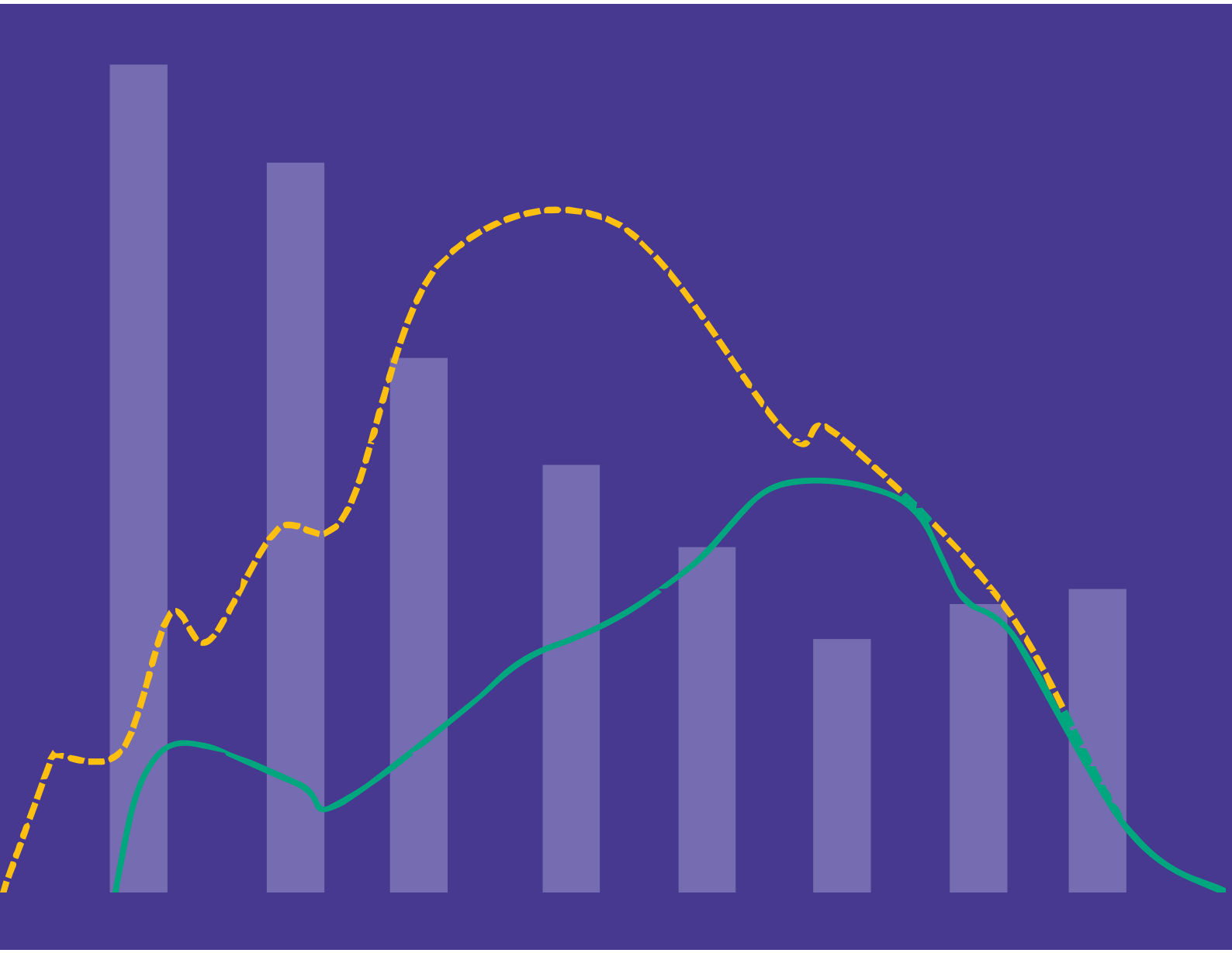
National Malaria Surveillance Guidelines 2019



Government of Nepal
Ministry of Health and Population
Department of Health Services
Epidemiology & Disease Control Division
Teku, Kathmandu

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Foreword

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Foreword

The National Malaria Surveillance Guidelines 2019 has been developed with the aim of providing a technical expertise in surveillance and response to the health workers in forefront of malaria elimination. This document was much needed to provide our local level health workers with the standard operating procedure for malaria case investigation and response.

The Pillar 3 of the Global Technical Strategy for Malaria 2016–2030 calls for the transformation of malaria surveillance into a core intervention. The aim of this document is to provide guidance to health workers on conducting an effective malaria surveillance.

Nepal has achieved a significant progress in reducing the malaria disease burden. Now the National Malaria Program has set a target of achieving zero indigenous malaria case by 2022 and achieve malaria elimination by 2025. Early detection and investigation of each case is key to interrupt local transmission and achieve this target.

I am happy to note that the National Malaria Surveillance Guidelines 2019 was prepared on the recommendations of the national and international technical experts, members of the technical working groups and based on extensive consultation and analysis made at the field by the experts for conducting surveillance at local level.

I would like to sincerely thank to Director EDCD and his team for their effort to develop this guideline. Similarly, last but not least I would like to thank team of WHO, SCI and USAID/PMI for their support in producing this excellent national malaria surveillance guideline which can help standardize and strengthen malaria surveillance in Nepal.

Dr Sushil Nath Pyakuryal
Director General
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Foreword

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Foreword

Malaria is caused by parasites of the Plasmodium family and transmitted by female Anopheles mosquito. Despite being preventable and treatable, malaria continues to have a devastating impact on people's health and livelihoods around the world.

Malaria continues to be a priority public health problem in Nepal. It affects mainly poor people living in rural areas, border communities, forest fringe areas and migrant populations. With strengthened surveillance, malaria has been detected in upper river valleys and hilly areas of Nepal like Mugu and Bajura where malaria was not reported before.

Despite all the adversities, with the continued efforts of many involved in the control and prevention of malaria, the era of malaria intervention has moved on with a target to achieve zero indigenous malaria cases by 2022 and eliminate malaria by 2025. So, there is an imperative need to further ensure that all the suspected cases are tested by quality assured RDT or microscopy and treated immediately.

Furthermore, only with strong surveillance system we would be able to detect the imported cases and prevent its further transmission in the community. The imported cases constitute more than 50 percent of the total case load, I am confident that with successful implementation of this guideline on surveillance, we will be able to reduce the indigenous cases to zero by 2022.

I would like to thank all the national and international experts who have contributed their invaluable suggestions and comments during the development of this guidelines. I would like to especially thank the WHO Country Office, SCI and USAID/PMI for providing technical support for developing this National Malaria Surveillance Guidelines 2019.

Dr. Bibek Kumar Lal
Director

Acknowledgement

The Director General, Health Service Department, Ministry of Health and Population expresses sincere gratitude to all the authors and reviewers of this guideline particularly to World Health Organization and all the members of the Technical Working Group for Malaria and all others who are involved in coming up with this comprehensive National Malaria Surveillance Guidelines 2019:

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Abbreviations and acronyms

App	Application
ACD	Active case detection
ACT	Artemisinin-based combination therapy
CIF	Case Investigation Form
DHIS-2	District health information system 2
DPHO	District public health office
EWARS	Early warning and reporting system
EDCD	Epidemiology and disease control division
FCHV	Female community health volunteer
GPS	Global positioning system
HC	Health coordinator
HH	Household
HO	Health office
IRS	Indoor residual spraying
IVM	Integrated vector management
IPC	Inter-personal communication
IRS	Indoor residual spraying
Km	Kilometer
LSM	Larval source management
LLIN	long-lasting insecticidal net
MDIS	Malaria disease information system
NMP	National malaria program
NMTP	National malaria treatment protocol
PCD	Passive case detection
PCR	Polymerase chain reaction
P.	Plasmodium
RDT	Rapid diagnostic test
RACD	Reactive case detection
SCI	Save the children international
SOP	Standard operating procedure
SMC	Surveillance medical coordinator
SMS	Short messaging service
WHO	World Health Organization

1. Introduction

1. Introduction

Surveillance is 'the continuous and systematic collection, analysis and interpretation of disease-specific data, and the use of that data in the planning, implementation and evaluation of public health practice'.

The World Health Organization's (WHO) Global technical strategy for malaria 2016–2030, recommends that malaria surveillance be transformed into a core intervention in all malaria-endemic countries and in those countries that have eliminated malaria but remain susceptible to re-establishment of transmission. Nepal's National Malaria Strategic Plan (2014-2025) has since endorsed surveillance as a core intervention to reduce and ultimately interrupt malaria transmission.

Surveillance is being rolled-out as the basis of operational activities nationwide, both in areas of high transmission where the aim is to reduce the burden of malaria, and in low burden areas where the aim is to interrupt malaria transmission and prevent re-establishment.

1.1 Epidemiology of malaria

Until the latter half of the 20th century malaria was one of the major health problems in much of lowland Nepal. Surveys conducted in the inner Terai region in 1925 revealed average spleen rates in children of 80%. There were an estimated 2 million cases each year (the total population was just over 5 million) and apparently 10-15% of these cases died.

Malaria eradication efforts were initiated with the support of United States Agency for International Development and WHO in 1958. Although falling short of malaria eradication, the initial results were impressive. Large areas of formerly uninhabitable land in the Terai were settled and cultivated; a major step forward in the socioeconomic development of the county. Moreover, the policy of indoor residual spraying with dichlorodiphenyltrichloroethane (DDT) (presumably in conjunction with significant deforestation) resulted in the elimination of the primary vector Anopheles minimus.

However, by the early 1970s the program started to suffer setbacks due to various technical, financial, administrative and logistical problems. In 1978 a decision was made to abandon eradication and switch to control. Following the call of WHO to revamp malaria control programs in 1998, the global 'Roll Back Malaria' initiative was launched in Nepal to control malaria transmission in hard-core forests, foot-hills, inner-Terai and hill river valleys, which accounted for more than 70% of the total malaria cases in the country.

The malaria burden in Nepal has declined steadily since 1985. As indicated in the 2013 review, the following elements are likely to have played a major role: a) overall improvement in social determinants of health, b) scale-up of simple diagnostic tools like combo-rapid diagnostic tests (RDTs), c) availability of chloroquine, primaquine and artemisinin-based combination therapy (ACT) in all public healthcare

facilities, and d) high coverage with long-lasting insecticidal nets (LLINs) in target areas. Financial support from the Global Fund has been a critical factor in this success.

The overall malaria trend clearly indicates that substantial progress has been made towards elimination in Nepal.

Plasmodium vivax is the predominant species in Nepal and P. falciparum is the other important species. The relative proportion of P. vivax cases have been increasing from 71% in 2010 to 95% in 2018, while the proportion of P. falciparum is correspondingly on the decline from around 29% in 2010 to around 5 % in 2018.

1.2 Changing Epidemiology

With the continuing gradual decline in malaria incidence in Nepal the epidemiology of the disease is changing:

- The number of uncomplicated malaria cases is decreasing.
- The numbers of severe cases and deaths has almost reached zero.
- Transmission is becoming more focal.
- The age-gender distribution of cases is changing with the relative burden of disease growing amongst adult males (forest goers and workers returning from India).
- The proportion of imported cases is rising.
- Where transmission have declined, populations have become less immune and associated risks have increased.

The proportion of P. falciparum is gradually increasing, as current interventions are more effective at controlling P. falciparum.

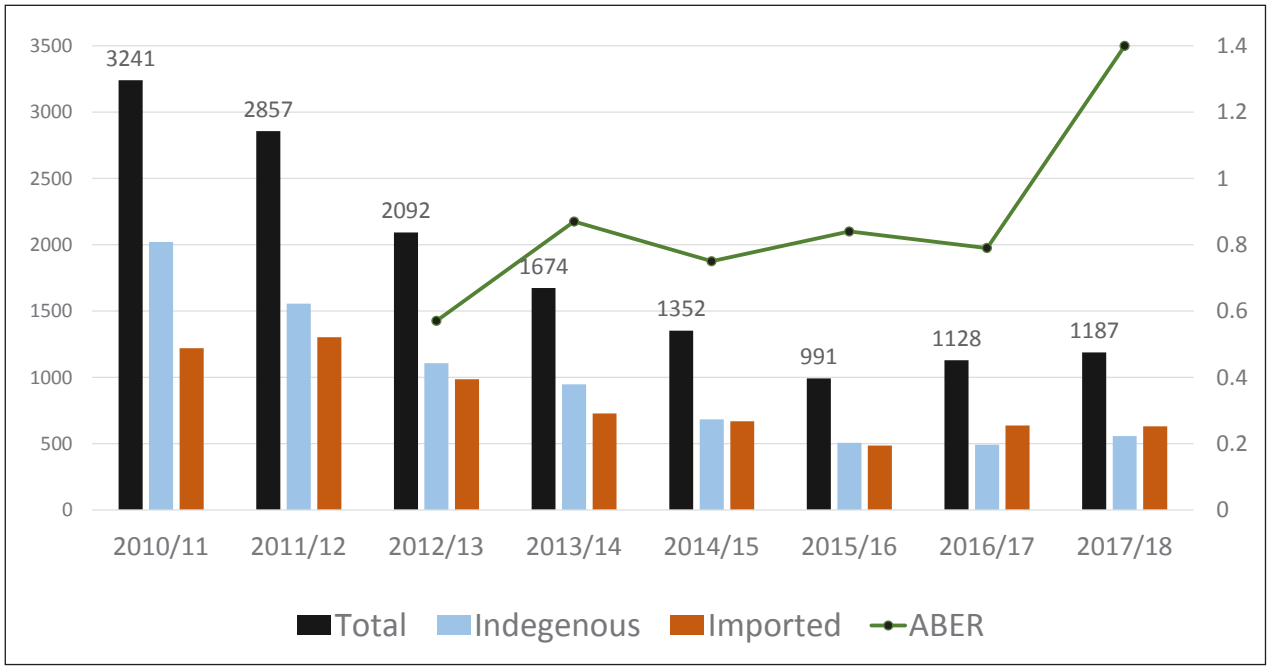


Figure 1. Malaria Disease trends (Source: HMIS)

