



**Ministry of Health  
Royal Government of Bhutan**

# **Monitoring and Evaluation Plan for Malaria Elimination in Bhutan**

**2020-2025**



2021

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## Acronyms

ABER: Annual Blood Examination Rate .....	17
AHB: Annual Health Bulletin.....	3
API: Annual Parasite Incidence .....	16
DHIS2: District Health Information System.....	9
DHO: District Health Officer.....	6
DMS: District Malaria Supervisor .....	5
FYP: Five Year Plan .....	11
GPMS): Government Performance Management System .....	11
GTS: Global Technical Strategy.....	6
HA: Health Assistant .....	14
HMIS: Health Management Information System .....	9
iDES: Integrated Drug Efficacy Surveillance.....	11
IRS: Indoor Residual Spray .....	5
KAP: Knowledge, Attitude and Practice .....	12
KGUMSB: Khesar Gyelpo University of Medical Sciences of Bhutan .....	14
LLIN: Long Lasting Insecticide Treated Bed Net .....	5
M&E: Monitoring and Evaluation .....	1
MIS: Malaria Indicator Survey .....	12
MT: Malaria Technician .....	4
NCDE: National Committee for Disease Elimination .....	13
NEQAS: National External Quality Assurance Scheme .....	10
NIRMMP: National Insecticide Resistance Monitoring and Management Plan .....	12
NKRA: National Key Result Area.....	11
NMRL: National Malaria Reference Lab .....	10
NSP: National Strategic Plan .....	1
ORC: Outreach Clinics .....	3
PHC: Primary Health Centre .....	2
PHCB: Population and Housing Census of Bhutan .....	2
QA: Quality Assurance .....	10
RCDC: Royal Centre for Disease Control .....	10
TAGME: Technical Advisory Group for Malaria Elimination .....	7
VDPC: Vector Borne Disease Control Programme.....	4
WHO: World Health Organization .....	1

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## Introduction

An effective and robust monitoring and evaluation (M&E) system is necessary to measure the success and progress of the national malaria strategic plan at achieving the stated goals and ensuring the use of evidence for decision making. “Monitoring” is the gathering and use of data on programme implementation (weekly, monthly, quarterly or annually) and its aim is to ensure that programmes are working satisfactorily and to make adjustments if necessary. Monitoring often includes use of administrative data to track inputs, processes and outputs; programme outcomes and impacts.

On the other hand, “Evaluation” involves a more comprehensive assessment of a programme and it is normally undertaken at discrete times and addresses the longer-term outcomes and impacts of programmes. The goal of monitoring and evaluation is to improve the effectiveness, efficiency and equity of programmes. Therefore, M & E allows the program managers and partners to monitor the implementation of planned activities in terms of input, output, and the outcome within a coherent framework. It also helps the managers to allocate resources, assess performance and demonstrate impact. According to WHO, M & E has the following major functions:

- regularly assess whether plans are progressing as expected or whether adjustments are required to the scale of the intervention or combination of interventions;
- allocate resources to the populations most in need in order to achieve the greatest possible public health impact;
- account for the funding received to allow the public, their elected representatives and donors to determine whether they are obtaining value for money;
- evaluate whether the programme objectives have been met and to learn what has worked and what has not, so that more efficient, effective programmes can be designed;
- advocate for investment in malaria programmes in accordance with the malaria disease burden in a country or subnational area; and
- track progress toward elimination

Similarly, as Bhutan strives to achieve zero indigenous malaria in 2022 and elimination by 2025 guided by the National Strategic Plan (NSP) 2020-2025, it is imperative that Bhutan has a robust and comprehensive M & E Plan in order to realize the stated national goal; and also to keep track of successes and progress of the malaria elimination programs and activities at all levels. Hence, this M & E Plan for malaria elimination in Bhutan is being revised to guide the overall elimination efforts in the country ultimately leading to the achievement of the elimination goal within the committed time frame.

## Country profile

Bhutan is a landlocked country of 38,394 square kilometers, nestled in eastern Himalayas bordered by India in the west, south and east (605 kilometers), and Tibet in the north, sharing about 470 kilometers with a recorded population size of 727,145 in 2017 (PHCB 2017). The entire country is mountainous with flat land limited to southern borders. The country has estimated 72 percent forest cover with rich biodiversity. Administratively, Bhutan is divided into 20 dzongkhags (districts) and 205 gewogs (blocks) with each gewog further divided into 5-8 chiwogs (sub-blocks).



*Fig.1. Bhutan map showing 20 districts*

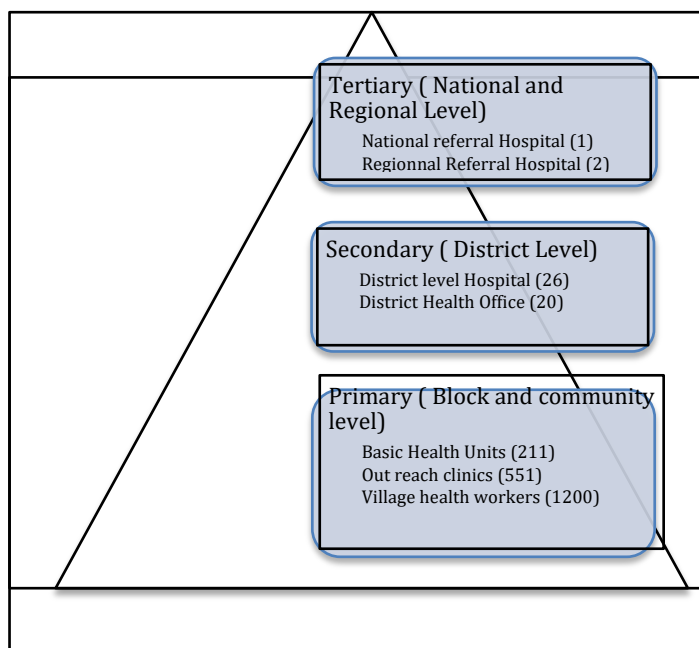
The form of governance is Democratic Constitutional Monarchy with the King as the head of the state and elected Prime Minister as the head of the government. Bhutan transitioned into the constitutional democracy in 2008. The country has already witnessed three national parliamentary elections with the recent one in 2018.

## National Health System

Health care services are provided free for its citizens in Bhutan. Health services are being provided through 3 tiered systems- primary (block & community level) provided by the Primary Health Cares (PHCs), Subposts and Outreach Clinics; Secondary (District level) provided by district level hospitals and tertiary (national & regional level) provided by the national and regional referral hospitals.

Modern health care in Bhutan formally began in the 1960's with the start of First Five Year Plan with only two hospitals and eleven dispensaries for the whole country in 1961. Under the dynamic and visionary leadership of the Kings, the modern health system progressed and developed rapidly over the last 5 decades which today have 184 PHCs, 54 sub posts and 552 ORCs at primary level, 48 hospitals at secondary level and three referral hospitals at the tertiary

level, spread across the country (AHB 2021). Today approximately 95 percent of the populations live within three hours walking distance from the nearest health facility.



*Figure 2: Pyramid of health care delivery system*

Article 9, section 21 of the constitution of Bhutan guarantees “The provision of free access to general and public health services in both modern and traditional medicines ensuring access, equity and quality health service” for its citizens in the country. The Ministry of Health has adopted a broad vision to become “A Nation with best health”. Moreover, the Ministry of Health is endeavoring continuously towards strengthening the health care system and has put forth the following missions:

1. To provide quality healthcare services in both traditional and modern medicines
2. To prevent, control, eliminate and eradicate diseases
3. To rehabilitate and promote healthy living
4. To ensure sustainable, responsive, equitable, accessible, reliable and affordable health services

## Vector Borne Disease Control Program

The national Vector Borne Disease Control Program (VDCP) is based at Gelephu under Sarpang Dzongkhag in the southern belt of the country. The program is one of the oldest programs under the Department of Public Health, Ministry of Health established in 1964 mandated for prevention and control of vector borne diseases in the country. Currently, the program is manned by 23 staff at the central level supported by 32 Malaria Technicians (MT) in eight malaria risk dzongkhags as shown in the organogram below.

