pokot
Pokot Central
Pokot South
Pokot North

ANNEX 2. HOW TO CALCULATE MALARIA EPIDEMIC THRESHOLDS

- The malaria epidemic threshold can be calculated with or without a computer. If computer use is not possible, use five-year data for easy comparison. The steps in the calculation are as follows:
- Collect out-patient department data for the weekly number of confirmed malaria cases for the five years preceding the year of interest (current calendar year).
- Arrange the data by putting weekly data in 52 rows and yearly data in 5 columns, as shown below.

Week	Year 1	Year 2	Year 3	Year 4	Year 5	Current year
1						
2						
3						
4						
5						
6						
…						
52						

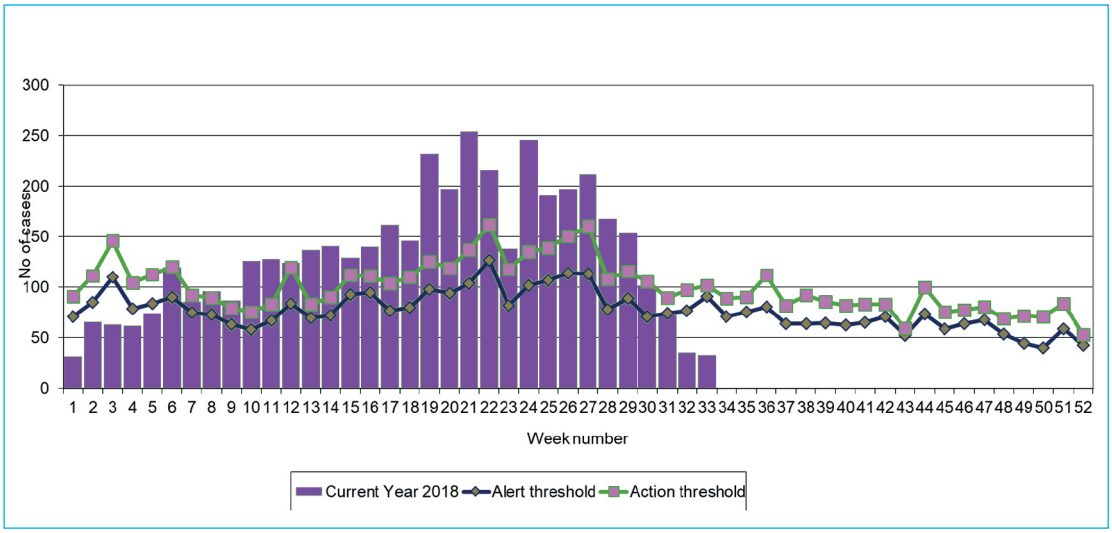
- For each week across the past five years, sort or, sort or rank the numbers from lowest to highest, and write them in that order.
- The middle number in each series is the median. Take the median for each week and plot the points on a graph of cases by week, and then join the points with a line.
- This is the average number of cases expected per week.
- The second-highest number in each series or column represents the third quartile.
- Take the third quartile numbers for each week and plot them on a graph of cases by month, and then join the points with a line. This is the alert threshold line.
- Recalculate thresholds at the beginning of each year by replacing the data from the oldest year with data from the most recent year.
- Plot the weekly number of confirmed cases for the current year in bars

If a computer is available:

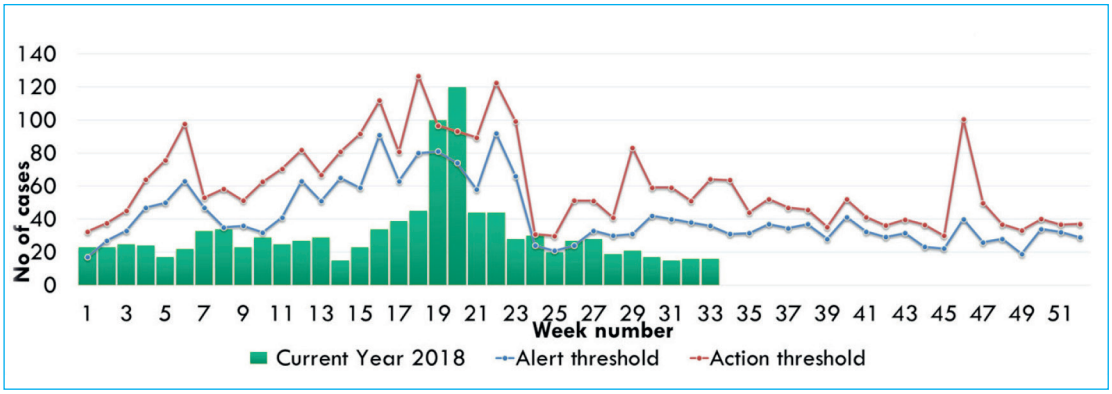
- Enter the data on weekly malaria out-patient department cases for the health facility in recent years in the columns as “year1,” “year 2,” ...., “year 5.” If you do not have five years of data, leave some of the columns blank (do not enter zeros).
- The third quartile, mean, and standard deviation can then be easily calculated using the functions in the Excel sheet. Once calculated, the third quartile and the mean+1.5 standard deviation can be shown on a graph (Figure 1).

- Health facilities should plot the weekly number of confirmed malaria cases and monitor them against the alert and action/epidemic thresholds.
- If the alert threshold is crossed, this is a signal for a possible epidemic. The health workers should closely monitor the cases and alert the sub-county to begin the necessary preparations, should the situation escalate to an epidemic.
- If the action/epidemic threshold is crossed, a rapid assessment should be conducted to confirm the epidemic and the necessary response actions initiated.

Number of monthly malaria cases compared with the alert threshold and action threshold at a health facility in Kenya (2013–2018).



Number of monthly malaria cases compared with alert threshold and action threshold at a health facility in Kenya 2013-2018



ANNEX 3. LABORATORY PROCEDURES DURING EPIDEMIC OUTBREAK

- **Sample Collection Procedure**

The use of specimens for malaria diagnosis requires that blood samples be collected and stabilised appropriately to ensure valid results. Both capillary through finger prick and venous blood samples are recommended. Larger volumes of venous blood are collected in EDTA tubes. The collected samples should be used for preparation of thick and thin blood films, malaria rapid diagnostic tests, and molecular analysis

- **Sample Processing**

Thick and Thin Films

Staining and examination of thick and thin film for malaria parasites according to recommended standard operating procedures in quality assurance guidelines for parasitological diagnosis of malaria

Malaria Rapid Diagnostic Tests

These are performed per the manufacturer's instructions.

Polymerase Chain Reaction

Extracted DNA from the DBS/EDTA samples, which is processed for genotyping using the manufacturer's instructions for confirmation of microscopy results and detection of other diseases

Quality Assurance for Malaria Blood Slides

Rechecking of malaria blood films is an important component of effective quality assurance.

Slide Selection Criteria for Rechecking

Select slides weekly for accuracy. Ten stained malaria slides are selected each month at the health facility responding to the epidemic and during outreach in hot spot areas. Five low density positive slides and five negative slides should be selected for rechecking as follows:

Week 1: Randomly select 2 weak positive slides and 1 negative slide=3 slides

Week 2: Randomly select 1 weak positive slide and 1 negative slide=2 slides

Week 3: Randomly select 1 weak positive slide and 1 negative slide=2 slides

Week 4: Randomly select 1 weak positive slide and 2 negative slides=3 slides

Total slides=10 slides

Note: Weak positive slides are slides having a count of 5 parasites per 200 white blood cells (200parasite/µl,) or less. If the number of slides examined is less than 10, select, select all slides.