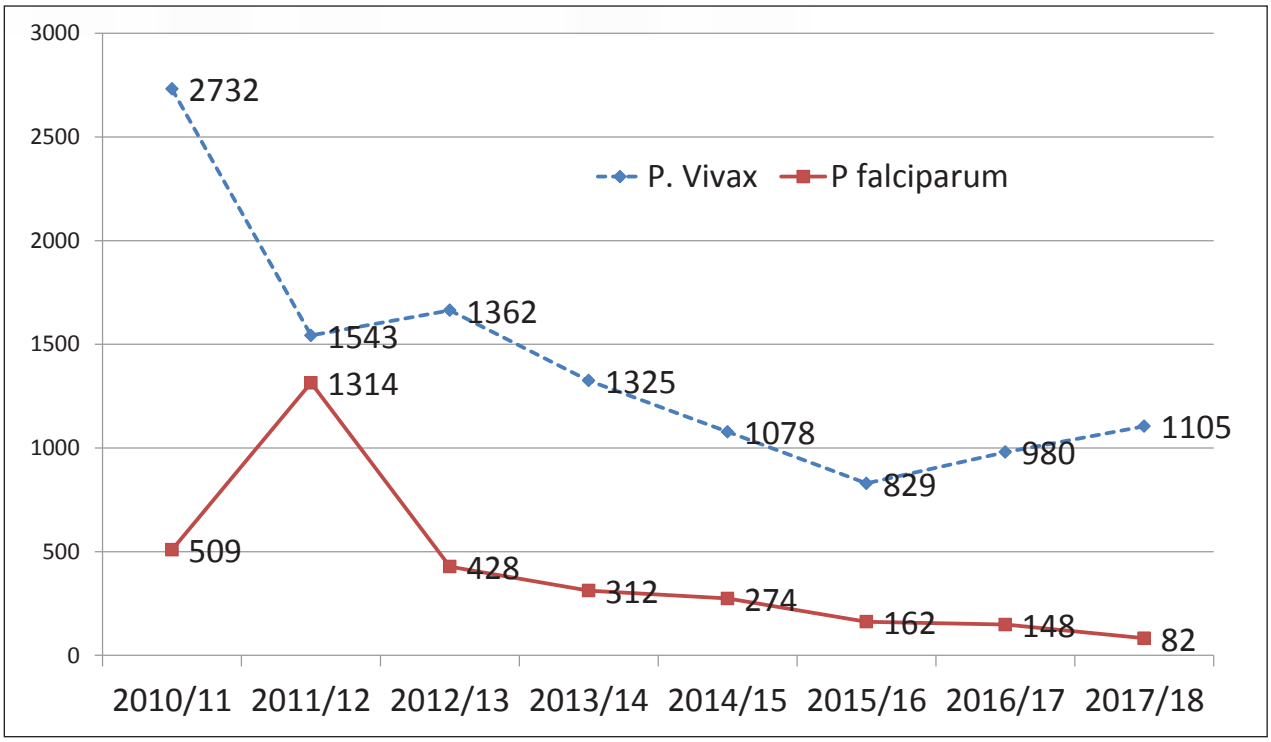


Figure 2. Malaria case by species

Risk of Malaria

The 2018 micro-stratification malaria risk map for Nepal is presented in figure 3. The key parameters considered for this stratification were:

- Disease burden (ward level) based primarily on indigenous cases, but also factoring in imported cases.
- Receptivity (district level) based-on altitude, temperature, forest cover, presence of water bodies, and ecotype.
- Vulnerability (regional level) based on estimated population mobility.

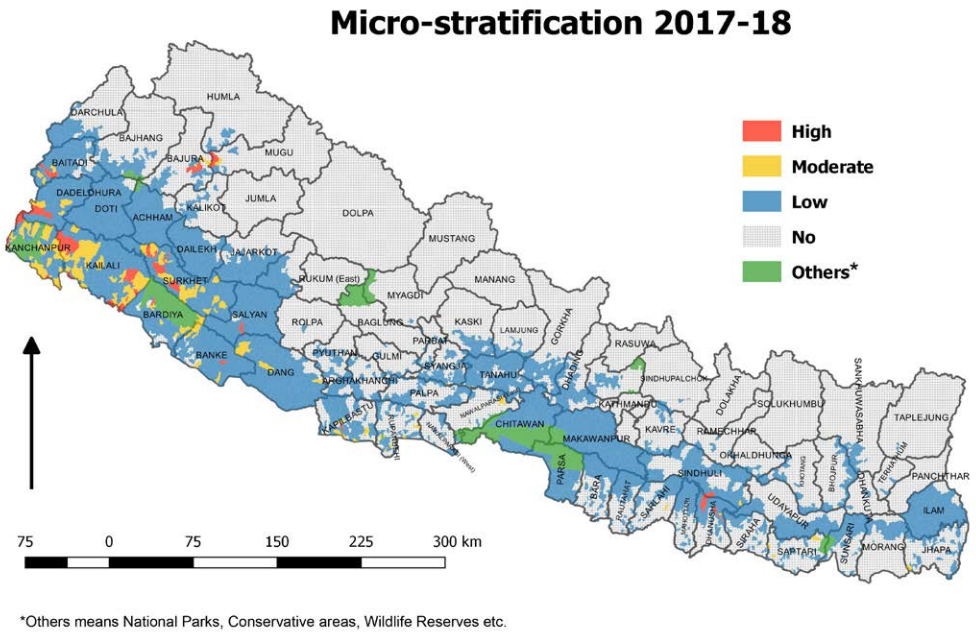


Figure 3. Ward-level malaria risk stratification in Nepal

2. Malaria surveillance

2.1 Malaria surveillance system

A malaria surveillance system comprises the people, procedures, tools and structures necessary to generate information on malaria cases and deaths. The information is used for planning, implementing, monitoring and evaluating malaria programs. An effective malaria surveillance system enables program managers to:

- Identify and target areas and population groups most severely affected by malaria, to deliver the necessary interventions effectively and to advocate for resources;
- Regularly assess the impact of intervention measures and progress in reducing the disease burden and help countries to decide whether adjustments or combinations of interventions are required to further reduce transmission;
- Detect and respond to epidemics in a timely way;
- Provide relevant information for certification of elimination; and
- Monitor whether the re-establishment of transmission has occurred and, if so, guide the response.

Nepal's surveillance system is expected to receive individual case notification within 24 hours of case detection from public, private, community and all other sources. Case notification is expected to trigger prompt case investigation within 48 hours of notification and focus investigation and response is expected within 7 days of case detection.

In Nepal at present malaria cases are reported using three different systems:

1. Malaria Disease Information System (MDIS) (case notification within 24 hours of case detection).
2. District Health Information System 2 (DHIS-2) (aggregate, monthly data).
3. Early Warning and Reporting System (EWARS-weekly reporting).

2.1.1 Malaria disease information system

The recently launched MDIS currently focuses mostly in public facilities in targeted districts. It will be strengthened, and its scope and geographical coverage will be expanded to cover all healthcare service providers (including the military and police, and those in the private sector) throughout the country by 2019. The system will support real-time case-based reporting, case investigation, focus investigation and focus response. More emphasis will be placed on data analysis and interpretation at the district and central level, and on the provision of timely and strategic feedback to district level teams and peripheral health staff.

Progression towards malaria-free status is a continuous process, and not a set of independent stages. Socioeconomic and environmental changes, the natural heterogeneity of malaria transmission, and the varying impacts of different interventions within a country means that progress is often uneven and varied. Based on the burden of malaria in the country, the aims of surveillance, specific actions and monitoring and evaluation also evolve (see table 1 below).

The burden of malaria in Nepal puts all areas of the country in the 'Very low transmission' category

Table 1. Malaria surveillance in different transmission settings

Burden of Malaria	Surveillance	Specific Actions
High transmission Case incidence >100/1000 pop	Data analysis on aggregated numbers ➢ Age and sex	Ensure Universal Access to quality assured diagnosis and prompt effective treatment at population level.
Moderate transmission Case incidence > 50 - <100/1000 pop Low transmission Case incidence >25 - <50/1000 pop	Data analysis on ➢ (each and every malaria case) ➢ Greater heterogeneity in the distribution of malaria. ➢ Identify vulnerable population groups and identify hot spots and hot pops and ensure targeted interventions.	➢ Map areas of residual transmission, and ➢ Analyse case distribution at individual HH and community level. ➢ Frequent data analysis to detect potential focal outbreaks ➢ Respond to focal outbreaks
Very low transmission (in elimination settings) Case incidence <25/1000 pop	➢ Prompt detection and response to new cases and foci.	➢ All cases of malaria and foci investigation conducted. ➢ Eliminate foci of transmission and maintain malaria-free status. ➢ Resource intensive and additional skills, training is required.

2.2 Case definitions

A ***suspected malaria case*** is an individual with an illness suspected by a health worker to be due to malaria, generally based on the presence of fever with or without other symptoms. This suspicion triggers the process of parasitological confirmation by microscopy or RDT and the subsequent decision on whether to treat the individual for malaria.

Common criteria for suspicion of malaria include:

- residents of endemic areas (high to low transmission) and active foci in elimination areas: patients with fever or a recent history of fever (or any other symptom considered related to malaria, chills, headache for example); and,
- residents in non-endemic areas with very-low transmission or maintaining zero transmission: patients with unexplained fever and a history of travel to areas at risk of malaria, either within the country or abroad.

More specific categories for suspicion in elimination settings include:

- all febrile patients from an active focus, especially during the transmission season;
- people with a history of malaria in the past 3 years and fever or recent history of fever;
- people who have fever within 1 year of having visited a malaria-endemic area (domestic or foreign) – this is sometimes extended to 3 years for areas at risk of P. vivax;

- patients with fever, malaise and chills; people with anaemia of unknown cause; patients with fever of unknown aetiology; patients with hepatomegaly or splenomegaly (or both); and
- recipients of blood donations who have fever during the 3 months after the transfusion.

A confirmed malaria case is a case in which the presence of parasites or antigens in the peripheral blood have been demonstrated, with or without symptoms.

A ***malaria case (uncomplicated)*** is symptomatic malaria parasitaemia without signs of severity or evidence of vital organ dysfunction.

A ***malaria case (severe)*** is symptomatic malaria parasitaemia with signs of severity or evidence of vital organ dysfunction, which includes:

– Prostration (inability to sit), altered consciousness, lethargy or coma
– Difficulty in breathing
– Severe anaemia (Haemoglobin < 7mg/dl)
– Generalized convulsions/ fits
– Inability to drink/vomiting
– Dark or limited production of urine
– Jaundice

Severe malaria is usually caused by P. falciparum; however, P. vivax can also cause severe malaria. If not treated on time, it is usually fatal.

2.3 Malaria case classification

Case classification becomes important during the last stages of elimination and is a primary reason for conducting case investigations. Once a case has been investigated, it is classified into one of the categories shown in figure 4. A case's classification helps to determine whether a focus investigation is required and the classification of subsequent cases identified during focus investigation help to determine whether a focus is active and plan for focus response.

A **locally acquired case** is one that is due to mosquito-borne transmission and acquired within the area of investigation (eg. ward/district/country). There are two types of locally acquired malaria cases:

1. Indigenous case: Any case contracted within the country, with no evidence of a direct link to an imported case. In the surveillance algorithm, the indigenous case is further classified for operational response purpose.
   - *Indigenous (same ward within the country) – any case contracted locally in the same ward, without strong evidence of a direct link to an imported case;*
   - *Indigenous (from different ward/district within the country) - any case contracted in the different ward/ district within the country, without strong evidence of a direct link to an imported case;*
2. Introduced – any case contracted locally, with strong epidemiological evidence linking it directly to a known imported case (first generation from an imported case; i.e. the mosquito was infected by a patient classified as an imported case). In areas where transmission is known to be ongoing, there is limited practical value in classifying cases as introduced.

[1] Unless the patient was diagnosed as having malaria prior to their return to Nepal.

There is little difference between introduced and indigenous cases. Both indicate local transmission, showing that malaria control was not strong enough to interrupt transmission.

Where staff have adequate technical capacity they should weigh several factors in the final assessment of whether or not a case is imported or indigenous. If in doubt the case should be classified as indigenous.

An **imported case** is one that is due to mosquito-borne transmission and is acquired in another country. National Malaria Program has standardized the initial classification of 'imported' malaria as a confirmed case of malaria detected within 1 month of return from an endemic area outside Nepal.

In reality the probability that a case was imported is more complex than this and is associated with several factors as outlined below.

1. The timing of travel to and from endemic areas to determine how long they have stayed there:

- The usual delay between an infectious mosquito bite and a primary clinical attack is 7–30 days.
- The minimum incubation period for P. falciparum is 7 days and for P. vivax is 10 days. Thus, detection of malaria parasites within 0–7 days of returning from another endemic country for P. falciparum or 0-10 days of returning from another endemic country for P. vivax indicates with a high degree of certainty that the person was infected before travelling and that the case is imported.
- People who have lived in malaria-free areas for 2 or more years and have low immunity to malaria are highly likely to have clinical symptoms shortly after the usual incubation period.
- Where the time between returning from travel to an endemic area and detection of malaria infection increases beyond these minimum incubation periods, the probability that the case is truly due to an imported infection starts to decline, and the probability that the case is due to local transmission increases1.