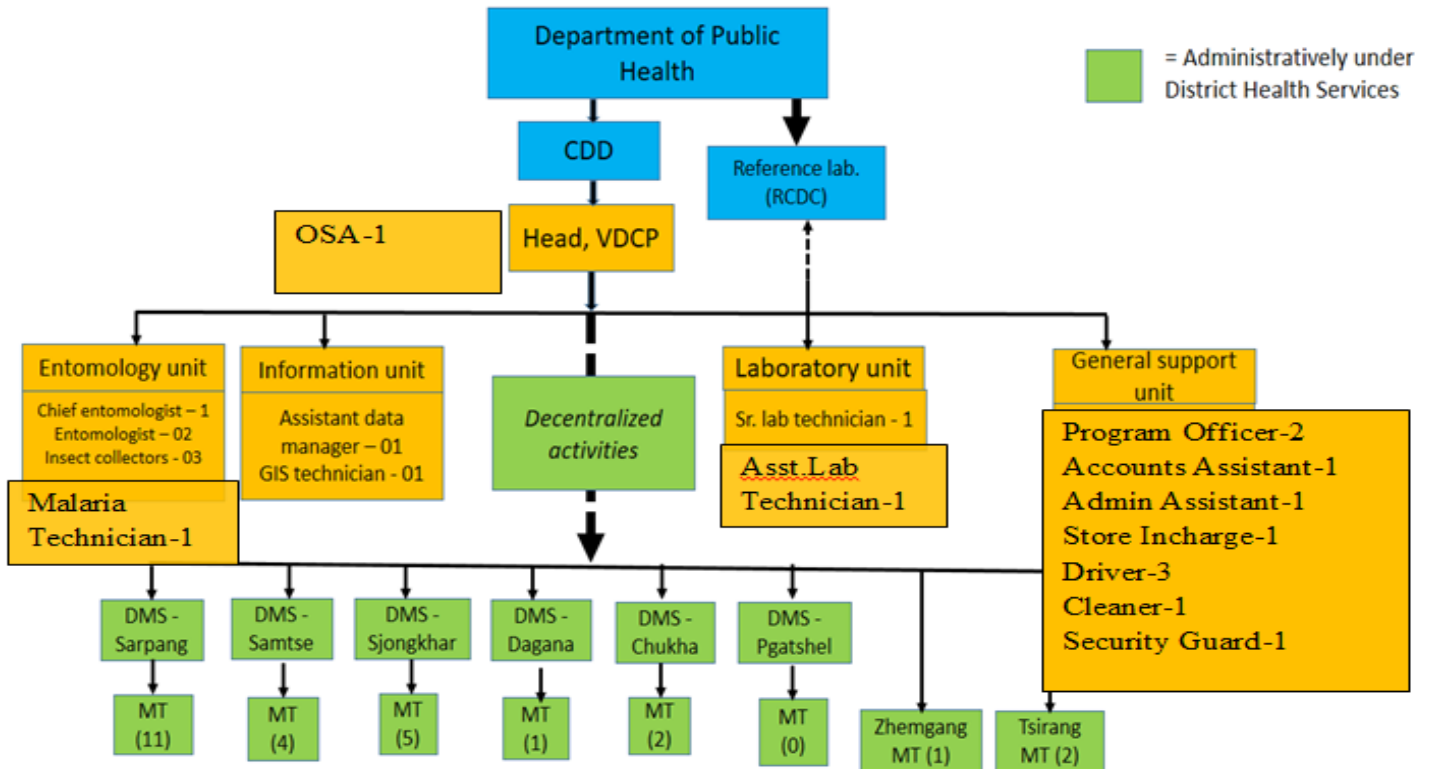


Fig.3: Organogram of Vector Borne Disease Control Program

## National Strategic Plan for Malaria Elimination and Prevention of Re-introduction

As Bhutan missed the elimination target in 2018 as envisaged in the National Strategic Plan (NSP) 2015-2020, it was revised in 2019 to NSP 2020-2025 aligned with the WHO E2025 initiative with a revised target to achieve zero indigenous malaria in the country by 2022 and WHO malaria free certification by 2025.

### Vision

Bhutan free of indigenous Malaria

## **Mission**

Achieving malaria elimination through use of evidence based interventions, sustaining political support and mobilizing multi-sectorial and community participation at all levels, and strengthen institutional capacity to prevent reintroduction of transmission.

## **Goal**

To achieve zero indigenous malaria in Bhutan by 2022 and obtain WHO-malaria free certification by 2025.

## **Outcome Objectives**

1. To strengthen and sustain health and community system for malaria elimination
2. To eliminate all active foci of malaria by 2022
3. To prevent re-establishment of local malaria transmission from 2025 onwards
4. To maintain zero malaria death

Towards achieving these objectives, 8 broad strategic objectives with action plans have been identified of which strengthening monitoring and evaluation of malaria elimination program is one of the strategic objectives. The strategies are interconnected, mutually inclusive and complementary to each other.

The eight broad strategic objectives are:

1. Strengthen targeted and focused preventive malaria interventions
2. Establish rigorous quality assurance program for laboratory diagnosis and ensure prompt and effective treatment and follow up
3. Strengthen services for surveillance for malaria case detection and rapid outbreak response system
4. Strengthen effective collaboration and partnerships to support malaria elimination program
5. Improve program management and performance
6. Intensify advocacy and pursue effective IEC approaches for malaria elimination
7. Conduct operational research on malaria elimination
8. Strengthen Monitoring and evaluation of malaria elimination program

## **Implementation approach**

Like any other health services, malaria services including core vector control interventions like LLIN distribution and IRS are also decentralized to the health centres in the malaria risk areas spearheaded by the Malaria Technicians. Similarly, District Malaria Supervisors (DMS) in collaboration with the District Health Officers (DHO) and health centre Incharges are also responsible for planning, implementing and monitoring all malaria activities at the field/district



level. On the other hand, the national VDCP is responsible for providing directions and necessary support ranging from logistics and supplies to capacity building of the health workers. Furthermore, it is also the mandate of the central program to mobilize adequate and timely resources to the field staff to carry out the control activities and accelerate towards malaria elimination. The role of program also extends to building institutional linkages with the key institutions and stakeholders to garner necessary support ultimately leading to the attainment of malaria elimination as per the target set in the national strategic plan.