The 10 slides selected should be sent to the county malaria reference laboratory for rechecking. Twenty-five percent of the rechecked slides should be sent to the national malaria reference for quality assurance.

- **Sample Storage and Transportation**

Samples should be safely packed to avoid spillage during transportation. The receiving laboratory should be informed ahead about the method of transport and anticipated time of receipt in the laboratory. Shipment of samples locally must adhere to World Health Organization safety guidelines on triple packaging of infectious material.

For plasma, whole blood and serum samples are refrigerated if they are to be shipped within a week or frozen for long-term storage. Frozen samples should be transported in cold chain. Slides for rechecking should be packed in slide mailers.

ANNEX 4. LIST OF LABORATORY EQUIPMENT, REAGENTS, AND OTHER CONSUMABLES

- Microscope
- Tally counters
- Giemsa stain
- Timer
- Slide-drying rack
- Blood slides
- Buffered water pH 7.2
- Beaker
- Pasteur pipette
- Whatman filter paper
- Giemsa powder or stain
- Absolute methanol
- Glycerol
- Methanol-cleaned solid glass beads
- Spatula or measuring spoon
- Weighing paper
- Graduated cylinder
- Plastic funnel
- Weighing balance
- Pasteur pipette with a rubber teat
- Disodium hydrogen phosphate, 500gms
- Potassium dihydrogen phosphate, 500 gms
- Oil immersion oil

ANNEX 5: LINE LIST FOR MALARIA CASES

2012 **MINISTRY OF HEALTH** MOH 503

IDSR HEALTH FACILITY LINE-LISTING FORM

HEALTH FACILITY: _____ SUB-COUNTY: _____ COUNTY: _____

__

DISEASE/CONDITION/EVENT: _____ DATE RECEIVED AT SUB-COUNTY: _____

A	B	C		D	E	F	G	H	I	J			K		L
No	Names	Patient Status (tick as appropriate)		Village or Town and Neighbourhood (Indicate major landmarks)	Sex	Age[1]	Date seen at health facility	Date of onset of illness	No. of doses of vaccine (Exclude doses given within 14 days of onset)[2]	Lab Tests			Outcome		Comments
		Out patient	In patient							Specimen taken (Yes/ No) If yes, date collected		Lab results	A-Alive	D-Dead	
										Date	Type				

[1] Age in years if more than 12 months, otherwise indicate number of months e.g. 4m, 7m.

[2] Include campaign (NIDs, SIDs) doses

ANNEX 6. POST-EPIDEMIC EVALUTION REPORT FORMAT

All epidemics must be documented in a scientific and systematic manner. The following is a recommended format for report writing:

Title of the Report

Introduction/Background Information

- Aim and Objectives of the Investigation
- Methodology of the Investigation

Results

- Summary of Major Findings/Description of Epidemics
- Period/Index Case/Time, Place, Person
- Laboratory Confirmation (Date)/Causal Agent
- Mode of Transmission
- Cases/Attack Rate
- Deaths due to Malaria/Case Fatality Ratio
- Distribution: Time, Place Person, Epidemic Curve, Mapping

Description of Response

- Coordination
- Monitoring/Surveillance
- Laboratory Surveillance
- Case Management
- Health Education
- Environmental Issues
- Community Involvement, etc.

Results of Response and Evidence of Impact

- Lessons Learnt/Self-Evaluation
- Conclusions and Recommendations

ANNEX 7. DRUGS, MATERIALS, EQUIPMENT, AND SUPPLIES

Drugs

Antimalarial drugs:

- Artemisinin-based combination therapies
- Artesunate injectable quinine
- Quinine tablets, dihydroartemisinin + piperaquine, injectable artemether

Anti-pyretics:

- Paracetamol tabs
- Injectable paracetamol

Anti-convulsants:

- Injectable penobarbitone
- Injectable diazepam

Other Supplies

Laboratory equipment and supplies:

- Microscopes
- Slides
- Lancets
- Malaria rapid diagnostic tests kits
- Reagents
- HemoCue

Blood transfusion:

- Blood transfusion sets
- Safe Blood
- Blood group antisera

Non-pharmaceuticals:

- Giving sets

- Cannulas
- Cotton wool
- Adhesive tapes
- Syringes and needles
- Infusion fluids: normal saline, dextrose, Hartmann's solution
- Thermometers.
- Gloves
- Spirit
- Branulas
- Safety boxes

ANNEX 8 RAPID ASSESSMENT CHECKLISTS

RAPID ASSESSMENT AT COMMUNITY LEVEL

Date:	[_____|_____|_____] [dd|mm|yyyy]
County:	Sub-county:
Name of Community Health Unit:	Name of Link Health Facility:
Interviewer/Supervision Team	
Name	Designation
1.	
2.	
3.	
4.	
5.	
Respondents	
Name	Designation
1.	
2.	
3.	

General Instructions

This checklist has three sections corresponding to the different phases of an epidemic/outbreak. The pre-epidemic section is to be completed if the visit is conducted before an outbreak occurs.

The epidemic section is to be completed during an on-going outbreak. The pre-outbreak section may also be completed to assess how prepared the affected region was before the outbreak occurred.

The post-epidemic section is to be completed after an outbreak is over. The pre-outbreak and epidemic sections may also be completed to assess preparedness and response activities of a past epidemic.

SCORING SCHEME

- Every correct response is awarded one mark (a score of 1).
- For every question that requires verification, availability of evidence is considered an additional mark.
- Qualitative questions shall not be scored but will be used by the assessing teams to identify facts for further action

Maximum possible score for the Community-level Rapid Assessment Tool = 97

Reviewed by: _____Date: _____

SECTION 1: PRE-EPIDEMIC PHASE

1 Coordination structures (Maximum possible score: 7)

a. Do you have a community health committee (CHC)? ☐ Yes ☐ No
(If no, skip to Q1c.)

b. If yes, how regularly do they meet? (Verify with minutes.)

☐ Weekly ☐ Monthly ☐ Quarterly

☐ Other (specify)_____

c. Do you hold monthly community health volunteer (CHV) review meetings? ☐ Yes ☐ No
(If no, skip to Q1f.)

d. Is malaria part of the agenda of the CHV review meeting? ☐ Yes ☐ No

e. Has malaria EPR been part of the agenda of the CHC meeting? ☐ Yes ☐ No

f. Have the CHVs been sensitised on malaria EPR? ☐ Yes ☐ No

g. Are there stakeholders supporting community malaria EPR activities? ☐ Yes ☐ No

2 Surveillance (Maximum possible score: 15)

a. Do you have updated lay case definition surveillance charts? ☐ Yes ☐ No

b. Are the following community health information systems tools available?
(If no, to skip to Q2d.)