2. Variation in parasite species:

- P. falciparum infections can last for 18-24 months, but several febrile episodes would be expected during that period, because parasite density increases intermittently to cause fever or symptomatic illness. Predominantly asymptomatic long-term infections are unlikely to occur in people with little antimalarial immunity but are possible.
- P. vivax infections due to activation of hypnozoites can cause infections up to 5 years after the previous infection or clinical episode but are most likely within 3 years. Experience in many countries shows that nearly 50% of imported cases occur within 1 month of arrival back in the country of residence, and up to 75% by 3 months.

An **induced case** is one that is not due to mosquito-borne transmission but to a blood transfusion or other form of parenteral inoculation of the parasite such as needle-stick injury. Induced cases never give rise to clinical relapses, because there are no liver-stage parasites.

A **relapsing case** occurs as a result of a recurrence of parasitaemia in P. vivax or P. ovale infections arising from hypnozoites, which are dormant parasite stages in the liver. Relapses occur when the blood stage infection has been eliminated but hypnozoites persist. After variable intervals of weeks, months or even years, some of these hypnozoites may be activated and mature to form hepatic schizonts which burst liberating merozoites into the bloodstream which go on to infect new red blood cells resulting in a new symptomatic episode.

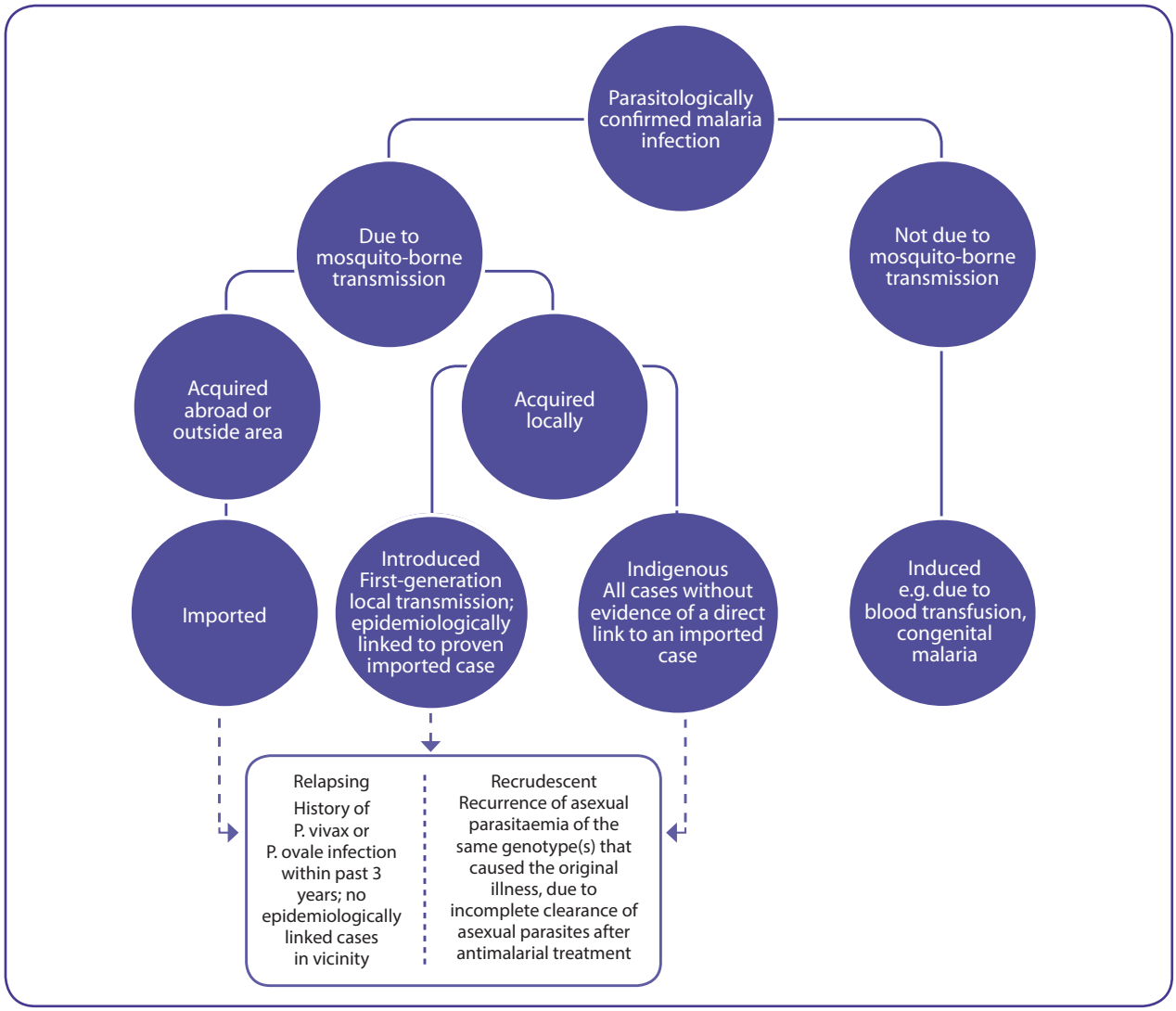


Figure 4. Classification of malaria case

A **recrudescent case** is the result of a recurrence of asexual parasitaemia of the same genotype(s) that caused the original illness, due to incomplete clearance of asexual parasites after antimalarial treatment.

2.4 Focus classification

For the purpose of malaria surveillance in elimination settings a 'focus' is considered to be a defined, circumscribed area situated in a currently or formerly malarious area containing the continuous or intermittent epidemiological factors necessary for malaria transmission.

Table 2. Focus classification

Type of focus	Definition	Operational criteria
Active	A focus with ongoing transmission.	Indigenous case(s) have been detected within the current calendar year.
Residual non-active	Transmission interrupted recently (1–3 years ago).	The last indigenous case(s) was detected in the previous calendar year or up to 3 years earlier.
Cleared	A focus with no local transmission for more than 3 years and which is no longer considered residual non-active.	A focus with no indigenous case(s) for more than 3 years, where only imported or/and relapsing/recrudescent cases or/ and induced cases may occur in the current calendar year.

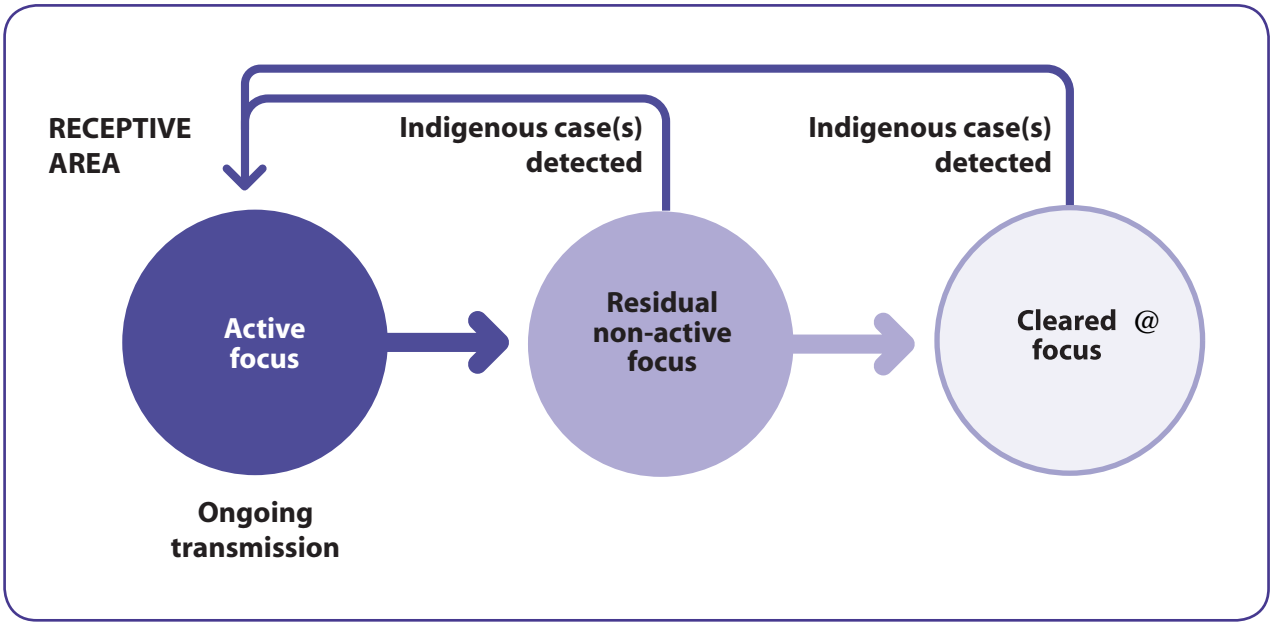


Figure 5. Classification of malaria foci

A focus can be classified into one of three types (table 2); the relations among different types of focus are shown in figure 5. Focus classifications are updated annually at the end of the malaria transmission season. The status of a focus is also reviewed as new cases appear and field investigations are undertaken. The results of focus investigations are compiled and maintained at national level in the 'Focus register' and a summary of the status of all national foci is updated at annually.

2.5 Malaria surveillance in the elimination phase

The aim of the elimination phase is to stop local transmission of malaria, in contrast to the control phase, in which the objective is to reduce the number of cases to low levels but not necessarily interrupt local transmission.

The objective of a malaria surveillance system in the elimination phase is to detect all malaria Infections and ensure that they are radically cured so early that they do not generate secondary cases. In practice, countries accomplish this in two stages:

- The first stage is to identify all areas or foci with local transmission of malaria. Foci are usually first identified from reports of confirmed malaria cases from public and private sector health facilities. Each malaria case is then investigated to determine whether it was locally acquired or imported and, if so, from where.

- Secondly, if a focus of local transmission is detected, the characteristics of transmission are documented by conducting a focus investigation. Control and surveillance activities are then intensified in the focus.

This two-step process targets symptomatic cases detected passively; most malaria infections in low-transmission settings produce fever periodically where people have no malaria immunity.

Passive case detection should therefore lead to the detection of most malaria infections. The continuous presence of a health worker is required for good passive case detection in active transmission foci and is preferable to periodic visits by mobile teams.

Active case detection is a complementary strategy that involves the detection by health workers of malaria infections at community and household level in population groups that are considered to be at high risk. Active case detection is always used in epidemiological investigations of new cases and foci.

Organizing active case detection by regular house-to-house visits

Local health-care providers or mobile teams list the targeted population by household with the assistance of local authorities. There should be complete coverage of the target population. People from organizations associated with the target population should be included in the lists, e.g. transport workers, development project workers, the military. People who may not be recorded on existing household lists, should also be covered. All efforts should be made to include people living in factories, especially migrants.

A plan of visits should be prepared, and the targeted population should be informed of the dates and times they will be visited. They should be conducted when family members are most likely be at home (before or after work or school)

During the community visit around 2 km radius of the index case, household members are asked about current or recent fever in the last 14 day. A RDT should be conducted and people confirmed with malaria are treated immediately, and cases and foci are investigated epidemiologically.

A register of all people who had blood taken during active case detection should be completed (Annex 4: line listing of malaria cases). It should include the identification number of the household, the name of the head of the household, address, person's name, age and other risk factor information (e.g. occupation, insecticide-treated net ownership and use, indoor residual spraying in the past year), date blood taken, type of testing and results (species, stages, density, presence of gametocytes).

2.6 Case Investigation, focus investigation and focus response

Nepal has adopted a 1-3-7 approach to case-based surveillance for malaria, whereby:

- all suspected cases are immediately tested parasitologically using antigen-based rapid diagnostic tests (RDT) or quality assured microscopy;
- all confirmed cases are immediately treated according to the National Malaria Treatment Protocol (NMTP);
- all confirmed cases are immediately reported to the Malaria Disease Information System (MDIS);
- all confirmed cases are investigated within 3 days using standard Case Investigation Forms;
- all suspected foci are investigated within 7 days using standard Focus Investigation Forms;
- all active foci are responded to within 7 days;
- all confirmed cases are followed-up for compliance according to the National Malaria Treatment Protocol (NMTP); and,
- all confirmed cases are provided with information relating to early treatment seeking and personal protection from malaria (delivered through inter-personal communication (IPC) by health workers and volunteers) and given a long-lasting insecticidal net (LLIN) if they do not already have one.

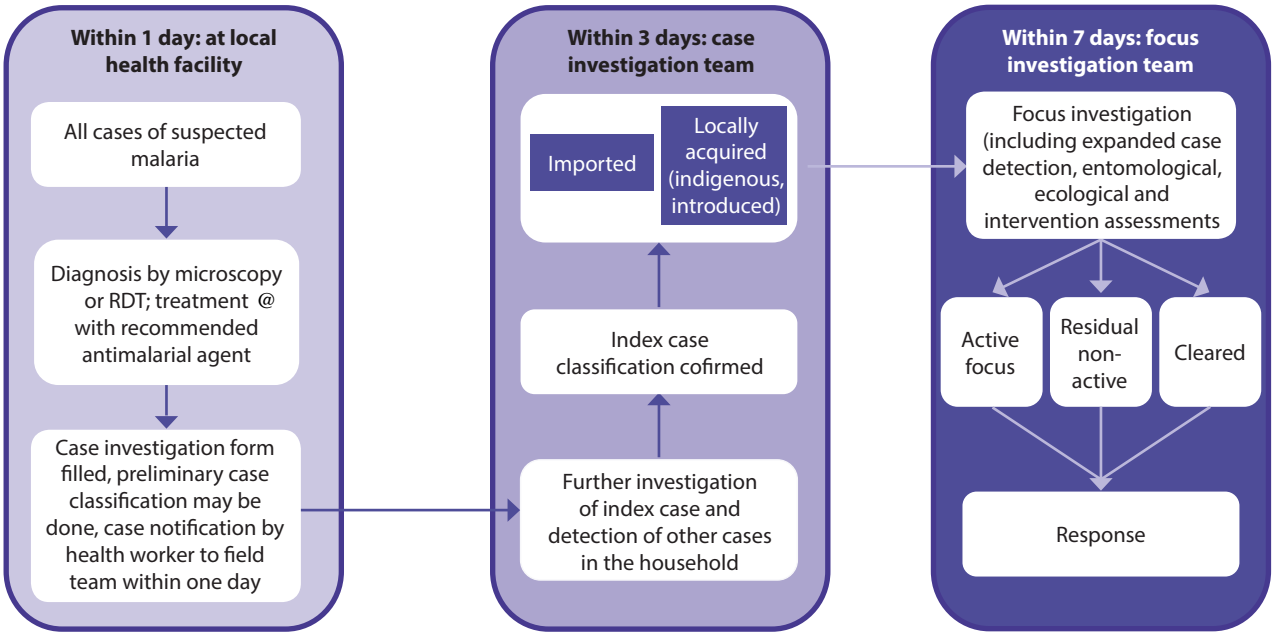


Figure 6: 1-3-7 approach to malaria surveillance

2.6.1 1-3-7 approach to malaria surveillance

When a suspected malaria case **[1]** is identified by a healthcare provider the patient should be tested by antigen-based rapid diagnostic test (RDT) or microscopy **[2]**. If the result is negative **[3]** then the healthcare worker should either continue with differential diagnosis **[5]** until a cause for the patient's symptoms can be identified or alternatively refer the patient to a higher-level health facility.