### **Monitoring and Evaluation (M & E) Frame work**

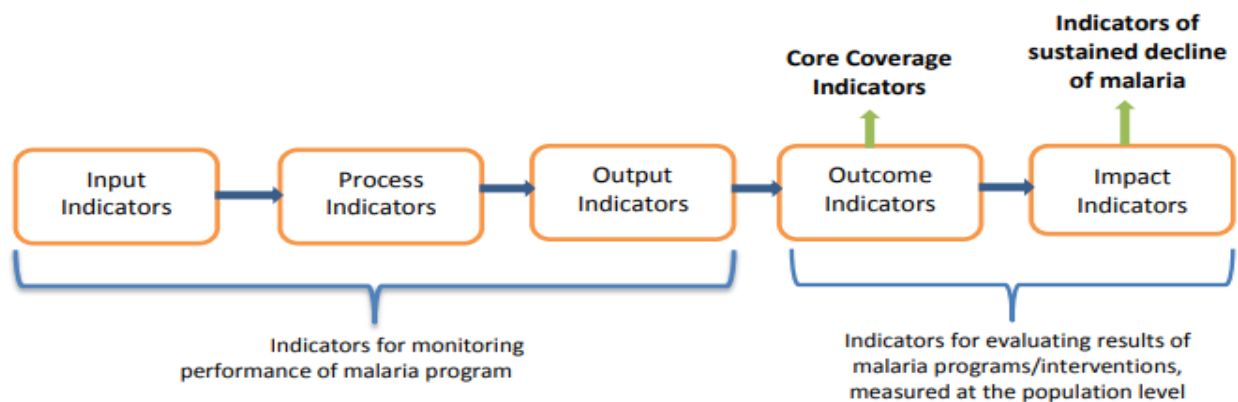
As the country strives for malaria elimination, effective and robust M & E system is critical to guide and keep on the right track. The goal of monitoring and evaluation is to improve the effectiveness, efficiency and equity of programmes. They are critical to achieving the goals of national programmes and tracking progress towards the objectives of the Global Technical Strategy (GTS) 2016-2030 as it allows the program managers and the partners to monitor the implementation of planned activities in terms of input, output, and the outcome within a coherent framework.

It also helps the managers to allocate resources, assess performance and demonstrate impact. An effective monitoring and evaluation system can capture data in an organized and cost-effective way and will contribute to more efficient allocation of resources for disease-specific activities. Therefore, a comprehensive and robust M & E framework will play a pivotal role in leveraging the country's malaria elimination efforts and needs to be integrated in an overall evidence-based planning system at district, regional, and national level. This will eventually lead to attainment of the national goal of malaria elimination.

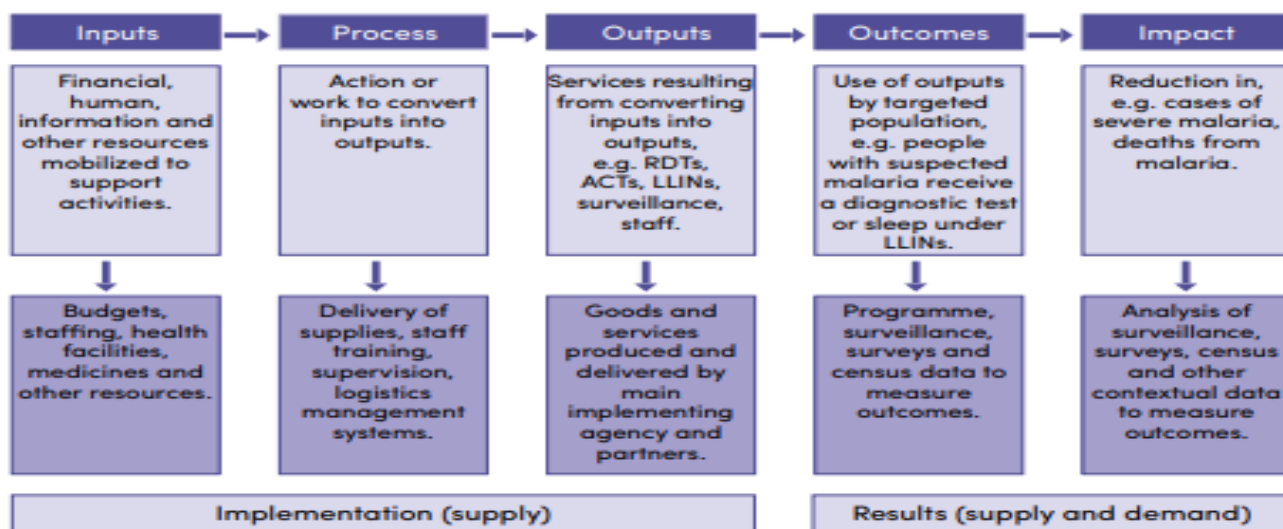
### **Objectives of M & E**

The main objectives of this M & E frame work are to:

- Monitor the overall progress of the elimination activities both at the centre and field levels.
- Keep track of malaria elimination progress and identify gaps for further improvements.
- Generate evidence for planning and decision making.
- Improve the effectiveness, efficiency and equity of programmes.
- Provide feedback to data providers, relevant authorities and partners to improve decision making and future planning.



**Monitoring and evaluation framework: from input to impact**



ACT, artemisinin-based combination therapy; RDT, rapid diagnostic test; LLIN, long-lasting insecticidal net

Fig 4. M & E indicator framework for malaria (WHO, 2018)

**Monitoring and Evaluation Structure and Roles**

The monitoring and evaluation of malaria interventions, activities and indicators will be carried out primarily at three levels- national, central program and district. This would not only make M & E effective and efficient but also keep check and balance at each level. For effective coordination and implementation of M & E Plan, a team will be formed at the central program while at the district level, DMS will be responsible for coordination. Monitoring and Evaluation will be carried out as indicated below.

**Malaria Risk Districts**

In malaria risk districts, biannual monitoring and supervision visits to the fields will be carried out by the district M & E team comprising DHO, CMO and DMS using a structured checklist provided in annex.4 and submit the copy of checklist to the central program. At the central program, the M & E team will review, analyze and provide necessary feedback and recommendations. In addition, the central program will identify health facilities that are

performing poorly and conduct annual monitoring for necessary improvement. At least 60 percent of randomly selected health centres should be covered in respective districts. Similarly, at least two Community Action Groups under each health centre should be monitored if CAG exist.

### Potential and No Risk Districts

In malaria potential and no risk districts, annual monitoring will be conducted by the central program in collaboration with DHO.

M & E level	What will be monitored? (M & E components)	Who will monitor? (responsible official)	How will it be monitored? (mechanism)
District level	<ul style="list-style-type: none"> <li>Planning and implementation of malaria activities at the field level</li> </ul>	DHO/DMS/CMO	Through IWP, activity reports/records
	<ul style="list-style-type: none"> <li>Monitoring of CAG activities</li> </ul>	DHO/DMS/CMO	Activity reports/field visits
	<ul style="list-style-type: none"> <li>Timeliness of reporting by the field workers</li> </ul>	DHO/DMS/CMO	DHIS2 , field verifications
	<ul style="list-style-type: none"> <li>Completeness of documents (case files)</li> </ul>	DHO/DMS/CMO	DHIS2 , field verifications
	<ul style="list-style-type: none"> <li>Laboratory QA system</li> </ul>	DHO/DMS/CMO	Field visits/DHIS2
	<ul style="list-style-type: none"> <li>Logistics and supplies at the field level</li> </ul>	DHO/DMS/CMO	DHIS2 , field verifications
Program level	Planning and implementation of malaria activities at district level	M & E team	Activity reports
	Monitoring and supervision by the district		Field visit reports
	Coverage of core malaria interventions		DHIS2/field report
	Completeness of documents (case files)		DHIS2/field visits
	Logistics and supplies at the district level		DHIS2/field visits
	Data analysis and usage at the district level		Field visits/Annual report
	Entomological surveillance and reports		DHIS2/field visits
National level	<ul style="list-style-type: none"> <li>Elimination activities</li> <li>Performance indicators</li> </ul>	TAGME	Program review/field verification and validation

*Table 1: M & E structure and roles at different levels*

Technical Advisory Group for Malaria Elimination (TAGME) will independently carry out annual evaluation of M & E indicators and provide necessary recommendations to the program.