MOH 513 (Household register) ☐ Yes ☐ No

MOH 514 (CHV monthly reporting tool) ☐ Yes ☐ No

MOH 515 (CHEWS summary) ☐ Yes ☐ No

MOH 516 (Chalkboard) ☐ Yes ☐ No

MOH 100 (Referral tool) ☐ Yes ☐ No

c. If yes, are malaria data captured using the tools? ☐ Yes ☐ No

d. Do you regularly collect malaria data from the households? ☐ Yes ☐ No
(If no, skip to Q2g.)

e. If yes, are reports regularly submitted to the CHA? ☐ Yes ☐ No

f. Do you get regular feedback on the reports submitted to the CHA? ☐ Yes ☐ No

g. Are there ways to monitor and report population and natural events that can be used to predict malaria epidemics? ☐ Yes ☐ No

h. Is the CHU undertaking community case management for malaria? (If no, skip to Q2j.) ☐ Yes ☐ No

i. If yes, do you use the CHU daily activity register for malaria commodities? ☐ Yes ☐ No

j. Do you submit a monthly report using the monthly summary form MOH 513 for malaria commodities? ☐ Yes ☐ No

3 Social and behaviour change (Maximum possible score: 11)

a. Do you have malaria SBC materials? (Verify.) ☐ Yes ☐ No

b. Are the SBC materials that you have adequate? ☐ Yes ☐ No

c. What channels of communication do you use in the community? (Tick all that apply.)

☐ House visits

☐ Community social meetings

☐ Community dialogue days

☐ Chiefs barazas

☐ School visit

☐ Radio

☐ IEC materials

☐ Other (specify)_____

4 What challenges do you experience with preparedness for malaria epidemics? (List.)

_____

_____

_____

5 How best can these challenges be addressed? (List.)

_____

_____

_____

SECTION 2: EPIDEMIC PHASE

1. Outbreak notification (Maximum possible score: 5)

a. How did you get to know about the current outbreak? *(Tick all that apply.)*

☐ Health facility

☐ Community

☐ Media

☐ MOH/County/Sub-county

☐ Other *(specify)* _____

2 Coordination of response (Maximum possible score: 12)

a. Are community outbreak meetings being held? (Check minutes to verify.)

☐ Yes ☐ No?

(If no, skip to Q2d.)

b. If yes, who attends?

Cadre	Yes	No
Clinical		
Laboratory		
Surveillance		
Pharmacy		
Community health assistant		
Public health officer		
Others (specify) _____		

c. How frequent are the community outbreak meetings held? (Check minutes to verify.)

☐ Daily ☐ Weekly ☐ Monthly

☐ Other (specify)_____

d. Is there any stakeholder support during the outbreak? ☐ Yes ☐ No

3 Mobilisation of resources (Maximum possible score: 4)

a. Have you received any support for the emergency malaria EPR supplies from the link health facility? ☐ Yes ☐ No

(If no, skip to Q4.)

b. If yes, how much of the following emergency malaria EPR supplies did you receive?

Name	Adequate	Inadequate	None
(i) ACT			
(ii) mRDTs			

c. Were the supplies delivered timely for the response? ☐ Yes ☐ No

4 Field response (Maximum possible score: 20)

a. Were the CHVs sensitised on the outbreak? ☐ Yes ☐ No
(If no, skip to Q4d.)

b. How many days after the onset of the outbreak were the CHVs sensitised?
☐ Within 1 week ☐ Within 2 weeks ☐ Within 1 month
☐ Other (specify)_____

c. Did you have enough CHVs required for the response? ☐ Yes ☐ No

d. Where do people first seek care when they get sick from malaria in this community?
☐ Health facility ☐ Private clinics ☐ Traditional herbalists
☐ Others (specify)_____

e. Were there temporary treatment centres set up during the outbreak?
(If no, skip to Q4i.)
☐ Yes ☐ No

f. If yes, did the temporary treatment centres have adequate healthcare workers?
☐ Yes ☐ No

g. Did the temporary treatment centre have adequate emergency malaria EPR commodities?
☐ Yes ☐ No

h. Was your CHU supported by RRTs during the outbreak? ☐ Yes ☐ No
(If no, skip to Q4k.)

i. If yes, which level did they come from? (Tick as applicable.)

☐ National

☐ County

☐ Sub-county

☐ Health facility

j. How many days after the onset of the outbreak did the first RRT support arrive?

☐ Within 1 day

☐ Within 3 days

☐ Within 1 week

☐ After 1 week

k. Were the following activities undertaken during the response?

Activity	Yes	No
Testing (mRDTs/microscopy)		
Treatment		
Case referrals		
Focalised IRS		
Targeted distribution of ITNs		
Environmental modification		
Others (specify) _____		

5 Enhanced surveillance (Maximum possible score: 9)

a. Did you get an outbreak malaria lay case definition? ☐ Yes ☐ No

b. If no, did you develop and use any outbreak case definition? ☐ Yes ☐ No

c. Was active case search undertaken? ☐ Yes ☐ No

d. Were outbreak case reports made daily? ☐ Yes ☐ No
(If no, skip to Q5i.)

e. If yes, were the reports sent to the health facility? ☐ Yes ☐ No

f. Did you get feedback from the health facility on the submitted reports? ☐ Yes ☐ No

g. Did you analyse the daily report? ☐ Yes ☐ No

h. If yes, did you share the analysis with the community? ☐ Yes ☐ No

i. Were mosquito breeding sites monitored during the outbreak? ☐ Yes ☐ No

6 Social behaviour change (SBC) activities (Maximum possible score: 7)

a. Did you disseminate SBC messages during the outbreak response to the community?

☐ Yes ☐ No

(If no, skip to Q6c.)

b. If yes, what channels were used? (Tick all that apply.)

☐ Interpersonal communications

☐ Community networks—CHVs, churches, barazas, schools

☐ IEC materials

☐ Others (specify)_____

c. Did you receive any IEC materials from the health facility? ☐ Yes ☐ No
(If no, skip to Q7.)

d. Did you distribute malaria IEC materials to the community? ☐ Yes ☐ No

7 What challenges did you face in responding to the outbreak? (List.)

_____

_____

_____

8 How best do you think these challenges could be addressed? (List.)

_____

_____

SECTION 3: POST-EPIDEMIC PHASE *(Maximum possible score: 7)*

1 How did you detect the end of the outbreak?

☐ Case counts

☐ Other (specify) _____

2 Was the end of the outbreak officially declared ? ☐ Yes ☐ No

3 If yes, who made the declaration?

☐ Cabinet Secretary for Health

☐ Director General for Health

☐ CEC

☐ CDH

☐ SCMOH

☐ Health Facility In-charge

☐ Others (specify) _____

4 Did you have a post-outbreak review meeting in the CU? ☐ Yes ☐ No

5 Did you prepare a post-outbreak report? (Verify with report.) ☐ Yes ☐ No

(If no, skip to Q9.)

6 If yes, with whom was the post-outbreak report shared?

_____

_____

7 What were the recommendations in the report?

_____

_____

8 Are recommendations being implemented by the following teams?

EPR	☐ N/A	☐ Yes	☐ No
Case management	☐ N/A	☐ Yes	☐ No
Vector control	☐ N/A	☐ Yes	☐ No
SBC	☐ N/A	☐ Yes	☐ No

9 What challenges did you experience during the post-epidemic activities? (List.)

10 How best can these challenges be addressed? (List.)

SECTION 4: OTHER COMMENTS

Do you have any other comments regarding the outbreak that have not been mentioned in the evaluation?