If the result of the parasitological test is positive **[4]**, then the patient should be treated according to the NMTP and a 'positive case' should immediately be reported to the Malaria Disease Information System (MDIS by text message (SMS) or using the MDIS 'App' developed by EDCD in 2018 **[6]**.

The local malaria focal person based at the Local Body or Health Office (HO) or the local Surveillance Medical Coordinator (SMC) should then immediately review the MDIS report for veracity and provide feedback to the health worker who reported the positive case **[7]**.

If the reviewer concludes that the case was reported in error **[9]** then the reviewer should provide feedback to the reported to prevent further erroneous reports in future **[10]**. If however the reviewer verifies the case **[8]** then the response depends on the area's focus classification status.

If the area is already classified as an 'active focus' **[11]** then the focus records should be updated, and a case investigation should be conducted by the "focus investigation and response team" as part of the ongoing focus response **[13]**. If however there is no focus classification record for the area from which the case report originated, or if the area is classified as a 'cleared focus', or a 'residual non-active focus' **[12]**, then case investigation should be conducted by day 3 **[14]**:

Local malaria focal person, local Female Community Health Volunteer (FCHV), the health worker who reported the case together with a lab assistant and in consultation with SMC should visit the patient's locality and, using the Case Investigation Form, investigate and classify the case **[15]**. Every case classification should be verified by responsible/supervising officer at local level.

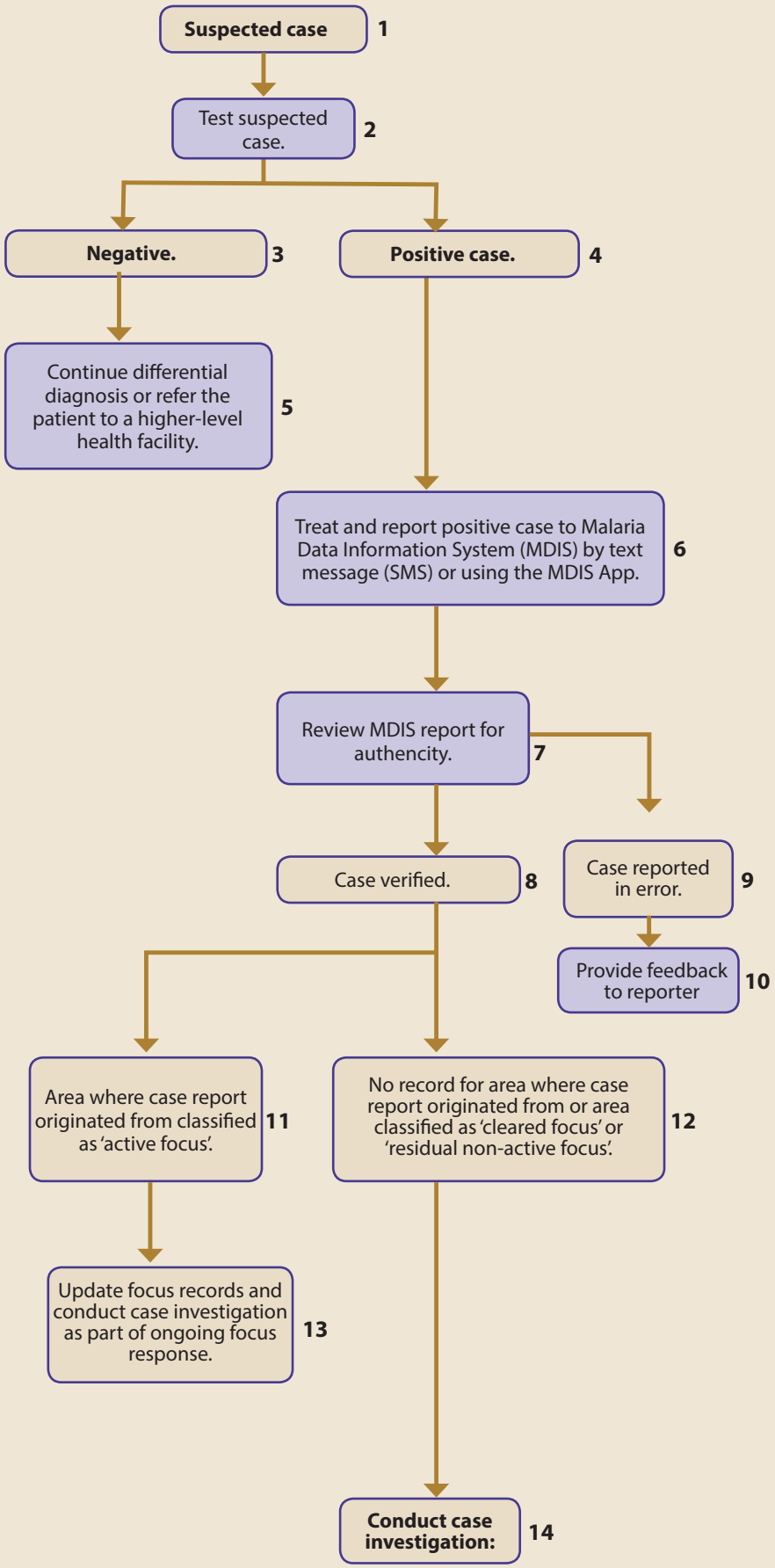
The case may be classified as follows:

1. **Imported case acquired in another country [16]**
2. **Indigenous case acquired in another ward/palika/district [17]**
3. **Indigenous case acquired locally (within ward) [18]**

If the case is classified as either an imported case acquired in another country **[16]** or an indigenous case acquired in another ward/palika/district **[17]** then the relevant individual (which may be the local malaria focal person, the SMC, the Health Coordinator, the EDCD, or the WHO Country office, depending on the origin of the case) should communicate with the source ward, palika, district or country if known **[19]**, so that an appropriate investigation can be carried-out at the source of the infection.

All household members of the index case and all co-workers/co-travellers returning from the source ward, palika, district or country should be screened for malaria by the health worker and lab assistant with the support of the FCHV and in consultation with the local malaria focal person or SMC **[20]**. Screening involves taking a finger-prick (or heel-prick in the case of infants) blood sample and testing this for the presence of parasites using either antigen-based RDTs or microscopy. Strenuous efforts must be made

By day 1:



WHERE?	WHO?
Health facility.	Healthcare provider.
Health facility.	Healthcare provider.
Health facility.	Healthcare provider.
Local body/ Health Office/ SCI Field Office.	Local malaria focal person/ Surveillance Medical Coordinator (SMC).
Local body/ HO/SCI Field Office.	Local malaria focal person/ SMC.
In the designated area.	Focus investigation and response team.

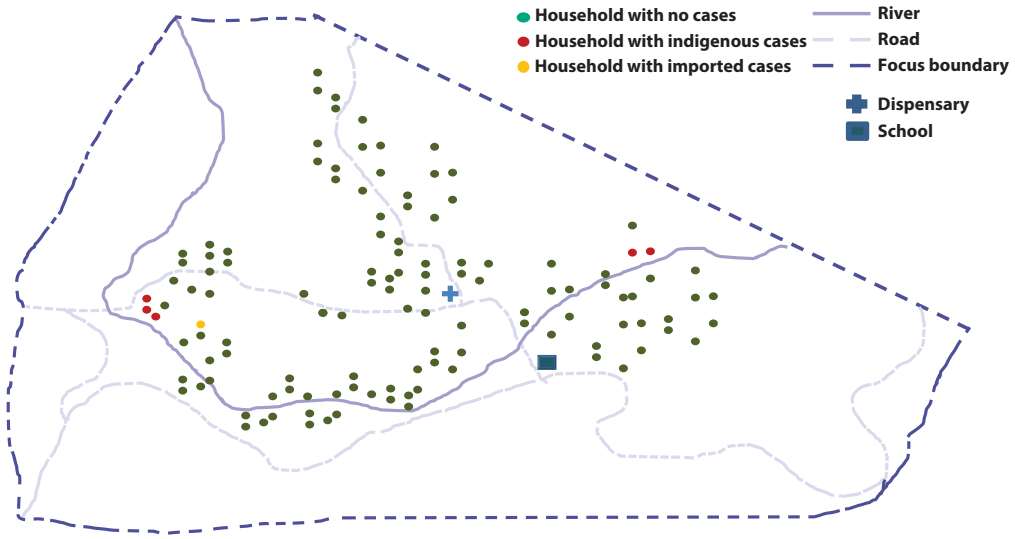


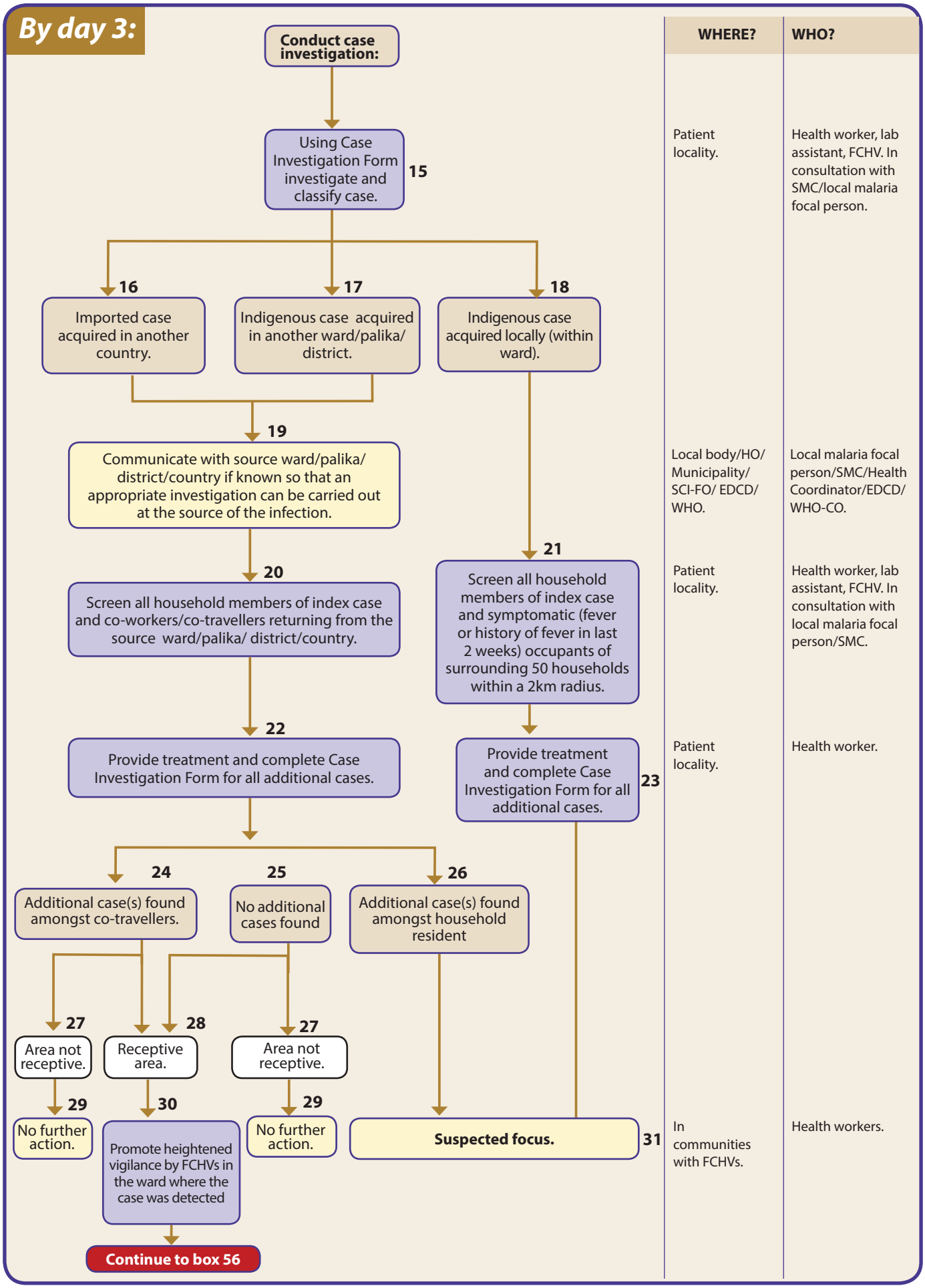
Figure 8. A focus map showing the distribution of households geolocated by GPS, roads and river.

to screen all co-travellers in the event of imported malaria, and all co-workers in the event of workplace malaria. The health worker should provide treatment and complete the Case Investigation Form for all additional cases found **[22]**.