### **Indicators and measurement**

For effective M & E, the most significant and measurable indicators need to be selected that would eventually lead the country to achieve the elimination target. This will require different sets of indicators that would enable the program managers and donors to monitor the performance and progress of the project and provide necessary and timely guidance and support. Indicators to be considered for M&E generally include input, process, output, outcome and impact. Input indicators measure inputs that trigger the process and impact indicators measure the end result. In between there are intermediary indicators that help monitoring the progress towards achieving program goals and objectives.

A list of key indicators to be collected under the malaria program M&E Plan with targets, data collection methods; data collection frequency and responsible entity are summarized in Annex 2. The indicators selected for M & E are also aligned with the performance framework of the NSP and the revised surveillance guideline.

### **Routine Data Collection**

A set of reliable, authentic and consistent information are required for effective M & E for malaria elimination for which the authentic sources of information need to be identified. Bhutan currently collects information from the following data sources for both M & E and programmatic planning and interventions.

#### **1. District Health Information System 2 (DHIS2)**

Bhutan has transitioned from the conventional method of reporting to a web-based reporting system (DHIS2) for malaria integrated with the nation Health Management and Information System (HMIS). The system was formerly rolled out in all the health centres across the country in the year 2019 during which more than 300 health workers were trained on Malaria Tracker Capture. The health workers have to report both suspected and positive cases on a daily basis. The new system was further revised in 2020 to incorporate comments from the health workers and experts and include entomological components and other essential reports. 11 new programs in addition to the two programs that were already in the system; of which 8 programs are entomological components and 3 are for aggregate reporting have been added in the revised system and subsequently rolled out in the entire country in 2021. More than 200 health workers from across 259 health facilities had been trained on the revised system.

To further strengthen the reporting system, the program has procured and distributed laptops to all health facilities above PHC level (183 PHCs, 51 hospitals, 3 THCs & 3 Subposts). Now with the revised system, the program can monitor the stock status of essential anti-malarial drugs and

test kits at the facility level and also the monthly cross-checking of malaria panel slides. DHIS2 system is now the main data source for the VDCP and almost all indicators can be monitored through the system. The health centres should do the reporting as per the schedule provided in table.1

Sl.no	Reporting components	Periodicity	Reporting time frame
1	Positive and suspected cases	Daily	On the day of diagnosis
2	Monthly Malaria Reporting	Monthly	1 <sup>st</sup> week of the succeeding month
3	Quarterly Supplies Update	Quarterly	1 <sup>st</sup> week of the first month of the succeeding quarter
4	Malaria screening report	As and when	As and when
5	VC-ITN campaign	Every 3 years	
6	VC-IRS campaign	Bi-annually	
7	VC-IRS residual efficacy monitoring	Quarterly	
8	VC-ITN-Bioefficacy	Quarterly	
9	Adult surveillance	As and when	
10	Larval surveillance	As and when	
11	Susceptibility test	Annually	

*Table 1. Reporting components and schedule for malaria*

At the national level, the system is being managed by the HMIS team at the Ministry and the Information Unit in the program monitors the system for data quality (completeness, consistency and timeliness of the reports from the health centres) and provides timely feedback. Data are also analyzed at the program level periodically for planning and monitoring purposes.

## **2. Annual Malaria Report**

Annual reports are one of the prerequisites of the WHO elimination documents. Hence, countries going for malaria elimination are required to produce annual malaria reports every year. Therefore, VDCP produces and maintains annual malaria reports which are also one of the important information sources for the malaria programs. Annual reports provide a stock of information about the programmatic interventions, changes in the epidemiology of malaria cases in the country and other activities that happened within a period of one year. This in a way helps programs to keep track of both past and present activities and make necessary adjustments if required. Annual reports also help the program managers and donor agencies to review and do self-assessment of the malaria interventions and accordingly come up with timely interventions. Bhutan's national malaria program (VDCP) started releasing annual malaria reports since 2007 with the latest one in 2021.

## **3. Annual Malaria Review Meeting**

Annual malaria review meeting is one of the platforms to bring on board all relevant stakeholders to measure the program performance and progress; identify gaps and challenges and

discuss the way forward to further improving the performance of the program. This also provides an opportunity to discuss and solve the implementation bottlenecks together with the relevant stakeholders and authorities. Moreover, the overarching recommendations that come out of the review meetings are duly followed up and implemented at all levels.

#### **4. National Malaria Reference Laboratory**

The National Malaria Reference Laboratory (NMRL) was first established in 2019 at Royal Centre for Disease Control (RCDC) as an independent entity to monitor and provide technical assistance in order to improve Quality Assurance (QA) on malaria diagnosis. The NMRL is still at nascent stage and initially began with implementation of NEQAS (National External Quality Assessment Scheme) system on malaria microscopy to facilitate and coordinate quality improvement through NEQAS assessment such as MP blinded rechecking, Panel Testing and on-site monitoring and supervision across health centers.

The annual QA report produced by the NMRL provides overall scenario of the quality of malaria diagnostic services across the country and the capacity of laboratory personnel who usually perform the malaria tests. Besides QA report, NMRL also produces technical reports on malaria panel testing, Integrated Drug Efficacy Surveillance (iDES) and monitoring and supervision reports. The information and recommendations of these reports are crucial in decision making and planning processes; and more importantly for monitoring and evaluation of malaria related services and interventions.

### **5. Program Review, Evaluation and Surveys**

#### **a. Population and Housing Census**

At the National level, Population and housing census is conducted every 10 years. The recent one was conducted in 2017. This is carried out by National Statistical Bureau of Bhutan. The information from this national survey is useful in planning and targeting malaria interventions like LLIN distribution and IRS and updating the stratification and denominators of various indicators.

#### **b. Five Year Plan Review and Annual Performance Agreement (APA)**

Guided by Bhutan's national development philosophy of Gross National Happiness, Bhutan follows a Five Year Plan (FYP) development framework. The current FYP is 12<sup>th</sup> in series and has 17 National Key Result Areas (NKRAs). Therefore, FYP is a guiding document for planning, monitoring and evaluation of the country's overall success and performance of the developmental activities and across the sector. The Prime Minister reviews the overall implementation of the planned activities through reviews. The annual monitoring and implementation of the planned activities is done through the government performance management systems (GPMS) by signing the Annual Performance Agreement between the

Prime Minister and Ministers, Ministers and Secretaries and Secretaries and departments and Divisions which are all linked to the individual performance to financial and programmatic performance systems.

### c. Program Review

The external program review is conducted every 3-5 years and it is jointly carried out with World Health Organization (WHO) with the main objective to review the implementation status and further guide the strategic shifts in malaria implementation approaches. The recommendations from the external program reviews are used for revisiting the strategic plans and activities to suit the elimination needs. The last malaria program review conducted was in 2019 by the two experts from WHO Global Malaria Program, Geneva and their recommendations were used to revise the malaria surveillance guideline and forms.

### d. Malaria KAP and Indicator Survey (MIS)

The effectiveness of malaria interventions will largely depend on knowledge, attitude and practice of the end users. Therefore, in order to target the interventions, it is important to conduct malaria KAP survey. Hence, the program conducts KAP survey and Malaria Indicator Survey (MIS) every three years to determine the reach of the implementation strategies to the key population and to identify the gaps for making programmatic shifts. This is also one of the methods to measure the impact and outcome indicators. The last KAP and MIS were conducted in 2017. The next KAP/MIS will be conducted in the year II of the current grant.