General comments by the interviewer:

How was the process? Was it difficult or easy to manage? Why? Were the participants comfortable or uncomfortable? Why?

RAPID ASSESSMENT AT HEALTH FACILITY LEVEL

Date:	[_____|_____|_____] [dd|mm|yyyy]	
County:	Sub-county:	
MFL No.:	Name of Health Facility:	
Interviewer/Supervision Team		
Name	Division/Organisation	Designation
1.		
2.		
3.		
4.		
5.		
Respondents		
Name	Department/Section	Designation
1.		
2.		
3.		

General Instructions

This checklist has three sections corresponding to the different phases of an epidemic/outbreak. The pre-epidemic section is to be completed if the visit is conducted before an outbreak occurs.

The epidemic section is to be completed during an on-going outbreak. The pre-outbreak section may also be completed to assess how prepared the affected region was before the outbreak occurred.

The post-epidemic section is to be completed after an outbreak is over. The pre-outbreak and epidemic sections may also be completed to assess preparedness and response activities of a past epidemic.

SCORING SCHEME

Every correct response is awarded one mark (a score of 1).

For every question that requires verification, availability of evidence is considered an additional mark.

Qualitative questions shall not be scored but will be used by the assessing teams to identify facts for further action.

Maximum possible score for the Health Facility-level Rapid Assessment Tool: 121

Reviewed by: _____Date: _____

SECTION 1: PRE-EPIDEMIC PHASE

1. Coordination structures (Maximum possible score: 16)

a. Do you have a health facility work plan (WP)? (Verify.) ☐ Yes ☐ No

(If no, skip to Q1e.)

b. If yes, has the WP been endorsed? ☐ Yes ☐ No

c. Is malaria EPR factored in the health facility WP? ☐ Yes ☐ No

d. Is the implementation of the plan on course? ☐ Yes ☐ No

e. Do you have the current national malaria EPR guidelines? ☐ Yes ☐ No

f. Do you have a health facility disease surveillance focal person? ☐ Yes ☐ No

g. Do you have a health facility outbreak committee? ☐ Yes ☐ No

(If no, skip to Q1k.)

h. If yes, list the members:

Cadre	Yes	No
Clinician		
Laboratory officer		
Surveillance officer		
Pharmacist		
Environmental health officer		
Others (specify) _____		

i. Has the health facility outbreak committee been trained on malaria EPR? ☐ **Yes** ☐ **No**

j. Are there facility-level stakeholders supporting malaria EPR? ☐ Yes ☐ No

2. Surveillance (officer responsible for disease surveillance) (Maximum possible score: 16)

a. Do you receive regular meteorological information? ☐ Yes ☐ No

(If no, skip to Q2c.)

b. If yes, do you use the information to forecast malaria outbreaks? ☐ Yes ☐ No

c. Have you prepared the malaria threshold chart for the current year? ☐ Yes ☐ No

(If no, skip to Q2h.)

d. If yes, do you regularly update the threshold charts? ☐ Yes ☐ No

e. Do you interpret and share feedback with the healthcare workers in the facility?

☐ Yes ☐ No

f. Do you regularly share updated weekly malaria thresholds with the higher levels?

☐ Yes ☐ No?

(If no, skip to Q2h.)

g. If yes, do you receive feedback? ☐ Yes ☐ No

h. Do you have the MOH 505 weekly summary tool? ☐ Yes ☐ No

(If no, skip to Q2l.)

i. If yes, do you use it to make weekly reports? ☐ Yes ☐ No

j. Do you get regular feedback on the weekly reports? ☐ Yes ☐ No

k. Is the feedback regularly shared with the rest of the healthcare workers?

☐ Yes ☐ No

l. Do you have the updated standard case definition chart? ☐ Yes ☐ No

m. Are there systems in place to monitor and report events in the facility that can be used to predict malaria epidemics (e.g., increased antimalarial prescriptions, test positivity rates, blood transfusion of febrile cases)?

☐ Yes ☐ No

n. Do you have the current national malaria case management guidelines? (Verify.)

☐ Yes ☐ No

(If no, skip to Q3.)

o. If yes, do you use it to guide case detection? ☐ Yes ☐ No

3. Availability of malaria commodities (Maximum possible score: 6)

a. How many months of stock (MoS) do you have?

Name	MoS
(i) ACT	
(ii) Artesunate	
(iii) mRDTs	
(iv)Microscopy reagents	

b. Do you have a facility procurement plan? ☐ Yes ☐ No?

(If no, skip to Q4.)

c. Have commodities for malaria epidemics been factored in the plan? ☐ Yes ☐ No

4. Pre-outbreak response (Maximum possible score: 8)

a. Have the reported malaria cases ever reached the alert levels? ☐ Yes ☐ No?

(If no, skip to Q5.)

b. If yes, were the following done?

Activity	Yes	No
Feedback to the affected areas		
Data quality assessment		
Description of the cases (time, place, and persons)		
Submission of malaria microscopy slides for EQA		
Focalised IRS		
Targeted distribution of ITNs		
Environmental modification		
EQA=external quality assurance, IRS=indoor residual spraying, ITNs=Insecticide treated nets		

5. Social and behaviour change (SBC) activities (Maximum possible score: 2)

a. Do you have pre-designed malaria epidemic SBC messages? ☐ Yes ☐ No

b. Do you have IEC materials for malaria EPR? ☐ Yes ☐ No

6. What challenges do/did you experience with preparedness for malaria epidemics? (List.)

_____

_____

7. How best can these challenges be addressed? (List.)

_____

_____

SECTION 2: EPIDEMIC PHASE

1. Outbreak notification (Maximum possible score: 4)

a. How did you get to know about the current outbreak? (Tick all that apply.)

☐ Surveillance (malaria thresholds)

☐ Healthcare workers (clinicians, pharmacy, laboratory, etc.)

☐ County/sub-county

☐ Community—CHVs, leaders, etc.

☐ Media

☐ Ministry of Health

☐ Other (specify)_____

b. How many days had the outbreak been on by the time you became aware of it?

☐ Within 1 week ☐ Within 2 weeks ☐ Within a month

☐ Other (specify)_____

c. Who made the official declaration of the outbreak? (Tick where applicable.)

☐ Cabinet Secretary of Health

☐ Director General of Health

☐ County Executive Committee/County Officer of Health

☐ County Director of Health

☐ Other (specify)_____

d. How did you receive the declaration?

☐ Circular

☐ E-mail

☐ Other (specify)_____

2. Coordination of response (Maximum possible score: 11)

a. Has the health facility outbreak committee been formed? ☐ Yes ☐ No

(If no, skip to Q2d.)

b. If yes, who are the members?

Cadre	Yes	No
Clinician		
Laboratory officer		
Surveillance officer		
Pharmacist		
Environmental health officer		
Health records information officer		
Others (specify) _____		

c. How frequently is the outbreak committee meeting?

☐ Daily ☐ Weekly ☐ Every 2 weeks

☐ Other (specify)_____

d. Was there stakeholder support during the outbreak? ☐ Yes ☐ No

3. Mobilisation of resources (Maximum possible score: 16)

a. What was the three-month stock status of the following routine malaria supplies at the onset of the outbreak?