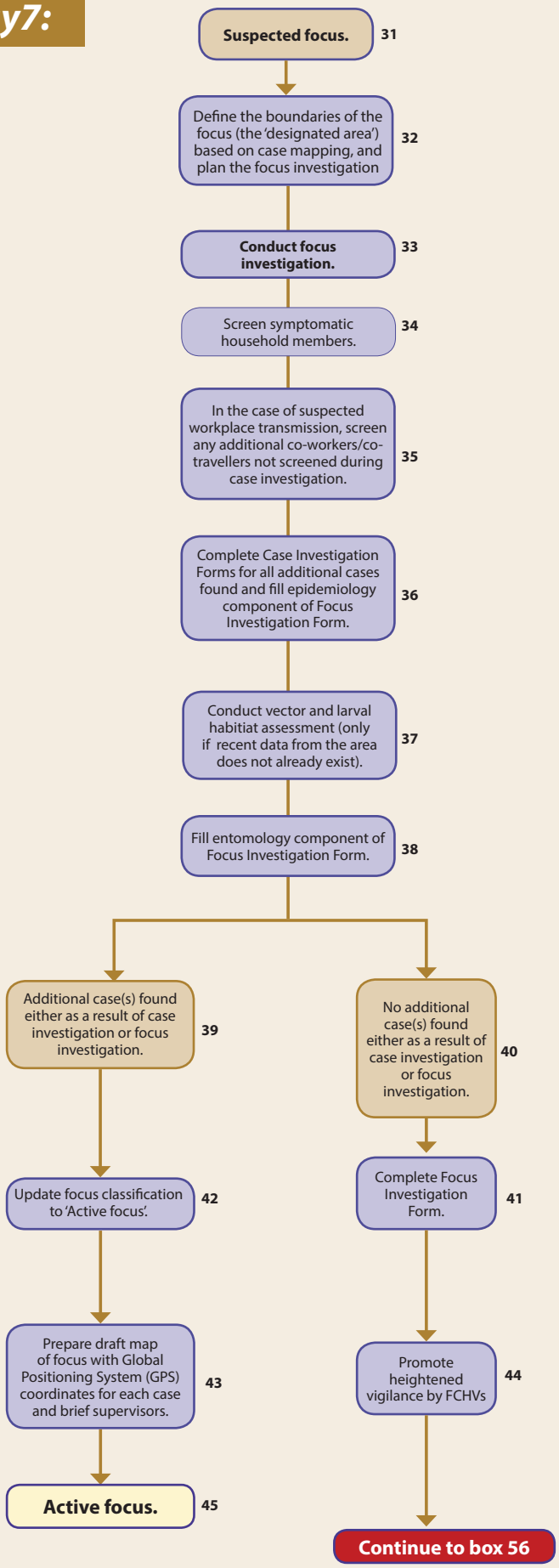
- If any additional cases are found amongst co-travellers **[24]** and the area is not receptive **[27]** then no further action need be taken **[29]**. If any additional cases are found amongst co-travellers **[24]** and the area is receptive **[28]** then the health worker should promote heightened vigilance by FCHVs (where present) **[30]** and the response team should conduct Active Case Detection (ACD) on days 14 and 28 **[56].** If any additional cases are found amongst householders during the ACD **[58]**, then the focus investigation and response team should update the focus classification to 'Active focus' **[42]** and conduct a focus investigation **[43-57]**.
- If no additional cases are found **[25]** and the area is receptive **[28]** then the health worker should promote heightened vigilance by FCHVs **[30]** and the focus investigation and response team should conduct Active Case Detection (ACD) on days 14 and 28 **[56]**. If any additional cases are found amongst householders **[58]**, then the focus investigation and response team should update the focus classification to 'Active focus' **[42]** and conduct a focus investigation **[43-57]**. If no additional cases are found **[25]** and the area is not receptive then no further action need be taken **[29]**.
- If any additional cases are found amongst household residents **[26]** then the area should be classified as a suspected focus **[31]**.

If the case investigation identifies the index case as being an Indigenous case acquired locally (within the ward) **[18]** the health worker, lab assistant, local FCHV and in consultation with the local malaria focal person or SMC should screen all of the household members of the index case and any symptomatic (fever or history of fever in last 2 weeks) occupants of the nearest 50 households within a 2km radius **[21]**. Case investigation teams should stay overnight in the target area to screen key populations if these key populations are absent during the day. The health worker should provide treatment and complete the Case Investigation Form for all additional cases found **[23]**.

For all suspected foci **[31]** either the local malaria focal person/ Entomologist/HC/SMC/health coordinator should immediately define the boundaries of the focus (the 'designated area') based on case mapping and

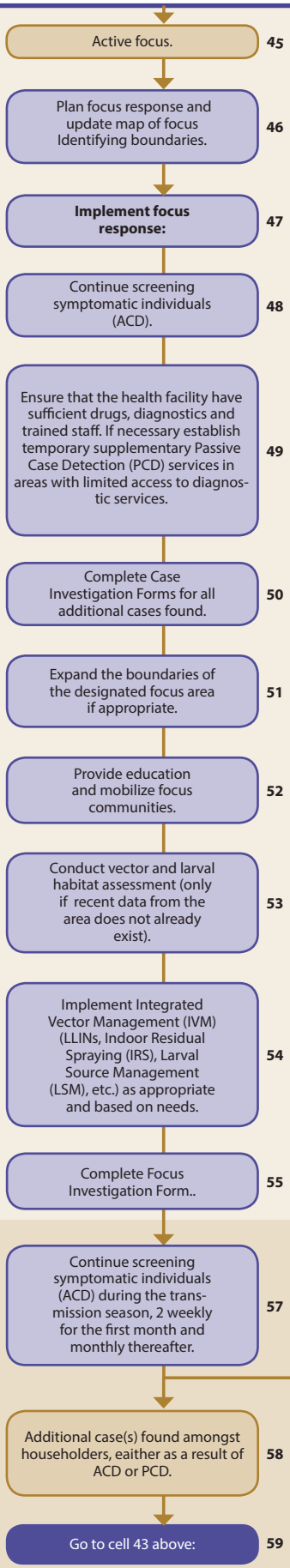

By day 3:
WHERE?
WHO?
Conduct case investigation:
Using Case Investigation Form investigate and classify case.
15
Patient locality.
Health worker, lab assistant, FCHV. In consultation with SMC/local malaria focal person.
16
Imported case acquired in another country.
17
Indigenous case acquired in another ward/palika/ district.
18
Indigenous case acquired locally (within ward).
19
Communicate with source ward/palika/ district/country if known so that an appropriate investigation can be carried out at the source of the infection.
Local body/HO/ Municipality/ SCI-FO/ EDCD/ WHO.
Local malaria focal person/SMC/Health Coordinator/EDCD/ WHO-CO.
20
Screen all household members of index case and co-workers/co-travellers returning from the source ward/palika/ district/country.
21
Screen all household members of index case and symptomatic (fever or history of fever in last 2 weeks) occupants of surrounding 50 households within a 2km radius.
Patient locality.
Health worker, lab assistant, FCHV. In consultation with local malaria focal person/SMC.
22
Provide treatment and complete Case Investigation Form for all additional cases.
Provide treatment and complete Case Investigation Form for all additional cases.
23
Patient locality.
Health worker.
24
Additional case(s) found amongst co-travellers.
25
No additional cases found
26
Additional case(s) found amongst household resident
27
Area not receptive.
28
Receptive area.
27
Area not receptive.
29
No further action.
30
Promote heightened vigilance by FCHVs in the ward where the case was detected
29
No further action.
Suspected focus.
31
In communities with FCHVs.
Health workers.
Continue to box 56

By day7:



WHERE?	WHO?
Local body/HO	Local malaria focal person/ Entomologist/ SMC/ Health Officer/Coordinator
For all households in the 'designated area'.	Focus investigation and response team.
In the designated area.	Focus investigation and response team.
In the designated area.	Focus investigation and response team.
In the designated area.	Focus investigation and response team.
In the designated area.	Focus investigation and response team.
In the focus investigation area.	Focus investigation and response team.
In the focus investigation area.	Focus investigation and response team.

By day 7:
Continue



Day 14+

WHERE?	WHO?
HO/Local body.	local malaria focal person/ Entomologist/ HC/SMC.
For all households within designated focus area.	Focus investigation and response team.
In the designated focus area.	SMC/local malaria focal person.
In the focus investigation area.	Focus investigation and response team.
In the focus investigation area.	Focus investigation and response team in consultation with the SMC/Entomologist/HC/ local malaria focal person.
For all within designated focus area.	Focus investigation and response team and FCHVs and local leaders.
In the designated focus area.	Focus investigation and response team.
In the designated focus area.	Focus investigation and response team.
In the designated focus area.	Focus investigation and response team.
For all households within designated focus area.	Focus investigation and response team.

plan **[32]** and implement a focus investigation **[33]**. The focus investigation and response team should screen all symptomatic household members **[34]** in all households in the designated area. In the case of suspected workplace transmission the team should also screen any additional co-workers/co-travellers not already screened during the case investigation[35]. Focus investigation and response teams should stay overnight in the target area to screen key populations if these key populations are absent during the day. The team leader should ensure that Case Investigation Forms (annex 2) are completed for all additional cases found and that the epidemiology component of the Focus Investigation Form (annex 5) is correctly filled **[36]**.

In case recent data from the area does not already exist, the team should also conduct a vector and larval habitat assessment **[37]** and complete the entomology component of the Focus Investigation Form **[38]**.

If no additional cases are found either as a result of case investigation or focus investigation **[40]** then the focus investigation and response team should complete the Focus Investigation Form **[41]** and promote heightened vigilance by FCHVs **[44]** before returning to routine duties. The focus investigation and response team should return to the area to conduct ACD on days 14 and 28 [58]. If any additional cases are found amongst householders **[58]**, then the focus investigation and response team should update the focus classification to 'Active focus' **[42]** and conduct a focus investigation **[43-57]**.

If one or more additional cases are found, either as a result of case investigation or focus investigation **[39]**, then the focus investigation and response team should update the focus classification to 'Active focus' **[42]**, prepare a draft map (see example in figure 8) of the focus marking the location of each case using Global Positioning System (GPS) coordinates and identifying other features relevant to malaria transmission (e.g. health facilities, roads, intervention coverage, forests, larval habitats, altitude, etc.) **[43]**, and immediately brief the SMC, entomologist or local malaria focal person at the DPHO or local body. The SMC, entomologist or local malaria focal person should then immediately plan an appropriate focus response and update the map of the focus Identifying its likely boundaries based on an examination of maps **[46]**.

The focus investigation and response team should then go on to implement the focus response **[47]** (this may be a continuation of the case investigation mission unless there is a need for the team to return to base to replenish stocks etc. The team should continue screening symptomatic individuals (ACD) **[48]** for all households within the designated focus area. The SMC or local malaria focal person may also decide to establish temporary supplementary Passive Case Detection (PCD) services in areas with limited access to diagnostic services and also strengthen the existing health facility **[49]**. Case Investigation Forms should be completed for all additional cases found **[50]**. If additional cases are found towards the edge of the designated focus area it may be necessary to expand its boundaries **[51]**. The team should do this in consultation with the SMC, entomologist or local malaria focal person.

The focus investigation and response team should work together with FCHVs and local leaders to provide education and mobilize all communities in the designated focus area to seek early treatment in the event of symptoms, to adopt self-protection measures and to support screening and control efforts **[52].**

In case there is no recent data from the area on vectors and larval habitats, the focus investigation and response team should conduct a vector and larval habitat assessment **[53]**. The team should then go

on to implement Integrated Vector Management (IVM) in the designated focus area providing universal coverage with LLINs or Indoor Residual Spraying (IRS), and in some cases implementing Larval Source Management (LSM) or other vector control or personal protection measures as appropriate based on needs **[54]**.

Once full coverage of the designated focus area with all of these response actions has been achieved the team should complete the Focus Investigation Form **[55]**.

During the transmission season the focus investigation and response team should return to the designated focus area to conduct ACD every two weeks for the first month and on a monthly basis thereafter to check for additional cases **[57]**. Any additional cases should result in a return to bi-weekly ACD visits for a month.

2.7 Malaria outbreaks and epidemics

A malaria epidemic is defined as a sharp increase in the incidence of malaria in populations in whom the disease is rare, or a seasonal increase in areas of low-to-moderate transmission over and above the normal pattern. The normal pattern is defined on the basis of a threshold computed from past data.

A malaria outbreak is often synonymous with a malaria epidemic; however, conventionally, outbreaks are either epidemics with small caseloads or a sudden occurrence of malaria in areas that had never experienced the disease before or had eliminated it and are limited geographically. While large epidemics are generally easy to define, small epidemics may be difficult to distinguish from expected seasonal and periodic variations.

In Nepal, with the nationwide roll-out of case-based investigating, every case should be investigated within 3 days and every confirmed focus of transmission should be responded to within 7 days. Every confirmed focus should thus be met with what is effectively an epidemic response, and, assuming interventions remain effective, it should therefore be possible to avoid epidemics.

All health workers should immediately report any unusual increase in febrile illness to their supervisors (for example if caseload doubles in a week). Health workers should also always be alert, listening for rumours relating to health circulating in their communities or on social media, and verifying reports of disease outbreaks in newspapers and on local radio and television. They should immediately raise any concerns with their supervisors. If a malaria epidemic is suspected an immediate verification should be carried-out by the local malaria focal person, SMC and entomologist working in collaboration with a team of peripheral health workers. To monitor the trend during the outbreak, form annex 4 should be used for summary reporting by the health facilities.

2.7.1 Epidemic preparedness

Epidemic preparedness is undertaken at all levels of the health system.

National level:

- Follow disease burden in weekly formats (52 epidemiological weeks January-December) to forecast for preparedness in epidemic-prone areas, with resource mobilization and engagement of partners
- Coordinate and ensure intersectoral collaboration
- Strengthen the capacity of health workers

- Monitor stocks of medicines and commodities to ensure adequate supplies are maintained
- Monitor anecdotal reports of disease outbreaks.