## 6. Sentinel Sites Surveillance

Sentinel sites surveillance is key aspect of M & E of vector control interventions like LLIN and IRS. It is necessary to monitor the effectiveness of vector control interventions besides its coverage. Therefore, the VDCP has strategically identified 8 sentinel sites in 5 different districts (4 in Sarpang, 1 each in Samtse, Samdrupjongkhar, Dagana and Zhemgang respectively) in National Insecticide Resistance Monitoring and Management Plan (NIRMMP), which is to be implemented from 2022. The reports of these surveillance including LLIN, IRS and vector components are now integrated in the revised web-based reporting system (DHIS2).

## Data Collection and Management

For M & E malaria elimination efforts, different sets of data are collected through a standardized data collection tools from all levels: community, health facility, surveys and operational researches. Standardized forms and guidelines for malaria are in place based on which the health workers implement and enter data into the DHIS2 system according to the reporting schedules provided in the malaria surveillance guideline, 2020.

Data collected in the DHIS2 system are being analyzed at all levels: health facility, district and national and use the information for planning and decision- making. At the PHC level health

workers are responsible for data analysis. Districts Medical Officer (DMO)/ District Health Officer (DHO) and District Malaria Supervisor (DMS) are responsible for data compilation and analysis at the district level for M & E purpose and also provide necessary feedback to the health centres. At the national level, the central program does overall data analysis for both M & E and decision-making purposes. Data analysis is usually carried out monthly, quarterly and yearly and also need-based.

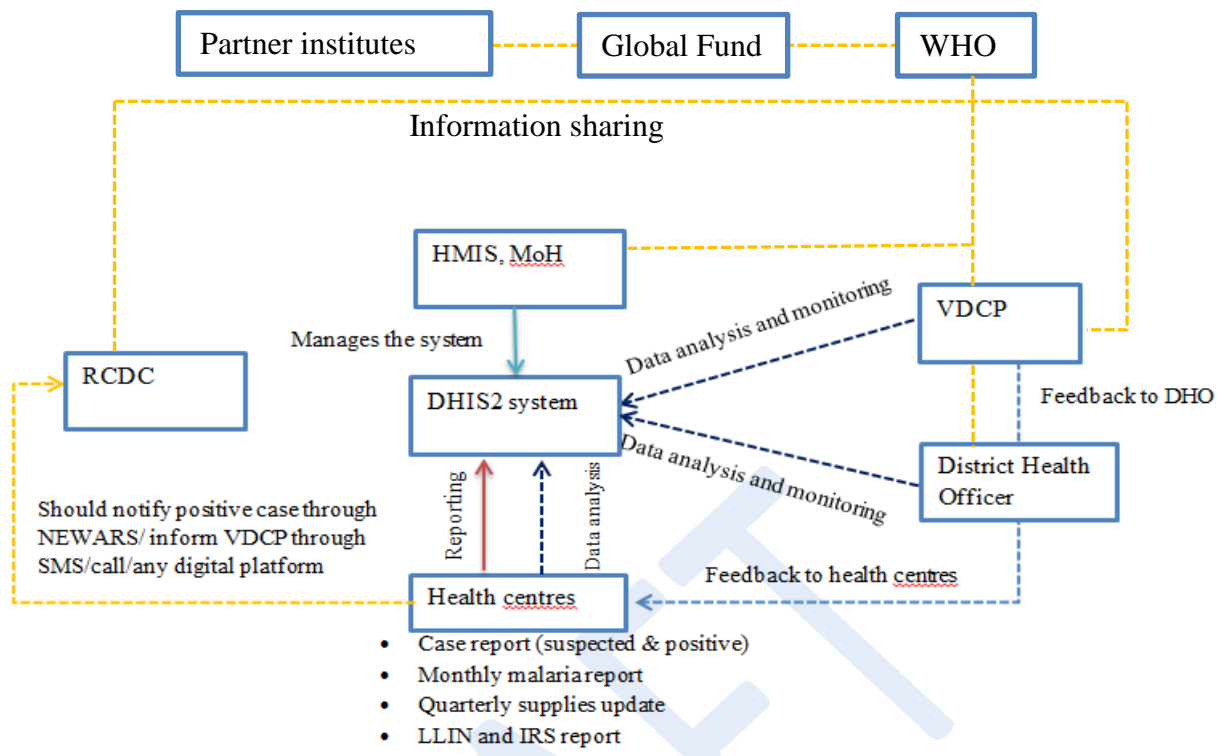


Fig.5. Information and data management flow chart

### Data Quality Assurance Mechanism and Related Supportive Supervision

Data quality assurance involves ensuring 4Cs of good data quality- Completeness, Correctness, Consistency and Current. One health worker from every health centre has been trained on DHIS2 where they were primarily trained on data entry into the system and also provided a laptop each as a reporting tool. The Information Unit at the central program monitors the data entered by the health workers in the system for all aspects of data quality periodically and provide timely feedback if gaps were found. In addition, a routine supervision and monitoring is also done from the program and from the District Health office to ensure the quality of the data processed. The Local fund agent also ensures the quality and accuracy of the data using the tools and guidelines provided by the Global fund.



## **M&E Coordination**

VDCP monitors and analyzes information through a web-based reporting system, DHIS2. However, an effective coordination is crucial among implementing partners and oversight bodies to build a robust M & E system for malaria elimination. Towards this end, VDCP conducts malaria review meetings at different levels annually/quarterly/bi-annually and on need-basis to review, plan and discuss the implementation bottlenecks.

Further, to guide the malaria elimination progress, two main oversight bodies are formed in 2019- National Committee for Disease Elimination (NCDE) and Technical Advisory Group for Malaria Elimination (TAGME) to provide strategic guidance and technical back up to the VDCP for malaria elimination.

## **Capacity Building**

M & E is of utmost importance to the malaria elimination program. Therefore, capacity building particularly on the M&E is need of the time as Bhutan's malaria program currently lacks capacity in this field. This will not only play a critical role in achieving malaria elimination but also in sustaining elimination status. This will be done in collaboration with the national and international institutional partners like KGUSMB. In fact, the VDCP has already initiated collaborations with the University where the program supports field attachments of final year trainees of Health Assistants (HA) and Lab Technicians. Furthermore, the training of first batch of medical entomology technician will possibly be commenced in 2022 academic year. The program will continue its collaborations with key regional and international institutes building research capacity and other technical capacity required for malaria elimination.

Besides institutional based capacity building programs, the VDCP also provides regular refresher trainings on malaria microscopy diagnosis, malaria case management, web-based reporting system and malaria surveillance to the health workers across the country.

## **10. Information Products, Dissemination and Use**

The data collected through both systematic and non-systematic are used for making informed decision and necessary adjustments and more importantly for monitoring and evaluation of the malaria interventions. The analyzed information are then disseminated to the relevant stakeholders/agencies and institutes through review meetings, annual reports and activity progress reports etc. The Ministry of Health produces an 'Annual Health Bulletin' which contains various sets of information at the national level. Similarly, VDCP also produces annual malaria reports and distribute to relevant agencies/authorities. Program also shares information with the WHO for producing annual malaria reports and for necessary interventions.

### **Monitoring and Evaluation Costed Work Plan and Budget**

Towards building a strong M & E system for malaria elimination, activities are rationalized and prioritized along with the estimated budget, timeline and responsible bodies/officials provided in the annex 3. The costed M & E work plan is for 5 years and is a subset of NSP 2020-2025 and it will be regularly monitored and reviewed.