Name	Adequate	Inadequate	None
(i) ACT			
(ii) Artesunate			
(iii) mRDTs			
(iv) Microscopy reagents			

b. Did you make requests/orders for additional supplies to cater to the outbreak?

☐ Yes ☐ No

(If no, skip to 3e.)

c. How many days after the onset of the outbreak did you make the requests?

☐ Immediately ☐ Within 7 days ☐ Within 2 weeks

☐ Other (specify)_____

d. If yes, did you forward the requests to the county/sub-county? ☐ Yes ☐ No

e. Did you get any malaria EPR supplies from the MOH? ☐ Yes ☐ No

f. What was the stock status of the following malaria EPR supplies delivered compared to your request?

Name	Adequate	Inadequate	None
(i) ACT			
(ii) Artesunate			
(iii) mRDTs			
(iv) Microscopy reagents			

g. Were the supplies delivered timely for the response? ☐ Yes ☐ No

h. Did you have adequate funds for the operations during the outbreak? ☐ Yes ☐ No

i. What proportion of the budgeted emergency fund was available for response? (Verify amount budgeted from the EPR plan.) (Amount available for response/budgeted emergency fund)

---

4. Field response (Maximum possible score: 20)

a. Were the healthcare workers (HCWs) sensitised on the outbreak? ☐ Yes ☐ No

b. How many days after the outbreak were the HCWs sensitised?

☐ Immediately ☐ Within 7 days ☐ Within 2 weeks

☐ Other, specify_____

c. Did you have enough HCWs required for the response? ☐ Yes ☐ No

d. Were there temporary treatment centres set up during the outbreak? ☐ Yes ☐ No

e. Was your health facility supported by the sub-county/county/national RRTs during the outbreak? ☐ Yes ☐ No

(If no skip, to Q4h.)

f. If yes, which cadre as per the following levels? (Tick as appropriate.)

Cadre	Sub-county		County		National	
	Yes	No	Yes	No	Yes	No
Clinicians						
Laboratory officers						
Nurses						
Surveillance officers						
Pharmacists						
Environmental health officers						
Health promotion officers						
Epidemiologists						
Entomologists						
Community health services						
Others (specify) _____						

g. How many days after the onset of the outbreak did the first RRT support arrive?

☐ Immediately ☐ Within 7 days ☐ Within 2 weeks

☐ Other, specify_____

h. Were the following activities undertaken during response?

Activity	Yes	No
Testing		
Treatment		
Submission of malaria slides for EQA		

5. Enhanced surveillance (Maximum possible score: 7)

a. Was there a working malaria outbreak case definition from the sub-county/county/national MOH? (Tick as appropriate.)

i. Sub-county ☐

ii. County ☐

iii. National/MOH ☐

b. If no, did you develop and use an outbreak case definition? ☐ Yes ☐ No

c. Were malaria outbreak line lists updated daily? (MOH503) ☐ Yes ☐ No

(If no, skip to Q6.)

d. If yes, were the line lists shared with the sub-county/county? ☐ Yes ☐ No

e. Did you get feedback on the shared line lists? ☐ Yes ☐ No

f. Did you prepare daily situation reports (SITREPS) from updated line lists? ☐ Yes ☐ No

g. If yes, did you share the SITREPS with the HCWs? ☐ Yes ☐ No

6. Social and behaviour change (SBC) activities (Maximum possible score: 6)

a. Did you adapt and use the pre-designed SBC messages at the health facility? ☐ Yes ☐ No

b. What channels of communication were used?

☐ Interpersonal communications

☐ Health talks

☐ Community networks—CHVs, churches, barazas, schools

☐ Others (specify)_____

c. Did you distribute malaria IEC materials to the outbreak region? ☐ Yes ☐ No

7. What challenges did you face in responding to the outbreak? (List.)

_____

_____

_____

8. How best do you think these challenges could be addressed? (List.)

_____

_____

_____

SECTION 3: POST-EPIDEMIC PHASE *(Maximum possible score: 9)*

1. How did you detect the end of the outbreak? (More than one parameter can be used.)

   a. Case counts

   b. Laboratory confirmation

   c. Using malaria thresholds

   d. Others (specify)_____

2. Was the end of outbreak officially declared? ☐ Yes ☐ No
(If no, skip to Q5.)

3. If yes, who made the declaration?

   a. Cabinet Secretary of Health

   b. Director General of Health

   c. County Executive Committee/County Officer of Health

   d. County Director of Health

   e. Other (specify)_____

4. How did you receive the declaration?

   ☐ Circular

   ☐ E-mail

   ☐ Other (specify)_____

5. Did you have a post-outbreak review meeting? ☐ Yes ☐ No

(If no, skip to Q9.)

6. How many days after the end of the outbreak was the review meeting held?

☐ Immediately ☐ Within 7 days ☐ Within 2 weeks

☐ Other, specify_____

7. Was a post-outbreak report prepared? (Verify check report) ☐ Yes ☐ No

8. If yes, with whom was the post-outbreak report shared?

_____

_____

_____

9. What were the report recommendations?

10. Are report recommendations being implemented by the following teams?

EPR	☐ N/A	☐ Yes	☐ No
Case management	☐ N/A	☐ Yes	☐ No
Vector control	☐ N/A	☐ Yes	☐ No
SBC	☐ N/A	☐ Yes	☐ No

11. What challenges did you experience during the post-epidemic activities? (List.)

12. How best can these challenges be addressed? (List.)

SECTION 4: OTHER COMMENTS

Do you have any other comments regarding the outbreak that have not been mentioned in the evaluation?

General comments by the interviewer:

How was the process? Was it difficult or easy to manage? Why? Were the participants comfortable or uncomfortable? Why?

RAPID ASSESSMENT AT SUB-COUNTY AND COUNTY LEVEL

Date:	**[_____|_____|_____] [dd|mm|yyyy]**	
County:	**Sub-county:**	
Interviewer/Supervision Team		
Name	**Organisation**	**Designation**
1.		
2.		
3.		
Respondents		
Name	**Organisation**	**Designation**
1.		
2.		
3.		

General Instructions

This checklist is to be completed by the relevant members of the county/sub-county health management team.

This checklist has three sections corresponding to the different phases of an epidemic/outbreak. The pre-epidemic section is to be completed if the visit is conducted before an outbreak occurs.

The epidemic section is to be completed during an ongoing outbreak. The pre-outbreak section may also be completed to assess how prepared the affected region was before the outbreak occurred.

The post-epidemic section is to be completed after an outbreak is over. The pre-outbreak and epidemic sections may also be completed to assess preparedness and response activities of a past epidemic.

SCORING SCHEME

- Every correct response is awarded one mark (a score of 1).
- For every question that requires verification, availability of evidence is considered an additional mark.
- Qualitative questions shall not be scored but will be used by the assessing team to identify common facts for further action.

Maximum possible score for the County/Sub-county-level Rapid Assessment Tool: 111

Reviewed by: _____Date: _____

SECTION 1: PRE-EPIDEMIC PHASE

1. Coordination structures (Maximum possible score: 21)

a. Do you have county/sub-county malaria focal persons? ☐ Yes ☐ No

b. Do you have a county/sub-county outbreak rapid response team (RRT)?