Provincial level:

- Follow disease burden in weekly formats (52 epidemiological weeks January-December) using the 'Malaria Disease Information System' (MDIS) and/or the 'District Health Information System-2' (DHIS-2) to identify any anomalies
- Conduct entomological assessment if necessary, correlate epidemiological data with other relevant indicators such as meteorological data, population movement or socioeconomic activities
- Monitor and report of disease outbreaks.

Local health facility level:

- Conduct simple analysis and graphing of weekly data
- Monitor and report anecdotal reports of disease outbreaks.

2.7.2 Epidemic verification

The steps in verification of a suspected malaria epidemic are:

Either the local malaria focal person/entomologist/HC should conduct rapid assessment to confirm that the reported unusual increase in the number of fever cases is due to malaria and that the cases are indigenous. This rapid assessment should involve:

- Review of the clinical features of all reported cases
- Review of the type and quality of RDTs used
- Cross-checking of any blood smears taken
- Review of any local malaria data from the past 3 years

If after this rapid assessment the evidence is still inconclusive the investigator should task the focus investigation and response team responsible for case-based surveillance with conducting ACD in the suspected epidemic area.

2.7.3 Epidemic response

If an epidemic is confirmed the response will depend on the stage at which the epidemic is detected. In general, the aim is to reduce transmission and mortality by treating those who are infected and preventing new infection.

Notification: The epidemic investigator should Immediately notify EDCD, Provincial Health Department and the Local Body of his/her findings.

Mapping: The investigator should prepare a map Identifying the likely boundaries of the epidemic area based on an examination of maps and satellite images (see example in figure 8). The map should be regularly updated marking the location of each case using GPS coordinates and identifying other features relevant to malaria transmission (e.g. health facilities, roads, intervention coverage, forests, larval habitats, altitude, etc.).

Planning: For any confirmed epidemic either the local malaria focal person/entomologist/HC should immediately plan and implement an epidemic response using the map developed above as a key tool.

***ACD*:** The focus investigation and response team should screen all symptomatic household members in all households in the designated epidemic area. In the case of suspected workplace transmission, the team should also screen any additional contacts and co-travellers. The teams should overnight in the target area if key populations are absent during the day. The team leader should ensure that Case Investigation Forms are completed for all cases found and that the epidemiology component of the Focus Investigation Form is correctly filled. All confirmed cases should be treated immediately according to NMTP.

***PCD*:** The SMC or local malaria focal person may also decide to establish temporary supplementary PCD services in areas with limited access to diagnostic services. Case Investigation Forms should be completed for all additional cases found. If additional cases are found towards the edge of the designated epidemic area it may be necessary to expand its boundaries. The team should do this in consultation with the SMC, entomologist/HC and local malaria focal person.

***Entomology*:** In case recent data from the area does not already exist, the team should also conduct a vector and larval habitat assessment and complete the entomology component of the Focus Investigation Form.

***Community mobilization*:** The team should work together with FCHVs, mothers' groups, teachers and local leaders to provide education and mobilize all communities in the designated epidemic area to seek early treatment in the event of symptoms, to adopt self-protection measures and to support screening and control efforts.

***Vector control*:** The focus investigation and response team should also implement IVM in the designated epidemic area providing universal coverage with LLINs or IRS, and in some cases implementing LSM or other vector control or personal protection measures as appropriate based on needs.

Once full coverage of the designated epidemic area with all of these response actions has been achieved the team should complete the focus investigation Form and return to routine duties.

During the transmission season the team should return to the designated epidemic area to conduct ACD every week for the first month, then every 2 weeks for the first month, and then on a monthly basis there after to check for additional cases. Any additional cases should result in a return to bi-weekly ACD visits by the team for a month, and then on a monthly basis thereafter. Additional cases may also require additional measures (to be decided by the SMC, entomologist or local malaria focal person). The team should complete additional case investigation forms for all new cases and update the focus investigation form accordingly.

***Monitoring of the Epidemics*:** Local body officials, provincial health office and EDCD should actively monitor the situation in an epidemic area by daily review of data to assess progress and inform planning. The most important data elements for monitoring epidemics are:

- Weekly number of cases tested (RDT or microscopy)
- Weekly number of cases positive (RDT or microscopy)
- Weekly test positivity rate
- Weekly number of inpatient malaria cases (admissions)
- Weekly number of malaria deaths.

2.7.4 Post Epidemic Assessment

A post-epidemic assessment will identify 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 results of a post-epidemic assessment may be used to improve the preparedness plan and to advocate for the necessary support at all levels of the response. The following components should be examined:

- Effectiveness of the early warning and detection system
- Availability of resources and capacity
- Roles and responsibilities of stakeholders during and after the epidemics
- Cost of the response
- Impact of the epidemics and of the interventions.

A detailed assessment report should be submitted to provincial and national disease control authority after the Post Epidemic Assessment

3. Monitoring and Evaluation

Monitoring is the routine tracking of progress of the implementation of a program's activities and changes in program performance over time. It can be thought of as continuous oversight of the implementation of a program's activities. It seeks to establish if the resources invested (inputs), the activities undertaken, the quality of those activities (processes), and number of activities performed (outputs) are proceeding according to plan. Monitoring includes the regular collection and analysis of data to assist in timely decision-making, to aid in program planning and management, to ensure accountability and lastly, to provide a basis for evaluation and learning.

Evaluation is a process that aims to determine: the relevance of objectives, the efficiency of resources used, the effectiveness of the program design and implementation, the value-added of a program, the sustainability of results and/or the impact of a program/intervention. Evaluation aims to provide valuable management information, to judge the value of an intervention and to provide lessons for future programs or policies.

In all settings, the quality of surveillance systems must be monitored continuously by:

- Maintaining an up-to-date list of operational health facilities
- Making sure that all core and support functions of the systems are in place
- Keeping track of which facilities have submitted the required reports
- Following-up on missing, incomplete and delayed reports
- Reviewing the data submitted and following-up on incomplete or erroneous data
- Providing positive feedback to health facilities that submit timely, complete and accurate data
- Making sure that there is a system for up-to-date training of surveillance staff.

3.1 Data recording

Detailed information relating to malaria cases should be recorded and maintained at different levels of health institutions, including peripheral health facilities Health facility

Field level

Case investigation: For each laboratory-confirmed case of malaria, a case investigation form should be completed.

Focus investigation: For each new focus identified, a focus investigation form should be completed. In addition, focus classification should be updated annually.

National level

A database should be established at central level (EDCD).

The main components of the database should be:

a) *National malaria case register*: a consolidated list of all malaria cases in Nepal, including unique identifiers (to allow tracking of subsequent infections in individuals), demographic information and location, a reference to the location of the original patient records, case investigation forms and laboratory forms.
b) *Malaria focus investigation data*: all data from malaria focus investigation forms.
c) Foci registers.
d) *Malaria program indicators*.
e) *Malaria microplanning at district level.*

3.2 Surveillance and monitoring indicator

The following indicators should be used for the monitoring of the National Malaria Program at National Level:

Outcome indicators:

SN	Indicator	Frequency	How does it calculate?	Data Source	Data analysis
1	Proportion of cases with suspected malaria who received a parasitological test	1-4 months	**Numerator:** Number of cases with suspected malaria who received a parasitological test **Denominator:** Number of suspected malaria cases	HMIS	Local HFs/ Local Body/ Provincial HO EDCD
2	Proportion of patients with confirmed malaria who received first-line antimalarial treatment as per National treatment protocol	1-4 Months	**Numerator:** Number of confirmed malaria cases treated according to National treatment protocol **Denominator:** Number of confirmed malaria cases	HMIS, MDIS	Local HFs/ Local Body Provincial HO EDCD
3	Proportion of patients with P. vivax malaria who received radical treatment	1-4 Months	**Numerator:** Number of P. vivax malaria cases treated according to National treatment protocol **Denominator:** Number of P. vivax malaria cases	HMIS, MDIS	Local HFs/ Local Body Provincial HO EDCD
4	Proportion of case reports received within 24h of detection	1-4 months	**Numerator:** Number of confirmed cases reported in MDIS by mobile SMS or apps within 24 hours **Denominator:** Number of cases detected	HMIS, MDIS	Local HFs/ Local Body Provincial HO EDCD

5	Proportion of cases investigated and classified within 48 hours of case notification	1-4 months	**Numerator:** Number of cases investigated and classified within 48 hours **Denominator:** Number of cases notified	HMIS, MDIS	Local HFs/ Local Body Provincial HO EDCD
6	Proportion of suspected foci investigated and classified in a timely manner	1-4 months	**Numerator:** Number suspected foci investigated and classified within 7 days of case detection **Denominator:** Number of suspected foci identified	Focus investigation report EDCD	Local Body Provincial HO EDCD
7	Annual blood examination rate (ABER): per 100 population per year	Yearly	**Numerator:** Number of persons receiving a parasitological test for malaria (microscopy or RDT) in a given year **Denominator:** Population at risk in that given year	HMIS	Local HFs/ Local Body Provincial HO EDCD

Impact Indicators:

SN	Indicator	Frequency	How does it calculate?	Data Source	Data analysis
1	Malaria case incidence rate per 1000 people per year	Yearly	**Numerator:** Number of parasitologically confirmed malaria cases **Denominator:** Population at risk	HMIS data	Local Body Provincial HO EDCD
2	Malaria test positivity rate	Yearly	**Numerator:** Number of parasitologically confirmed malaria cases **Denominator :** Number of suspected cases tested parasitologically	HMIS data	Local Body Provincial HO EDCD
3	Inpatient malaria deaths per 100,000 persons per year	Yearly	**Numerator:** Number of in-patient malaria deaths **Denominator:** Population at risk	HMIS data	Local Body Provincial HO EDCD

4. References

1. Global technical strategy for malaria 2016–2030. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream handle/10665/176712/9789241564991_eng.pdf, accessed 1 January 2019).
2. A framework for malaria elimination. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.
3. Malaria surveillance, monitoring & evaluation: a reference manual. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO.

Annexes

ANNEX 1: SOP - Outbreak and epidemic response

A malaria epidemic is defined as a sharp increase in the incidence of malaria in populations in whom the disease is rare, or a seasonal increase in areas of low-to-moderate transmission over and above the normal pattern. The normal pattern is defined on the basis of a threshold computed from past data.

A malaria outbreak is often synonymous with a malaria epidemic; however, conventionally, outbreaks are either epidemics with small caseloads or a sudden occurrence of malaria in areas that had never experienced the disease before or had eliminated it and are limited geographically. While large epidemics are generally easy to define, small epidemics may be difficult to distinguish from expected seasonal and periodic variations.

In Nepal, with the nationwide roll-out of case-based reporting for elimination, every case should be investigated within 3 days and every confirmed focus of transmission should be responded to within 7 days. Every confirmed focus should thus be met with what is effectively an epidemic response, and, assuming interventions remain effective, it should therefore be possible to avoid epidemics altogether.

However, case-based surveillance systems are seldom flawless, and so fail-safes must be in place to ensure a prompt and appropriate response in the event of an epidemic occurring. All health workers should immediately report any unusual increase in febrile illness to their supervisors (for example if caseload doubles in a week). Health workers should also always be alert, listening for health-related rumours circulating in their communities or on social media, and scrutinizing anecdotal reports of disease outbreaks in newspapers and on local radio and television. They should immediately raise any concerns with their supervisors. If a malaria epidemic is suspected an immediate verification should be carried-out by the Surveillance Medical Coordinator (SMC), entomologist or local malaria focal person working in collaboration with a team of peripheral health workers.

EDCD should issue bulletins to heighten awareness of epidemic malaria risk amongst health workers seasonally based on historical trends in the seasonality of malaria as well as on any high-risk weather conditions and/or flooding.

Epidemic preparedness

Actions to ensure epidemic preparedness should be undertaken at all levels of the health system.

At National level the Programme should:

- follow disease burden in weekly formats (52 epidemiological weeks January-December) using the 'Malaria Disease Information System' (MDIS) and/or the 'District Health Information System-2' (DHIS-2) to forecast for preparedness in epidemic-prone areas, with resource mobilization and engagement of partners
- coordinate and ensure intersectoral collaboration
- strengthen the capacity of health workers
- monitor stocks of medicines and commodities to ensure adequate supplies are maintained
- monitor anecdotal reports of disease outbreaks.

At Provincial level the malaria focal person should:

- follow disease burden on a daily basis using the 'Malaria Disease Information System' (MDIS) and/or the 'District Health Information System-2' (DHIS-2) to identify any anomalies
- conduct entomological assessment if necessary, correlate epidemiological data with other relevant indicators such as meteorological data, population movement or socioeconomic activities
- monitor and report anecdotal reports of disease outbreaks.

At local health facility level the malaria focal person should:

- conduct simple analysis and graphing of weekly data
- monitor and report anecdotal reports of disease outbreaks.

Epidemic verification

In the event of a suspected malaria epidemic either the local malaria focal person or entomologist at the District Public Health Office (DPHO) or the District Medical Officer at District Headquarters should immediately conduct a rapid assessment to confirm that the reported unusual increase in the number of malaria or fever cases is due to malaria and that the malaria cases are indigenous. This rapid assessment should involve:

- a review of the clinical features of all reported cases
- a review of the type and quality of rapid diagnostic tests (RDT) used
- cross-checking of any blood smears taken
- a review of any local malaria data from the past 3 years

If after this rapid assessment the evidence is still inconclusive the investigator should task the focus investigation and response team responsible for case-based surveillance with conducting active case detection (ACD) in the suspected epidemic area. All confirmed cases should be investigated using the standard Case Investigation Form.