## References

1. WHO (2018): Malaria Surveillance, Monitoring and Evaluation- A reference manual
  2. Strategic Plan for Elimination of Malaria and Prevention of Re-introduction in Bhutan 2020-2025
  3. Monitoring and Evaluation Plan 2015-2020, Bhutan
  4. Annual Health Bulletin (2021), Ministry of Health, Royal Government of Bhutan
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## Annexure 1. M & E Indicators and Definitions

<b>Impact indicator 1: Annual Parasite Incidence (API)</b>	
Definition	Confirmed malaria cases per 1000 population in risk area (7 risk districts)
Interpretation	It gives the overall performance of the programme and guides the progress. This indicator assesses the burden of malaria infection in the population
Formula	$\frac{\text{Total confirmed cases}}{\text{Total population at risk}} \times 1000$
Data source	DHIS2/patient register at HCs
Data collection frequency	Annually
<b>Impact indicator 2: Number of Inpatient malaria deaths</b>	
Definition	Death due to confirmed malaria infection (RDT/Microscopy)
Interpretation	Any malarial death should be thoroughly investigated for necessary interventions.
Formula	Number of inpatient malaria deaths per year confirmed by RDT/Microscopy
Data source	DHIS2/patient register at the HCs
Data collection frequency	Annually
<b>Impact Indicator 3: Malaria test positivity rate</b>	
Definition	Percentage of slides or rapid diagnostic tests found positive among all slides and rapid diagnostic tests performed. National program should separately calculate test positivity rate for microscopy, RDT as well as by

	parasite species besides the overall test positivity rate. Test results from PDCs should not be included.
Interpretation	This indicator measures the prevalence of malaria parasite among the population and thus helps to monitor malaria transmission trends.
Formula	$\frac{\text{Total confirmed cases (RDT/Microscopy)}}{\text{Total test performed (RDT/Microscopy)}} \times 100$
Data source	DHIS2/BTC log book at the HCs
Data collection frequency	Annually
<b>Impact Indicator: Annual Blood Examination Rate (ABER)</b>	
Definition	Percentage of blood tests examined for malaria either by RDT or Microscopy
Interpretation	Adequate screening is crucial for timely diagnosis and treatment to avert community transmission. As per the surveillance guideline, all fever cases in the risk areas should be screened for malaria.
Formula	$\frac{\text{Total malaria tests performed (RDT/Microscopy)}}{\text{Total population at risk}} \times 100$
Data source	DHIS2/BTC log book at HCs <i>**ABER in DHIS2 is based only on microscopy test. However, for evaluation purpose, ABER will be calculated considering both microscopy and RDT.</i>
Data collection frequency	Annually
<b>Outcome Indicator 1: Population at risk that slept under an ITN the previous night</b>	
Definition	Proportion of population at risk that slept under an ITN the previous night
Interpretation	ITN and IRS are core vector control interventions for malaria. Therefore, it is essential to have an adequate coverage of LLIN to protect the population in risk areas. Hence, this indicator will give overall coverage of LLIN and also a usage of LLIN.
Formula	$\frac{\text{Total population at risk that slept under an ITN the previous night}}{\text{Total population at risk}} \times 100$
Data source	MIS/KAP survey/Household survey
Data collection frequency	Every three years

<b>Outcome Indicator 2: Children under five years old who slept under an insecticide-treated net* the previous night</b>	
Definition	Proportion of children under five years old who slept under an insecticide-treated net* the previous night
Interpretation	According to WHO, children under five are one of the high risk groups for malaria. Therefore, it is imperative that that are protected from the mosquito bites. This indicator will help the program assess whether the children under five in the malaria risk areas are adequately protected by LLIN/ITN and come up with necessary interventions.
Formula	$\frac{\text{Total number of children under five that slept under an ITN the previous night}}{\text{Total number of children under five the previous night in the risk area}} \times 100$
Data source	MIS survey/Household survey
Data collection frequency	Every three years
<b>Outcome Indicator 3: Pregnant women who slept under an insecticide-treated net* the previous night</b>	
Definition	Proportion of pregnant women who slept under an insecticide-treated net* the previous night
Interpretation	According to WHO, pregnant women are one of the high risk groups for malaria. Therefore, it is imperative that that are protected from the mosquito bites. This indicator will help the program assess whether the pregnant women in the malaria risk areas are adequately protected by LLIN/ITN and come up with necessary interventions.
Formula	$\frac{\text{Total number of pregnant women at that slept under an ITN the previous night}}{\text{Total number of pregnant women at the time of the survey in the risk area}} \times 100$
Data source	MIS survey
Data collection frequency	Every three years
<b>Outcome Indicator 4: Households with atleast one ITN for every two people/ or sprayed by IRS within the last 12 months</b>	
Definition	Proportion of households with at least one insecticide-treated net for every two people and/or sprayed by IRS within the last 12 months
Interpretation	LLINs are a core prevention tool used widely by the people at risk of malaria. In order to achieve a universal and equitable LLLIN coverage, mass distribution is done every three years in the malaria risk

	areas and some potential risk areas. According to the WHO standard, there should be 1 net for every 1.8 persons. Therefore, through this indicator, the program will be able to assess the overall LLIN coverage in the risk areas.
Formula	$\frac{\text{Number of households surveyed in risk areas with at least one LLIN for every two people}}{\text{Total number of households surveyed within the risk areas}} \times 100$
Data source	MIS survey
Data collection frequency	Every three years
<b>Outcome Indicator 4: Confirmed malaria cases that are treated according to the national treatment guidelines</b>	
Definition	Percentage of confirmed malaria cases that are treated according to the national treatment guideline
Interpretation	Early diagnosis and treatment is crucial to stop further transmission of malaria in the community. In Bhutan, a confirmed malaria case is admitted and treated in the hospital for 3 days.
Formula	$\frac{\text{Total confirmed malaria cases treated as per the treatment protocol}}{\text{Total confirmed malaria cases reported in a year}} \times 100$
Data source	DHIS2/patient case file
Data collection frequency	Annually
<b>Outcome Indicator 4: Confirmed malaria cases that are followed up according to the surveillance guideline</b>	
Definition	Percentage of confirmed malaria cases that completed all follow up days as per the surveillance guideline (Revised 2 <sup>nd</sup> edition)
Interpretation	According to surveillance guideline (Revised 2 <sup>nd</sup> edition), Pv malaria cases are followed up on Day 14, 28, 3 months and 1 year and pf case on day 14 & 28 to ensure complete treatment course, parasite clearance or relapse and adverse reaction.
Formula	$\frac{\text{Total confirmed cases that completed all follow up days}}{\text{Total confirmed cases}} \times 100$
Data source	DHIS2/Case files
Data collection frequency	Annually

## Annexure 2. Monitoring and Evaluation Indicators

<b>1.Outcome indicators</b>							
<i>Indicator components</i>	<i>Indicators</i>	<i>Indicator baseline</i>	<i>Indicator Target</i>	<i>Indicator measurement</i>	<i>Data source</i>	<i>Responsible official/agencies</i>	<i>Remark</i>
Vector control	Proportion of population at risk that slept under an ITN the previous night	99.5 (2017)	>99.5	Percent	KAP/MIS	VDCP	
	Proportion of households with at least one ITN	99.1 (2017)	100	Percent	KAP/MIS	VDCP	
	Proportion of children under five years old who slept under an insecticide-treated net* the previous night	90.9 (2017)	>95	Percent	KAP/MIS	VDCP	
	Proportion of households with at least one insecticide-treated net for every two people	98 (2017)	>95	Percent	KAP/MIS	VDCP	
	Proportion of population protected by IRS within the last 12 months in sprayed areas	62.1 (2017)	>80	Percent	KAP/MIS	VDCP/DMS/DHO	
Diagnosis and case management	Percentage of confirmed malaria cases that are treated according to the national treatment guidelines	100 (2019)	100	Percent	DHIS2	Health centres /CMO/Incharges	
	Proportion of patients with confirmed malaria who received first-line antimalarial treatment according to national policy	100 (2019)	100	Percent	DHIS2	Health centres /CMO/Incharges	
	Proportion of detected cases that contacted health services within 2 days from the onset of symptoms	28 (2019 review report)	100	Number	DHIS2, Patient register,	Health centres /CMO/Incharges	
	Proportion of patients with suspected malaria who received a parasitological test	100 (2019)	90-100	Percent	DHIS2, Patient register	Health centres /CMO/Incharges	To be discussed with CMO/HCs
	Proportion of health facilities without stock-outs of ACT drug		100	Percent	DHIS2, M & S Reports,	DHO/VDCP/Incharges	