☐ Yes ☐ No

(If no, skip to Q1e.)

c. If yes, list the members:

Cadre	Yes	No
Clinical		
Laboratory		
Surveillance		
Pharmacy		
Environmental health		
Others (specify) _____		

d. Has the county/sub-county RRT been trained on malaria EPR? ☐ Yes ☐ No

e. Is there a county/sub-county stakeholder group for malaria? ☐ Yes ☐ No
(If no, skip to Q1h.)

f. Is malaria EPR discussed in the stakeholder meetings? ☐ Yes ☐ No

g. If yes, how frequently do the stakeholders meet? (Verify, check minutes.)

☐ Weekly ☐ Monthly ☐ Quarterly

h. Is there a County/Sub-county Public Health Emergency Management Committee (PHEMC)?

☐ Yes ☐ No

(If no, skip to Q1j.)

i. If yes, how often does the PHEMC meet? (Verify.)

☐ Weekly ☐ Monthly ☐ Quarterly

j. Do you have the current national malaria EPR guidelines? (Verify.) ☐ Yes ☐ No

k. Is there a costed county/sub-county malaria EPR plan? (Verify.) ☐ Yes ☐ No

(If no, skip to Q2.)

l. If yes, has the plan been endorsed? ☐ Yes ☐ No

If yes, is the implementation of the plan on course? ☐ Yes ☐ No

2. Surveillance (Maximum possible score: 14)

a. Do you receive regular meteorological information? ☐ Yes ☐ No

(If no, skip to Q2c.)

b. If yes, do you use the information to predict malaria outbreaks? ☐ Yes ☐ No

c. Do you routinely conduct malaria entomological surveillance? ☐ Yes ☐ No

(If no, skip to Q2e.)

d. Do you use the entomological surveillance results to predict malaria outbreaks? ☐ Yes ☐ No

e. Do you regularly receive weekly malaria data from the facilities/sub-counties? (Verify.) ☐ Yes ☐ No

f. Do you regularly receive weekly malaria data from sentinel facilities? (Verify.) ☐ Yes ☐ No

g. Does the county regularly receive updated weekly threshold graphs from sub counties? (Verify.) ☐ Yes ☐ No

(If no, skip to Q2k.)

h. If yes, do you regularly review the thresholds and give feedback? (Ask to see the latest feedback shared.) ☐ Yes ☐ No

i. Do you regularly share updated weekly malaria thresholds with the higher levels? (Ask to see the latest shared weekly thresholds.) ☐ Yes ☐ No

j. If yes, do you receive feedback? ☐ Yes ☐ No

k. Do you monitor population dynamics and natural events that can be used to predict malaria epidemics? ☐ Yes ☐ No

3. Emergency commodities for malaria epidemic preparedness (Maximum possible score: 2)

a. Was forecasting of emergency commodities for malaria epidemics done in the past 12 months? ☐ Yes ☐ No

b. Was quantification for emergency commodities for malaria epidemics done in the past 3 months? ☐ Yes ☐ No

4. Pre-outbreak response (Maximum possible score: 8)

a. Have malaria cases reported reached the set alert threshold levels? ☐ Yes ☐ No

(If no, skip to Q5.)

b. If yes, were the following activities done?

Activity	Yes	No
Feedback to the affected areas		
Data quality audit		
Description of the cases		
Submission of malaria microscopy slides for EQA		
Focalised IRS		
Targeted distribution of ITNs		
Environmental modification		
EQA=external quality assurance, IRS=indoor residual spraying ITNs =insecticide-treated nets		

5. Social and behaviour change (SBC) activities (Maximum possible score: 2)

a. Do you have pre-designed malaria epidemic SBC messages? ☐ Yes ☐ No

b. Do you have IEC materials for malaria EPR? ☐ Yes ☐ No

6. What challenges do you experience with preparedness for malaria epidemics? (List.)

_____

_____

_____

7. How best can these challenges be addressed? (List.)

_____

_____

_____

SECTION 2: EPIDEMIC PHASE

1. Outbreak notification (Maximum possible score: 4)

a. How did you get to know about the current outbreak? (Tick all that apply.)

- ☐ Malaria thresholds
- ☐ Health facility
- ☐ Community
- ☐ Media
- ☐ Ministry of Health (national level)
- ☐ Other (specify)_____

b. How long did it take you to realize there is an outbreak?

☐ 1 week ☐ 2 weeks ☐ 1 Month

☐ Other (specify)_____

c. Who made the official notification of the outbreak?

- ☐ County Executive Committee Member for Health
- ☐ Chief Officer of Health
- ☐ County Director of Health
- ☐ Subcounty Medical Officer of Health
- ☐ Disease Surveillance Coordinator
- ☐ Health Facility In-charge
- ☐ Other (specify)_____

d. Who made the official declaration of the outbreak?

- ☐ Cabinet Secretary
- ☐ Director General of Health
- ☐ County Governor
- ☐ County Executive Committee Member for Health
- ☐ Chief Officer of Health
- ☐ County Director of Health
- ☐ Other (specify)_____

2. Coordination of response (Maximum possible score: 10)

a. Has the county/sub-county Public Health Emergency Management Committee (PHEMC) been formed? ☐ Yes ☐ No

(If no, skip to Q2d.)

b. If yes, who are the members?

Cadre	Yes	No
Clinical		
Laboratory		
Surveillance		
Pharmacy		
Environmental health		
Others (specify)		

c. How frequently is the PHEMC meeting held?

d. Is there stakeholder support during the outbreak? ☐ Yes ☐ No

3. Mobilisation of resources (Maximum possible score: 16)

a. What was the three-month stock status of the following routine malaria supplies at the onset of the outbreak?

Name	Adequate	Inadequate	None
(i) ACT			
(ii) Artesunate			
(iii) mRDTs			
(iv) Microscopy reagents			

b. Have you received requests for emergency malaria EPR supplies from the outbreak area? ☐ Yes ☐ No

(If no, skip to Q3f.)

c. If yes, how many days after the onset of the outbreak did you receive the requests?

☐ Within one week ☐ Within 2 weeks ☐ within a month

☐ Other (specify)_____

d. If yes to Q3b, did you process and forward the requests to the MOH? ☐ Yes ☐ No

(If no, skip to Q3f.)

e. If yes, how many days after receiving the requests did you forward them?

☐ Within 1 week ☐ Within 2 weeks ☐ Within a month

☐ Other (specify) _____

f. Have you received any emergency malaria EPR supplies from the MOH? ☐ Yes ☐ No

(If no, skip to Q3i.)

g. If yes, what was the stock status of the following emergency malaria EPR supplies delivered compared to your request?

Name	Adequate	Inadequate	None
(i) ACT			
(ii) Artesunate			
(iii) mRDTs			
(iv) Microscopy reagents			

h. Were the supplies delivered in time (within 1 week) for the response? ☐ Yes ☐ No

i. Do you have adequate funds for the operations during the outbreak? ☐ Yes ☐ No

j. What proportion of the budgeted emergency fund is available for response? (Amount available for response/budgeted emergency fund)

---

4. Field response (Maximum possible score: 34)

a. Have the rapid response team (RRT) members been deployed to the field to provide support? ☐ Yes ☐ No

(If no, skip to Q4d.)

b. If yes, who are the members?