Epidemic response

If an epidemic is confirmed the response will depend on the stage at which the epidemic is detected. In general, the aim is to reduce transmission and mortality by treating those who are infected and preventing new infection.

***Notification*:** The epidemic investigator should Immediately notify the Epidemiology and Disease Control Division (EDCD), Provincial Health Department and the Local Body of his/her findings.

***Mapping*:** The investigator should prepare a map Identifying the likely boundaries of the epidemic area based on an examination of maps and satellite images (see example in figure 8). The map should be regularly updated marking the location of each case using GPS coordinates and identifying other features relevant to malaria transmission (e.g. health facilities, roads, intervention coverage, forests, larval habitats, altitude, etc.).

***Planning*:** For any confirmed epidemic either the local malaria focal person or entomologist at DPHO or the District Medical Officer at District Headquarters should immediately plan and implement an epidemic response using the map developed above as a key tool.

***Active Case Detection*:** The focus investigation and response team should screen all symptomatic household members in all households in the designated epidemic area using antigen-based RDTs and quality assured microscopy. In the case of suspected workplace transmission, the team should also screen any additional contacts and co-travellers. The teams should overnight in the target area if key populations are absent during the day. The team leader should ensure that Case Investigation Forms are completed for all cases found and that the epidemiology component of the Focus Investigation Form is correctly filled. All confirmed cases should be treated immediately according to the National Malaria Treatment Protocol (NMTP).

***Passive Case Detection (PCD)*:** The SMC or local malaria focal person may also decide to establish temporary supplementary PCD services in areas with limited access to diagnostic services. Case Investigation Forms should be completed for all additional cases found. If additional cases are found towards the edge of the designated epidemic area it may be necessary to expand its boundaries. The team should do this in consultation with the SMC, entomologist or local malaria focal person.

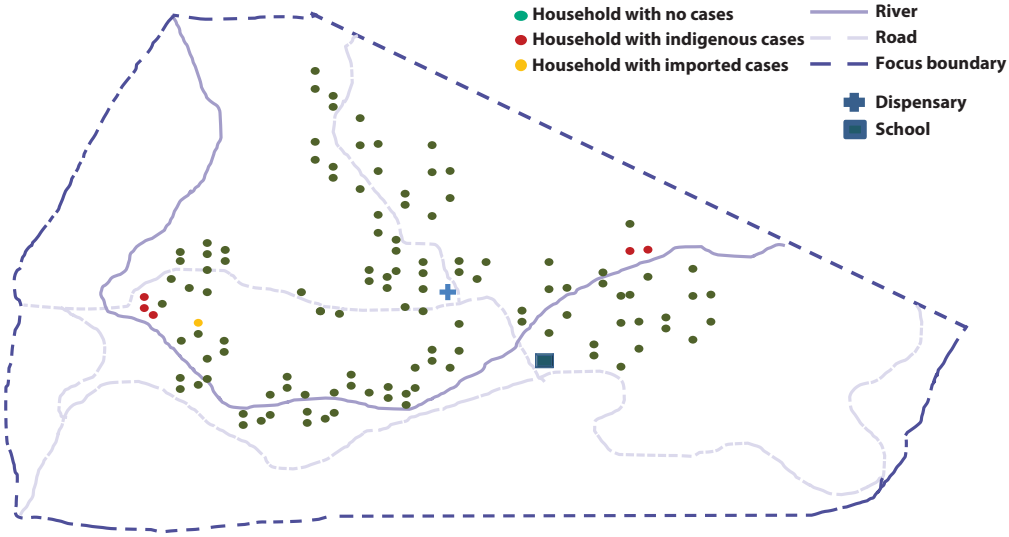


Figure 8. An epidemic map showing the distribution of households geolocated by GPS, roads and river.

***Entomology*:** In case recent entomological data from the area does not already exist, the team should also conduct a vector and larval habitat assessment and complete the entomology component of the Focus Investigation Form.

Community mobilization: The team should work together with Female Community Health Volunteers (FCHV), mothers' groups, teachers and local leaders to provide education and mobilize all communities in the designated epidemic area to seek early treatment in the event of symptoms, to adopt self-protection measures and to support screening and control efforts.

Vector control: The focus investigation and response team should also implement Integrated Vector Management (IVM) in the designated epidemic area providing universal coverage with long-lasting insecticidal nets (LLINs) or indoor residual spraying (IRS), and in some cases implementing Larval Source Management (LSM) or other vector control or personal protection measures as appropriate based on needs.

Once full coverage of the designated epidemic area with all of these response actions has been achieved the team should complete the Focus Investigation Form and return to routine duties.

During the transmission season the team should return to the designated epidemic area to conduct ACD every week for the first month, then every 2 weeks for the next 2 months, and then on a monthly basis thereafter to check for additional cases. Any additional cases should result in a return to weekly ACD visits by the team for a month, and then every 2 weeks for the next 2 months, and then on a monthly basis thereafter. Additional cases may also require additional measures (to be decided by the SMC, entomologist or local malaria focal person). The team should complete additional Case Investigation Forms for all new cases and update the Focus Investigation Form accordingly.

Monitoring of the Epidemics: Local body officials, provincial health office and EDCD should actively monitor the situation in an epidemic area by daily review of data to assess progress and inform planning. The most important data elements for monitoring epidemics are:

- weekly number of cases tested (RDT or microscopy)
- weekly number of cases positive (RDT or microscopy)
- weekly test positivity rate
- weekly number of inpatient malaria cases (admissions)
- weekly number of malaria deaths.

Post Epidemic Assessment

A post-epidemic assessment will identify 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 results of a post-epidemic assessment may be used to improve the preparedness plan and to advocate for the necessary support at all levels of the response. The following components should be examined:

- effectiveness of the early warning and detection system
- availability of resources and capacity
- roles and responsibilities of stakeholders during and after the epidemics
- cost of the response
- impact of the epidemics and of the interventions.

A questionnaire for epidemic assessment is provided below:

QUESTIONNAIRE FOR ASSESSMENT BEFORE AND AFTER A MALARIA EPIDEMIC

The following questionnaire provides an analytical framework to assess the level of preparedness or success in responding to the epidemic.

1. Epidemic-prone areas:

a. Demarcated?

If yes, is/was the epidemic in a high-risk area?

b. Is/was the epidemic related to population movement?

2. Forecasting and warning systems based on seasonal trends and weather data:

a. Are/were forecasting data made available, used and shared by national teams?

b. Do/did the data predict a possible epidemic in the region?

c. Is/was the regional malaria section aware of the risk?

d. Is/was this information disseminated to all levels of malaria control?

e. Is/was there adequate planning for source reduction measures if the predictions were confirmed?

3. Early detection system:

a. Is/was a well-functioning surveillance system in place for early detection in epidemic-prone districts?

b. Are/were these data recorded, analysed with set-up thresholds at district level with regular feedback/ update to peripheral health care facilities?

c. Are/were records of previous years available for comparison?

d. What method is/was used to analyse anomalies and define/validate thresholds (i.e. mean + two standard deviations, third quartile, cumulative sum, etc.)?

e. Are/were these data regularly reported to a central facility?
If yes, communication channels used.

4. Preparedness plan of action:

a. Is/was there a plan of action

b. If yes, is/was it technically and operationally appropriate?

c. Are/were partners involved in preparing the plan of action?
If yes, list.

d. Is/was a budget allotted for malaria epidemic response?

e. Is/was the budget translated into actual disbursements for response?

f. Are/were adequate drugs and medical supplies pre-positioned at district level for rapid distribution?
Specify the missing commodities.

g. Are/were there sufficient trained personnel to handle the epidemic?

5. Response:

a. Is/was there effective communication between the local and district level and above?

b. What is/was the lag time between confirmation of the epidemic and local response?

c. Were there sufficient trained personnel to handle the epidemic?

d. Which vector control measures are/were applied?

e. Is/was mass drug administration considered for transmission reduction?

If yes, specify the type of medicine, coverage in the affected population.

f. Are/were community mobilization and engagement activities adequate?

6. Disease and economic burden:

a. Length of the epidemic in weeks?

b. Population size affected?

c. Lives lost

d. Morbidity

7. If the situation required mobilizing national emergency support:

a. What was the time lag for communication between district and national levels?

b. Who alerted the national level to stimulate a national response (district office, newspaper or other media, other source)?

c. Was national support necessary?
Was partners' support necessary?

ANNEX 2 :

Case investigation form

Government of Nepal
Ministry of Health & Population
Department of Health Services
Epidemiology and Disease Control Division

Malaria Case Investigation Form (औलो खोजपड्ताल फारम)

Malaria Case ID:											
	Year (B.S.)				Province Number		District Code		Case Number		
Example (उदाहरण):	2	0	7	5	0	1	0	1	0	0	1

Section 1: Case history (बिरामीको विवरण)

मिति उल्लेख गर्दा नेपाली पात्रो (विक्रम संवत) अनुसार भर्नुहोस् ।

101 Date of onset of first symptoms of current clinical episode (यस पटक पहिलो लक्षण देखिएको मिति): Year (साल) | Month (महिना) | Day (गते)

102 Case detection/diagnosed date (रोग पत्ता लागेको मिति): Year (साल) | Month (महिना) | Day (गते)

103 SMS notification date (SMS वा जानकारी प्राप्त गरेको मिति): Year (साल) | Month (महिना) | Day (गते)

104 SMS approval date (SMS वा जानकारी निक्र्योल गरेको मिति): Year (साल) | Month (महिना) | Day (गते)

105 Date of case investigation (खोजपड्ताल/सोधपुछ गरेको मिति): Year (साल) | Month (महिना) | Day (गते)

106 Patient name (बिरामीको पुरा नाम)

107 Age (उमेर): वर्ष | महिना

- पुरा गरेको वर्ष राख्ने ।
- एक वर्ष भन्दा कमको बालबालिकाको हकमा मात्र महिनामा राख्नुहोस् ।

108 Sex (लिंग): O Male (पुरुष) O Female (महिला) O Third Gender (तेस्रोलिंगी)

If female; Pregnant (यदि महिला भएमा गर्भवती हो वा होइन एकिन गर्नुहोस्) O Yes (हो) O No (होइन)

109 Weight (तौल): Kg (के.जी.)

110 Occupation of Patient (बिरामीको पेशा): तल चिन्ह लगाउनुहोस् ।

Farmer (खेतीपाती गर्ने) Labor (ज्याला मजदुरी गर्ने) Migrant/Seasonal Worker (वैदेशिक/मौसमी कामदार)

Office Worker (अफिसमा काम गर्ने) House Wife (घरमै बस्ने) School Children (स्कुल जाने बालबालिका)

Small Children at home (घरमै बस्ने साना बालबालिका) Security Personal (सुरक्षाकर्मी/प्रहरी/सैनिक) Other (अन्य भए खुलाउनुहोस्): _____

111 Place of work (काम गर्ने स्थान वा ठाउँ):

112 Present home address of patient (हाल बसोबास गरेको स्थान): District (जिल्ला):

Rural/Urban municipality (गा.पा. / न.पा): Ward No (वडा नं):

Village/Tole (गाउँ / टोलको नाम): Contact No. (बिरामीको सम्पर्क नं.):

113 Home GPS coordinate (GPS नक्शाङ्कन):

	Latitude (N) (26.4831 - 29.84121)	Longitude (E) (80.33333 - 88.09436)	Altitude
(Range for Lat: 26.4831 - 29.84121; Long: 80.33333 - 88.09436)			(meter)

114 Permanent address if different from above (स्थायी ठेगाना, यदि हाल बसोबास गरेको स्थान भन्दा फरक भएमा):

District (जिल्ला): Rural/Urban municipality (गा.पा. / न.पा):

Ward No (वडा नं): Village/Tole (गाउँ / टोलको नाम):

115 Information provided by (विवरण दिने व्यक्ति)

O Patient (बिरामी आफै) O Family member (परिवारका सदस्य) O Relative (नातेदार) O Neighbors (छिमेकी) O Other (अन्य)

116 Informant (विवरण दिने व्यक्तिको नाम):

Section 2: Case detection & treatment (रोगको पहिचान र उपचार)

201 Select symptoms (लक्षणहरु एक भन्दा वढि पनि हुन सक्दछ। सोही अनुसार नम्बरमा चिन्ह लगाउनुहोस्।

1. Fever (ज्वरो आउनु) 2. Severe chills & Rigors (काप छुट्नु, जाडो हुनु) 3. Body aches (जिउ दुख्नु)
4. Sweating (पसिना छुट्नु) 5. Headache (टाउको दुख्नु) 6. Nausea (वाकवाकी लाग्नु)
7. Vomiting (बान्ता हुनु) 8. Dizziness (चक्कर लाग्नु) 9. Blood stool (दिसामा रगत देखिनु)
10. Fatigue (थकित हुनु) 11. Abdominal Pain (पेट दुख्नु) 12. Enlarged Spleen (फियो सुन्निनु)
13. Others (अन्य भए खुलाउनुहोस्):_____

202 Case Type (बिरामीको अवस्था): O Complicated (जटिल) O Uncomplicated (सामान्य)

203 Method used for case detection (बिरामीको पहिचानका लागि प्रयोग भएको प्रकृया): चिन्ह लगाउनुहोस्

O Active Case Detection (ACD) O Passive Case Detection (PCD)

If Active Case Detection (ACD): 1. House to house Visit 2. Mobile malaria clinic 3. Contact survey

4. Fever survey 5. Population based survey

204 Tool used for diagnosis (निदानको लागि प्रयोग भएको विधि मध्ये कुनै एकमा चिन्ह लगाउनुहोस्)

O RDT (द्रुत निदानद्वारा गरिएको) O Microscopy (माईक्रोस्कोपीबाट गरिएको) O Both (दुबै विधिबाट गरिएको)