	Proportion of health facilities without stock-outs of Chloroquine		100	Percent			
	Proportion of health facilities without stock-outs of primaquine		100	Percent			
	Proportion of health facilities without stock-outs of Artesunate/Artemether		100	Percent			
	Proportion of health facilities without stock-outs of RDT		100	Percent			
	Percent of health centres provided training/refresher training on malaria microscopy & QA/QC	100 (2019)	100	Percent	Administrative reports/NMRL	VDCP/NMRL	All hospitals with/without MTs and PHCs with MTs
	Percent of malaria testing lab participating in a blinded rechecking	54 2019	>80	Percent	NMRL DHIS2	NMRL/CMO/Incharges	Hospitals and PHCs with Malaria Technicians in the malaria risk areas (23 in total)
	Percent of malaria testing lab participating in a panel testing	81 2019	>80	Percent	NMRL	NMRL/CMO/Incharges	All hospitals and PHCs with laboratory facilities (57 in total)
Surveillance	Percent of malaria cases notified within 24 hours	100 (2019 Program review)	100	Percent	DHIS2, NEWARS/Patient register	Health centres /CMO/Incharges	For calculation purpose, data of notification from the patient case file will be considered.
	Percent of monthly malaria test reports received from health centers	89.5 2019	100	Percent	DHIS2	DHO/VDCP	
	Proportion of confirmed malaria cases fully investigated and classified within 72 hours	100 2019	100	Percent	DHIS2/case files	Health centres /CMO/Incharges/ VDCP	
	Proportion of foci investigated and classified within 7 days	95 2019	100	Percent	DHIS2/case files	Health centres /CMO/Incharges/ VDCP	
	Number of sentinel sites monitored for insecticide resistance	4 (2020)	8	Number	Report	VDCP	
	Annual Blood Examination Rate in low risk districts (detected passively and actively)	18 (2019)	≥20	Percent	DHIS2	Health centres /CMO/Incharges/ VDCP	

<b>2.Impact Indicators</b>							
Incidence	Malaria test positivity rate	0.123 2019			DHIS2	Health centres /CMO/Incharge s/VDCP	
Mortality	Number of inpatient malaria death per year	0 (2019)	0	Number	DHIS2/Patient register	Health centres /CMO/Incharge s/VDCP	
Elimination	Number of low risk districts that have eliminated indigenous malaria	6 (2019)	7	Number	Annual malaria reports	Health centres /CMO/Incharge s/VDCP	
	Number of indigenous malaria	2 (2019)	0	Number	Annual malaria report/DHIS2	Health centres /CMO/Incharge s/VDCP	
	Number of active foci	1 (2019)	0	Number	Annual malaria reports /DHIS2	Health centres /CMO/Incharge s/VDCP	



<b>12</b>	Conduct annual field monitoring and supervision visit by TAGME members	6435	6435	6435	6435	6435		
<b>13</b>	Biannual meeting of the NCDE	6840	6840	6840	6840	6840		
<b>14</b>	Bi-annual review of malaria status with TAGME		5472	5472	5472	5472		
<b>15</b>	Annual Malaria Review Meeting	11400	11400	11400	11400	11400		
<b>16</b>	Publication of annual reports	1000	1000	1000	1000	1000		
<b>17</b>	Conduct KAP /MIS survey		30000					
<b>18</b>	Conduct external evaluation of the malaria elimination program			20000				
<b>19</b>	Monitoring of sentinel sites		9360	9360	9360	9360		
<b>20</b>	Conduct one time field survey in low risk areas with local transmission to detect asymptomatic parasite carriers			5616		5616		

#### Annexure 4: Integrated M & E Checklist for malaria

Name of visiting officials:			
Sl.no	Name	Designation	Date of visit:
			Dzongkhag:
			Health centre:

Officials contacted during your visit:		
Sl.no	Name	Designation

Sl.no	Checklist category		Remarks
<b>1</b>	<b><i>Human resource and Capacity development</i></b>		
i	Did any staff from your health facility receive malaria case management training atleast once within last 3 years?	Yes[ ] No [ ] NA [ ]	
ii	Did any staff of your health facility receive malaria microscopy training atleast once within the last 3 years?	Yes[ ] No [ ] NA [ ]	
iii	Did any staff of your health facility receive DHIS2 training atleast within the last 3 years?	Yes[ ] No [ ] NA [ ]	
iv	Did any staff of your health facility receive malaria surveillance training atleast once within the last 3 years?	Yes[ ] No [ ] NA [ ]	
v	Did any staff of your health centre receive training on vector surveillance atleast once within the last 3 years?	Yes[ ] No [ ] NA [ ]	
<b>2</b>	<b>Availability of required documents/manuals/SOPs</b>		
i	Malaria Treatment Guideline is available (5 <sup>th</sup> edition, 2019)	Yes[ ] No [ ] NA [ ]	
ii	Malaria Surveillance Guideline (2 <sup>nd</sup> Edition, 2020)	Yes[ ] No [ ] NA [ ]	

iii	QA manual is available (2021 )	Yes[ ] No[ ] NA[ ]	
iv	Malaria case surveillance forms (revised version 3) are available	Yes[ ] No[ ] NA[ ]	
v	SOP for malaria microscopy and RDT ( 2021 )	Yes[ ] No [ ] NA[ ]	
vi	Malaria vector surveillance guideline ( 2 <sup>nd</sup> Edition )	Yes[ ]No [ ] NA[ ]	
vii	In-house SOP for malaria microscopy	Yes[ ] No[ ] NA[ ]	
<b>3 Laboratory system related to malaria</b>			
i	BTC log book is maintained daily	Yes[ ]No [ ] NA[ ]	
ii	Does the health facility have laboratory facility?	Yes[ ] No[ ] (if No, skip to section 4)	
iii	Monthly cross-checking of blood slides submitted	Yes[ ] No [ ] NA[ ]	
iv	Feedback on monthly cross-checking received	Yes[ ] No [ ] NA[ ]	
v	Average score of parasite detection for the last month 3 months.		
Vi	Average score of parasite species identification for the last 3 months		
vii	Average score of parasite stage for the last 3 months		
viii	Average score of parasite count for the last 3 months		
ix	Average score of blood film for the last 3 months		
x	Average score of staining for the last 3 months		
xi	Any actions for improvement recommended from monthly cross-checking slides	Yes[ ] No [ ]	
xii	Corrective Actions Form maintained asper the feedback/recommendation from NMRL	Yes[ ] No [ ]	
xiii	Functional microscope is available	Yes[ ] No [ ]	
xiv	Microscope maintenance log book is available	Yes[ ] No [ ]	
xv	Microscope maintenance is documented in the laboratory maintenance log.	Yes[ ] No [ ]	
xvi	Malaria laboratory reagent		