Cadre	Yes	No
Clinical		
Laboratory		
Nurse		
Surveillance		
Pharmacy		
Environmental health		
Health promotion		
Epidemiologist		
Entomologist		
Community health services		
Others (specify)		

c. How many days after the outbreak notification were the RRT members deployed to the field?

☐ Within 1 week ☐ Within 2 weeks ☐ Within a month

☐ Other (specify)_____

d. Has your county/sub-county been supported by the national RRTs during the outbreak?

☐ Yes ☐ No

(If no, skip to Q4g.)

e. If yes, who were the members?

Cadre	Yes	No
Clinical		
Laboratory		
Nurse		
Surveillance		
Pharmacy		
Environmental health		
Health promotion		
Epidemiologist		
Entomologist		
Community health services		
Others (specify)		

f. How many days after the notification of the outbreak did the national RRT provide support?

☐ Within 1 week ☐ Within 2 weeks ☐ Within a month

☐ Other (specify)_____

g. Are the following activities being undertaken during the response?

Activity	Yes	No
Testing		
Treatment		
Submission of malaria slides for EQA		
Identification of breeding habitats and malaria vector surveillance		
Focalised IRS		
Targeted distribution of ITNs		
Environmental modification		
Others (specify)		

5. Enhanced surveillance (Maximum possible score: 9)

a. Do you have a malaria outbreak case definition? ☐ Yes ☐ No

b. If no, have you developed and disseminated an outbreak case definition to the affected areas? ☐ Yes ☐ No

c. Is active case search being undertaken? ☐ Yes ☐ No

d. Are updated line lists (MOH503) from the outbreak region received daily? (Ask to see the latest line lists received and tick yes if available.) (If no, skip to Q5g.) ☐ Yes ☐ No

e. If yes, are the line lists shared with the national MOH? ☐ Yes ☐ No

f. Have you received any feedback from the national MOH on the shared line lists? (Ask to see evidence of feedback.) ☐ Yes ☐ No

g. Are you preparing daily situation reports (SITREPs) from the line lists received? (Ask to see the latest SITREPs and tick yes if available.) ☐ Yes ☐ No

(If no, skip to Q5i.)

h. If yes, did you share the SITREPs with the outbreak sites? ☐ Yes ☐ No

i. Has vector surveillance been enhanced during the outbreak? ☐ Yes ☐ No

6. Social and behaviour change (SBC) activities (Maximum possible score: 7)

a. Have you adapted and deployed the pre-designed SBC messages to the affected population? ☐ Yes ☐ No

b. If yes, what channels were used?

☐ Interpersonal communications
☐ Health talks
☐ Mass media (radios, television, newspapers)
☐ Community networks—CHVs, churches, barazas, schools
☐ Others (specify)_____

c. Have you distributed malaria IEC materials to the outbreak region? ☐ Yes ☐ No

7. What challenges are you facing in responding to the outbreak? (List.)

_____

_____

8. How best do you think these challenges could be addressed? (List.)

_____

_____

_____

SECTION 3: POST-EPIDEMIC PHASE (Maximum possible score: 7)

1. Was the end of outbreak officially declared? ☐ Yes ☐ No

2. If yes, who made the declaration?

- ☐ Cabinet Secretary
- ☐ Director General of Health
- ☐ County Executive Committee/County Officer of Health
- ☐ County Director of Health
- ☐ Others (specify)_____

3. Did you hold a post-outbreak review meeting? ☐ Yes ☐ No

How many days after the end of the outbreak was the review meeting held?

☐ Within 1 week ☐ Within 2 weeks ☐ Within a month

☐ Other (specify)_____

4. Was a post-outbreak report prepared? (Verify.) ☐ Yes ☐ No

5. If yes, with whom was the post-outbreak report shared?

_____

_____

6. What were the report recommendations?

_____

_____

7. Were report recommendations implemented? ☐ Yes ☐ No

8. Which specific recommendations were implemented?

_____

_____

9. What challenges did you experience during the post-epidemic activities? (List.)

_____

_____

10. How best can these challenges be addressed? (List.)

_____

_____

_____

SECTION 4: OTHER COMMENTS

Do you have any other comments regarding the outbreak that have not been mentioned in the evaluation?

_____

_____

_____

General comments by the interviewer:

How was the process? Was it difficult or easy to manage? Why? Were the participants comfortable or uncomfortable? Why?

_____

_____

_____

RAPID ASSESSMENT AT NATIONAL LEVEL

Date:	[_____|_____|_____] [dd|mm|yyyy]	
Interviewer/Supervision Team		
Name	**Organisation**	**Designation**
1.		
2.		
3.		
Respondents		
Name	**Organisation**	**Designation**
1.		
2.		
3.		

General Instructions

This checklist is to be completed by the head of the programme or focal person for malaria epidemic preparedness and response.

This checklist has three sections corresponding to the different phases of an epidemic/outbreak. The pre-epidemic section is to be completed if the visit is conducted before an outbreak occurs.

The epidemic section is to be completed during an ongoing outbreak. The pre-outbreak section may also be completed to assess how prepared the affected region was before the outbreak occurred.

The post-epidemic section is to be completed after an outbreak is over. The pre-outbreak and epidemic sections may also be completed to assess preparedness and response activities of a past epidemic.

SCORING SCHEME

- Every correct response is awarded one mark (a score of 1).
- For every question that requires verification, availability of evidence is considered an additional mark.
- Qualitative questions shall not be scored but will be used by the assessing team to identify common facts for further action.

Maximum possible score for the National-level Rapid Assessment Tool: 121

Reviewed by: _____Date: _____

SECTION 1: PRE-EPIDEMIC PHASE

1. Coordination structures (Maximum possible score: 20)

a. Does the programme have a malaria EPR focal person? ☐ Yes ☐ No

b. Does the programme have updated malaria EPR guidelines? (Verify and tick yes if available.)
☐ Yes ☐ No

c. If yes, has the plan been approved? (Verify and tick yes if approved.) ☐ Yes ☐ No

d. Is there a costed national malaria EPR plan? (Verify and tick yes if available.)
☐ Yes ☐ No

(If no, skip to Q1g.)

e. Has the plan been approved? (Verify and tick yes if approved.) ☐ Yes ☐ No

f. Is the implementation of the plan on course? ☐ Yes ☐ No

g. Is there a national outbreak rapid response team (RRT)? ☐ Yes ☐ No

(If no, skip to Q1j.)

h. If yes, who are the members?

Cadre	Yes	No
Clinical		
Laboratory		
Surveillance		
Pharmacy		
Environmental health		
Others Specify		

i. Has the national RRT been trained on malaria EPR? ☐ Yes ☐ No

j. Is there a national stakeholder group for malaria EPR? ☐ Yes ☐ No

k. If yes, how frequently do they meet? (Verify, check minutes.)
☐ Monthly ☐ Quarterly
☐ Other, specify_____

2. Surveillance (Maximum possible score: 9)

a. Do you receive regular meteorological information? ☐ Yes ☐ No

(If no, skip to Q2c.)

b. If yes, do you use the information to forecast malaria outbreaks? ☐ Yes ☐ No

c. Do you routinely conduct entomological surveillance? ☐ Yes ☐ No

(If no, skip to Q2e.)

d. If yes, do you use the routine entomological surveillance results to predict malaria outbreaks? ☐ Yes ☐ No

e. Do you receive updated weekly malaria thresholds from the sentinel surveillance sites? (Verify and tick yes if thresholds are received.) ☐ Yes ☐ No

(If no, skip to Q2g .)

f. Do you regularly review the thresholds and give feedback? (Verify and tick yes if feedback was given.) ☐ Yes ☐ No

g. Are there programmes in place to monitor and report population and natural events that can be used to predict malaria epidemics? ☐ Yes ☐ No

3. Emergency commodities for malaria epidemics (Maximum possible score: 3)

a. Is forecasting of emergency commodities for malaria epidemics done? ☐ Yes ☐ No

b. Has quantification for emergency commodities for malaria epidemics been done? ☐ Yes ☐ No

c. Is there a plan to procure emergency commodities for malaria epidemics?

☐ Yes ☐ No

4. Pre-outbreak response (Maximum possible score: 8)

a. Have malaria cases reported reached the set alert threshold levels? ☐ Yes ☐ No

(If, no skip to Q5.)

b. If yes, were the following done?

Activity	Yes	No	N/A
Feedback to the affected areas			
Data quality audit			
Description of the cases (time, place, and persons)			
Submission of slides for EQA			
Focalised IRS			
Targeted distribution of ITNs			
Environmental modification			
EQA=external quality assurance, IRS=indoor residual spraying, TNs=Insecticide-treated nets			

5. Social and behaviour change (SBC) activities (Maximum possible score: 5)

a. Do you have pre-designed malaria epidemic SBC messages? (Verify.) ☐ Yes ☐ No

b. Have you developed IEC materials for malaria EPR? (Verify.) ☐ Yes ☐ No

c. If yes, have they been procured? ☐ Yes ☐ No

6. What challenges did you experience with preparedness for malaria epidemics? (List.)

7. How best can these challenges be addressed? (List.)

SECTION 2: EPIDEMIC PHASE

1. Outbreak notification (Maximum possible score: 3)

a. How did you get to know about the current outbreak?

☐ Thresholds

☐ Media

☐ County/sub-county

☐ Health facility

☐ Community

☐ Other (specify)_____

b. How many days had the outbreak been on by the time you were made aware of it?

☐ Within one week ☐ Within 2 weeks ☐ Within a month

☐ Other (specify)_____

c. Who made the official declaration of the outbreak?

☐ Cabinet Secretary of Health

☐ Director General of Health

☐ County Director of Health

☐ Others (specify)_____

2. Coordination of response (Maximum possible score: 9)

a. Has a national outbreak taskforce (NTF) been formed? ☐ Yes ☐ No

(If no, skip to Q2d.)

b. If yes, who are the members? Name institutions/departments in the task force.

Name of institution/department	Name of institution/department

c. How frequently is the NTF meeting? (Verify, check minutes.)

☐ Weekly ☐ Monthly ☐ Quarterly

☐ Other (specify)_____

d. Is there stakeholder support during the outbreak? ☐ Yes ☐ No

3. Mobilisation of resources (Maximum possible score: 11)

a. Have you received orders for emergency malaria EPR supplies from the affected region?

☐ Yes ☐ No

(If no, skip to Q3c.)

b. If yes, what was your stock status for the following emergency malaria EPR supplies at the time you received the orders?

Name	Adequate	Inadequate	None
(i) ACT			
(ii) Artesunate			
(iii) mRDTs			
(iv) Microscopy reagents			
(iv) Insecticides for IRS			
(v) ITNs			

c. Do you have adequate funds for operations during the outbreak? (Verify, check budgets.)

☐ Yes ☐ No

d. What proportion of the budgeted emergency fund is available for response? (Amount available for response/budgeted emergency fund)

---

4. Field response (Maximum possible score: 17)

a. Have rapid response team members been deployed to the field to provide support?

☐ Yes ☐ No

(If no, skip to Q4d.)

b. If yes, who are the members?

Cadre	Yes	No
Clinical		
Laboratory		
Surveillance		
Epidemiologist		
Entomologist		
Pharmacy		
Environmental health		
Others (specify)		

c. How many days after the outbreak notification were the RRT members deployed to the field?

☐ Within 1 week ☐ Within 2 weeks ☐ Within a month

☐ Other (specify)_____

d. Are the following activities being undertaken during response?

Activity	Yes	No	N/A
Testing			
Treatment			
Received slide microscopy for EQA			
Focalised IRS			
Targeted distribution of ITNs			
Environmental modification			
Others (specify)			

5. Enhanced surveillance (Maximum possible score: 7)

a. Is there a working malaria outbreak case definition? ☐ Yes ☐ No

b. Is active case search being undertaken? ☐ Yes ☐ No

c. Are updated line lists (MOH503) from the affected region received daily? (Verify, check line lists.) ☐ Yes ☐ No

d. Are situation reports (SITREPS) developed daily and shared with all the stakeholders? (Verify, check SITREPS.) ☐ Yes ☐ No

e. Has vector surveillance been enhanced during the outbreak? ☐ Yes ☐ No

6. Social and behaviour change activities (Maximum possible score: 9)

a. Have you developed and disseminated SBC messages for the affected population? (Verify.) ☐ Yes ☐ No

b. If yes, what channels are used?

- ☐ Interpersonal communication
- ☐ Health talks
- ☐ Mass media (radios, television, newspapers)
- ☐ Community networks—CHVs, churches, barazas, schools
- ☐ Posters, banners, fliers, brochures
- ☐ Others (specify)_____

c. Have you distributed malaria IEC materials to the affected region? ☐ Yes ☐ No

7. What challenges are you facing in responding to the outbreak? (List.)

_____

_____

_____

8. How best do you think these challenges could be addressed? (List.)

_____

_____

_____

SECTION 3: POST-EPIDEMIC PHASE (Maximum possible score: 9)

1. Was the end of the outbreak officially declared? ☐ Yes ☐ No

(If no, skip to Q10.)

2. If yes, who made the declaration? _____

3. Did you have a post-outbreak review meeting? ☐ Yes ☐ No

4. How many days after the end of the outbreak was the review meeting held?

☐ Within 1 week ☐ Within 2 weeks ☐ Within a month

☐ Other (specify)_____

5. Was a post-outbreak report prepared? ☐ Yes ☐ No

6. If yes, with whom was the post-outbreak report shared?

_____

7. What were the report recommendations?

_____

_____

_____

8. Have the recommendations been implemented? ☐ Yes ☐ No

9. If yes, which specific recommendations have been implemented?

_____

_____

_____

10. What challenges did you experience during the post-epidemic activities? (List.)

_____

_____

_____

11. How best can these challenges be addressed? (List.)

_____

_____

_____

SECTION 4: OTHER COMMENTS

Do you have any other comments regarding the outbreak that have not been mentioned in the evaluation?

_____

_____

_____

General comments by the interviewer:

How was the process? Was it difficult or easy to manage? Why? Were the participants comfortable or uncomfortable? Why?

_____

_____

_____

Contact Information:
Division of National Malaria Programme (DNMP)
P.O Box 19982-00202 Nairobi, Kenya

Website: www.nmcp.or.ke
Facebook: www.facebook.com/nmcpkenya
Twitter: @nmcpkenya