	a. Giemsa stock stain is available	Yes[ ] No [ ]	
	b. Methanol AR Grade is available	Yes[ ] No [ ]	
	c. Blood slides are available	Yes[ ] No [ ]	
	d. Immersion oil is available	Yes[ ] No [ ]	
xvii	RDT kits are properly stored in a cool place away from direct sun light	Yes[ ] No [ ]	
xviii	RDT kits are WHO pre-qualified	Yes[ ] No [ ]	
xix	Internal audit conducted as per the IQC checklist	Yes[ ] No [ ]	
xx	Corrective Action Form is maintained based on internal audit	Yes[ ] No [ ]	
xxi	Received the panel slides from malaria reference laboratory within last 6 months	Yes[ ] No [ ]	
xxii	Participated in the panel testing	Yes[ ] No [ ]	
xxiii	Feedback on panel testing received	Yes[ ] No [ ]	
xxiv	Any actions for improvement recommended from the panel slide testing	Yes[ ] No [ ]	
xxv	Corrective Actions Form maintained as per the feedback/recommendation from NMRL	Yes[ ] No [ ]	
xxvi	On-site monitoring and supervision on QA for Malaria by malaria reference laboratory within the last 6 months	Yes[ ] No [ ]	
xxvii	Feedback received from the QA monitoring	Yes[ ] No [ ]	
xxviii	Any actions for improvement recommended from the QA monitoring	Yes[ ] No [ ]	
xxix	Corrective Actions Form maintained as per the feedback/recommendation from QA monitoring	Yes[ ] No [ ]	
4	<b>Logistics and Supplies</b>		
i	Stock register is properly maintained and up to date	Yes[ ] No [ ]	
<b>Vector control tools</b>			
ii	Does the health facility distribute LLIN?	Yes[ ] No [ ]	
iii	Number of LLINs in stock:		
iv	LLINs are properly stored	Yes[ ] No [ ]	
v	LLIN distribution record is properly maintained and up to date	Yes[ ] No [ ]	
vi	Does the health centre do Indoor Residual Spray?	Yes[ ] No [ ]	
vii	Total chemical in stock:		

viii	IRS record is properly maintained and up to date	Yes[ ] No [ ]	
ix	Number of functional spray pumps:	Yes[ ] No [ ]	
x	Spray pumps are properly maintained		
<b>Essential anti-malarial drugs and test kits</b> *‘within expiry date’ refers to drugs/kits that are not expired.			
I	ACT within expiry date	Yes[ ] No [ ] Not in stock [ ]	
ii	Tab Chloroquine within expiry date	Yes[ ] No [ ] Not in stock [ ]	
iii	Tab Primaquine within expiry date	Yes[ ] No [ ] Not in stock [ ]	
iv	Inj. Artemether/Artesunate within expiry date	Yes[ ] No [ ] Not in stock [ ]	
v	Inj Quinine within expiry date	Yes[ ] No [ ] Not in stock [ ]	
vi	Malaria Rapid Diagnostic Test kit within expiry date	Yes[ ] No [ ] Not in stock [ ]	
<b>5 Planning and implementation of prevention and control activities</b>			
i	Does the health facility do malaria control activities?	Yes[ ] No [ ]	If No, skip to section 6
ii	Malaria vector surveillance is reflected in IWP	Yes[ ] No [ ]	
iii	Vector surveillance is carried out as per IWP	Yes[ ] No [ ]	
iv	IRS is reflected in IWP	Yes[ ] No [ ]	
v	IRS conducted as per IWP	Yes[ ] No [ ]	
vi	LLIN distribution is reflected in IWP	Yes[ ] No [ ]	
vii	LLIN distribution done as per IWP	Yes[ ] No [ ]	
viii	Case-based focus investigations is reflected in IWP	Yes[ ] No [ ]	
ix	Focus investigations conducted (if positive cases are detected)	Yes[ ] No [ ]	
x	Community based fever surveillance is included in IWP	Yes[ ] No [ ]	
xi	Fever surveillance conducted as per IWP	Yes[ ] No [ ]	
xii	Proactive case detection is included in IWP	Yes[ ] No [ ]	
xiii	Proactive case detection conducted as per IWP	Yes[ ] No [ ]	



xiv	Awareness program is reflected in IWP	Yes[ ] No [ ]	
xv	Awareness conducted as per IWP	Yes[ ] No [ ]	
xvi	LLIN use inspection is included in IWP	Yes[ ] No [ ]	
xvii	LLIN inspection conducted as per IWP	Yes[ ] No [ ]	
xviii	CAG supervision is reflected in IWP	Yes[ ] No [ ]	
xix	CAG supervision conducted as per IWP	Yes[ ] No [ ]	

**6 Completeness of malaria case documentation**

i	Did your health centre detect any malaria case in the previous year? Yes[ ] No[ ] <i>(If No, skip to sl.no.xiii and 7- iv &amp; v)</i>		
ii	Number of confirmed malaria case :		
iii	Number of cases with individual case file :		
iv	Number of case files with case summery report:		
v	Number of case files with duly filled notification form:		
vi	Number of case files with copy of verification of diagnosis by Level I/II microscopist :		
vii	Number of case files with duly filled follow up and treatment form:		
viii	Number of case files with duly filled case investigation form:		
ix	Number of case files with duly filled focus investigation form:		
x	Number of case files with duly filled RACD form:		
xi	Number of case files with a case GIS map:		
xii	Number of case files with a focus follow up:		
xiii	Foci register updated for the previous year	Yes[ ] No [ ] NA[ ]	

**7 Timeliness of reporting by the field workers in the previous year**

i	Number of confirmed cases notified within 24 hours		
ii	Number of confirmed cases investigated within 48 hours		
iii	Number of foci fully investigated within 7 days		
iv	Monthly malaria report submitted	Yes[ ] No[ ]	
v	Quarterly supplies update submitted	Yes[ ] No[ ]	

**Issues and Challenges:**

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<b>Meeting with Community Action Group (CAG)</b>			
	<b>Gewog:</b>	<b>Chiwog:</b>	<b>Date of visit:</b>
i	Did CAG conduct any meeting in the last one year?	Yes[ ] No [ ] Not in work plan [ ]	
ii	If yes, Is record available?	Yes[ ] No[ ]	
iii	Did CAG conduct fever surveillance in the last one year?	Yes[ ] No [ ] Not in work plan[ ]	
iv	If yes, Is record available?	Yes[ ] No[ ]	
v	Did CAG refer any fever cases in the last one year?	Yes[ ] No [ ] Not in work plan[ ]	
vi	If yes, Is record available?	Yes[ ] No[ ]	
vii	Did CAG conduct awareness on malaria in the last one year?	Yes[ ] No [ ] Not in work plan[ ]	
viii	If yes, Is record available?	Yes[ ] No [ ]	
ix	Did CAG carry out destruction of mosquito breeding sites in the last one?	Yes[ ] No [ ] Not in work plan[ ]	
x	If yes, Is record available?	Yes[ ] No [ ]	
xi	Did CAG conduct cleaning campaign in the last one year?	Yes[ ] No [ ] Not in work plan[ ]	
xii	If yes, Is record available?	Yes[ ] No[ ]	
xiii	Did CAG conduct LLIN use inspection in the last one year?	Yes[ ] No [ ] Not in work plan[ ]	
xiv	If yes, Is record available	Yes[ ] No [ ]	
xv	Did CAG submit quarterly reports to the concerned health facilities?	Yes[ ] No [ ] Not in work plan[ ]	
xvi	If yes, Is record available	Yes[ ] No[ ]	
xvii	Did CAG propose budget to the gewog administration in the last one year?	Yes[ ] No [ ] Not in work plan[ ]	
xviii	Did CAG receive budget support from the gewog administration in the last one year?	Yes [ ] No [ ]	
xix	Has there been any change in CAG membership in the last one year?	Yes[ ] No [ ]	
	<b>Any comments from the CAG:</b>		