205 Rapid Diagnostic Test (RDT) performed at (द्रुत निदान गर्ने स्वास्थ्य संस्था वा ल्याब):

206 Rapid Diagnostic Test (RDT) performed by
(द्रुत निदानद्वारा जाँच गर्ने व्यक्तिको नाम)

207 Date of RDT examination (द्रुत निदानद्वारा जाँच गरिएको मिति):
Year (साल) Month (महिना) Day (गते)

208 Manufacturer and brand name of RDT
(आर.डि.टी. बनाउने कम्पनी र ब्राण्डको नाम):

209 Batch number (ब्याच नम्बर):

210 Result (परिणाम): O Positive (पोजिटिभ) O Negative (नेगेटिभ)

211 If positive, Plasmodium Species (पोजिटिभ भएमा प्लास्मोडियम स्पेसिस): कुनै एकमा चिन्ह लगाउनुहोस् ।
O P. vivax O P. falciparum O P. ovale
O P. malariae O P. knowlesi O Mixed Infection:

212 Blood sample collected by (रगत नमुना लिने व्यक्तिको नाम):

213 Date of sample collection (परिक्षणको लागि रगत लिएको मिति):
Year (साल) Month (महिना) Day (गते)

214 Microscopic examination performed at
(माइक्रोसकोपी गर्ने स्वास्थ्य संस्था वा ल्याब):

215 Microscopic examination performed by
(माईक्रोस्कोपीबाट जाँच गर्ने व्यक्तिको नाम)

216 Date of examination (माईक्रोस्कोपीबाट परिक्षण गरिएको मिति):
Year (साल) Month (महिना) Day (गते)

217 Result (परिणाम): O Positive (पोजिटिभ) O Negative (नेगेटिभ)

218 If positive, Plasmodium Species (परजीवी देखिएमा प्लास्मोडियम स्पेसिस): कुनै एकमा चिन्ह लगाउनुहोस् ।
O P. vivax O P. falciparum O P. ovale
O P. malariae O P. knowlesi O Mixed Infection:

219 Parasite Density
(परजीवीको घनत्व): _____/µl 220 Gametocytes present
(गेमेटोसाइट्स): O Yes (छ) O No (छैन)

221 Specimen taken for Molecular Testing & Polymerase Chain Reaction
(PCR) (पिसिआर जाँचको लागि नमुना संकलन भए नभएको): O Yes (भएको) O No (नभएको)

222 If yes, (PCR) performed at
(यदी भएको भए, पिसिआर जाँच गर्ने संस्था वा ल्याब):

223 PCR performed by (पिसिआर जाँच गर्ने व्यक्तिको नाम):

224 Date of PCR testing (पिसिआर जाँच गरिएको मिति):

Year (साल) Month (महिना) Day (गते)

225 Result (परिणाम): Plasmodium DNA (प्लास्मोडियम डिएनए) O Detected (छ) O Not Detected (छैन)

226 G6PD test performed (G6PD को जाँच भए नभएको): O Yes (भएको) O No (नभएको)

227 If yes, performed at
(यदी G6PD जाँच भएको भए जाँच गर्ने संस्था वा ल्याब):

228 G6PD performed by (G6PD जाँच गर्ने व्यक्तिको नाम):

229 Date of testing (G6PD जाँच गरिएको मिति):

Year (साल) Month (महिना) Day (गते)

230 Result (परिणाम): O Deficient (G6PD कमी भएको) O Normal (सामान्य अवस्था)

Antimalarial treatment provided (औलोको उपचार):

231 Treatment started date (उपचार शुरु गरिएको मिति):

Year (साल) Month (महिना) Day (गते)

232 Medicine used/prescribed (उपचारमा प्रयोग गरिएको औषधी): मात्रा भर्नुहोस् र Tab वा mg मा गोलो लगाउनुहोस् ।

Medicine	Total Dose (Tab/mg)			Total Days
Tab Chloroquine		Tab	mg	
Tab ACT		Tab	mg	
Inj. Quinine			mg	
Inj. Artesunate			mg	

Medicine	Total Dose (Tab/mg)			Total Days
Tab Primaquine		Tab	mg	
Tab Quinine		Tab	mg	
Inj. Artemether			mg	
Other :				

Section 3: WHERE, HOW and from WHOM did the transmission possibly take place

(कहाँ, कसरी र को बाट संक्रमित (सम्भावित) भएको

301 Length of residence at current/present home address
(हालको ठेगानामा बसोवास गरेको अवधी): Years (वर्ष) Months (महिना)

302 If residence in current/present address is less than one year kindly provide earlier address including date (यदी हालको ठेगानामा १ वर्ष भन्दा कम बसोवास गरेको छ भने १ वर्ष पहिले बसोबास गरेको ठेगाना र मिति):

Date (बसोबास गरेको मिति): / /

303 Recent travel history within the country with dates (i.e. to other malaria-endemic areas)
(हालसालै देशभित्र भ्रमण गरेको स्थान र मिति: औलो प्रभावित क्षेत्र भएमा उल्लेख गर्ने):

Date travel (भ्रमण मिति): / / देखि / / सम्म

304 Recent Travel History outside the Country with dates (i.e. to other malaria-endemic areas)
(हालसालै गरिएको बैदेशिक भ्रमण गरेको स्थान र मिति: औलो प्रभावित क्षेत्र भएमा उल्लेख गर्ने):

Date travel (भ्रमण मिति): / / देखि / / सम्म

305 Type of preventive measures taken during the above-mentioned travel to endemic areas/ countries:
(औलो प्रभावित क्षेत्रमा भ्रमण गर्दा अपनाइएको रोकथामका उपायहरु के थियो):

O Not taken (नगरेको) O Normal Net (सामान्य झुल) O LLIN (कीटनाशक झुल)
O Chemoprophylaxis taken (औषधी खाएको) O Other (अन्य): _____

If chemoprophylaxis taken: *Drug Name* (औषधीको नाम): ☐

Dose (मात्रा): ☐ *Duration* (अवधि): / / देखि / / सम्म

306 Recent (within 4 weeks) contact with malaria cases (provide details):
(४ हप्ताभित्रको अवधिमा कुनै औलो बिरामीसँग सम्पर्क भएको भए उल्लेख गर्ने):

☐

307 Blood transfusion within past three months
(पछिल्लो ३ महिना भित्र रक्तसंञ्चार गरेको छ/छैन): O Yes (छ) O No (छैन)

308 History of confirmed malaria case in Ward/Tole within this transmission season
(बसोवास गर्दै आएको वडा/टोलमा यस वर्ष औलो देखा परेको अवस्था) O Yes (छ) O No (छैन)

If Yes (यदी छ भने) O Imported (आयातित) O Indigenous (स्थानिय)

309 Did patient have previous history of malaria (के बिरामीलाई पहिले पनि औलो लागेको थियो):
No (थिएन) भएमा Section 4 मा जानुहोस् । O Yes (थियो) O No (थिएन)

310 Date (कहिले भएको थियो): ☐ ☐ ☐
Year (साल) Month (महिना) Day (गते)

311 Location (कुन ठाउँमा भएको थियो): ☐

312 Diagnosis performed at (Health Facility/Lab)
(निदान गर्ने स्थान, स्वास्थ्य संस्था वा ल्याबको नाम, ठेगाना): ☐

313 Plasmodium Species (प्लास्मोडियम स्पेसिस): कुनै एकमा चिन्ह लगाउनुहोस्

O P. vivax O P. falciparum O P. ovale O Unknown (जानकारी नभएको)
O P. malariae O P. knowlesi O Mixed Infection:

314 Has patient being treated following NMTP (के बिरामीले राष्ट्रिय
औलो उपचार विधि अनुसार उपचार पाएको थियो) O Yes (थियो) O No (थिएन) O Unknown (थाहा भएन)

Section 4: Conclusion (निष्कर्श)

401 Malaria infection likely acquired at (औलो लागेको संभावित स्थान): Country (देश):

State (प्रदेश): ☐ District (जिल्ला): ☐

Rural/Urban Municipality (गा.पा./न.पा): ☐ Ward No. (वडा नं): ☐

Village/Tole/Street (गाउँ/टोल/मार्गको नाम): ☐

402 Types of Species (औलोको प्रकार छान्नुहोस्):

O P. vivax O P. falciparum O P. ovale

O P. malariae O P. knowlesi O Mixed Infection: ☐

403 Case classification (रोगको वर्गिकरण छान्नुहोस):

O Imported (आयातित) O Indigenous (स्थानिय)

O Relapse /Recrudescent O Other (अन्य_____ (Specify, उल्लेख गर्नुहोस् ।

Section 5: Follow-up (अनुगमन भेट)

501 Date of follow-up (फलोअप गरेको मिति):

1st (Day-3)	2nd (Day-5)	3rd (Day-10)	4th (Day-15)	5th (Day-28)

502 Treatment outcome after follow-up visits in 4 weeks (४ हप्तापछि फलोअप भ्रमण गर्दा उपचारको नतिजा)

O Cured O Not Cured O Died O LAMA* O Unknown

503 Action taken (बिरामीको बासस्थान रहेको ठाउँमा के कस्तो कदम चालियो): सोही अनुसार नम्बरमा चिन्ह लगाउनुहोस्

1. Foci Investigation 2. Responsive Activities 3. Not Applicable

If Responsive Activities: a. RACD b. Responsive Spraying c. Social Mobilization
d. Distribution of LLIN

Case investigation undertaken by (खोजपड्ताल गर्ने व्यक्तिको विवरण)

Name (नाम): _____ Designation (पद):
_____

District (जिल्ला): _____ Institution (संस्था): _____
_____

Signature (हस्ताक्षर): _____

**(Treatment) Leaving Against Medical Advice*

Note: If additional infections are identified in the case or neighboring households, continue to focus investigation protocols

ANNEX 3:

Line listing of malaria cases

Reporting District: _____ Fiscal Year: _____ Month: _____

SN	Date	Patient's name	Age (yrs)	Sex (M/F)	Municipality	Ward No.	Contact Number	Diagnosis By (RDT/ Microscopy/ Both)	Species (PV/PF/ Mixed)	Classification (Imported or Indigenous)	House Received IRS in last 6 months (Y/N)	LLIN owned by household (Y/N)	Date of onset of fever	Pregnant Women	Severe Malaria	Death	Travel History Details (when/ where/return)
														YES/NO			
		Total															

Prepared By

_____

Name/Signature

Approved By

_____

Name/Signature

ANNEX 4: Weekly malaria case reporting form

Malaria Reporting Form								
Month:								
Calender Dates								Weekly
Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
PATIENT RECORD								
Suspected Malaria (Currently having Fever)								
MICROSCOPY/RDT								
Patient Tested with RDT or Microscopy								
P. Vivax								
P.Faliciparum								
MIXED								
Positive test < 5 years								
Positive Test > 5+ years								
Total Positive Cases								
TREATMENT								
Confirmed cases receiving Antimalarials								
Severe Malaria Cases								

Prepared By:

Position:

Health Facility:

District:

ANNEX 5: Focus investigation form

Individual focus investigation form

Characterization of the focus

1. Malaria focus ID:

2. List all case ID numbers that are part of this focus ID:

3. Date of focus identification:

4. District and health facility catchment area:

Province No.:_____ District:_____ NP/GP_____
W.N._____

Village_____HF:_____ GPS: N:_____ E:_____
Altitude: _____

5. Information about the focus

5.1 Geographical map of focus and its limits, map of houses, heath facilities and other important structures, as well as access routes within the focus (GPS Coordinates)

5.2 Size of population, number of houses

Population: No. of houses: No. of structure:

5.4 Distribution of parasites (species, number and location of infections identified)

S.N.	Location with GPS coordinates	No of Parasites identified		
		Pv	Pf	Mix

5.5 Distribution of vector species within the focus (principal and secondary malaria vectors and their behaviour, including breeding sites with presence or absence of larvae)

Vector	Present	Absent	Behavior	Breeding sites with GPS coordinates	Larva Present	absent
An.fluviatilis						
An.maculatus complex						
An. annularis						

5.6 Type of environment in relation to receptivity (urban or rural population, altitude, main geographical

features, environmental changes as a result of development, original and current endemicity, etc.) and vulnerability (close proximity to endemic areas within the country or across international border, refugees, etc.) within the focus

Type of settlement (Urban/Rural):_____
Altitude:_____

Geographical Features

Topography:_____Housing condition:_____

Endemicity:
Original:_____ Current:_____

Temperature : Summer_____ Winter_____

Relative Humidity: Summer _____ Winter_____

Rainfall: _____

Developmental projects: _____

Focus in proximity with malaria endemic area (name area):_____

Focus in proximity with endemic area outside the country/across international border (name area or border crossing point):_____

5.7 Population characteristics in relation to vulnerability (migration patterns, presence and numbers of temporary workers, typical travel histories, etc.) within the focus

- Migrants from the area to malaria endemic areas within the country or across international border.
  _____
- Immigrants coming from malaria endemic areas:_____
- Night halts in border area or malaria endemic areas:_____
- Presence of large numbers of temporary workers:_____
- Forest movement: _____
- Typical travel histories:_____

6. Focus history

6.1 Total number of malaria cases by species reported within the focus during the past five years

Year	Total cases	Number of cases by Plasmodium species											
		P. vivax		P. falciparum		P. malariae		P.ovale		P. knowlesi		Mixed	
		Ind	Imp	Ind	Imp	Ind	Imp	Ind	Imp	Ind	Imp	Ind	Imp

6.2 Results of malaria surveys, including active case detection within the focus during the past five years

Year	Case detection methods (survey, ACD, PCD etc)	No. of BS or RDT examined	Number of positive case detected	Nos. treated as per NMTP

6.3 Dynamics of the focus status during the past five years (active foci versus residual non-active foci versus cleared foci)

Year	Active focus	residual non-active foci	cleared foci	Remarks

6.4 Types and dates of vector control and other preventive measures applied within the focus during the past five years (provide details)

Year	Date	LLIN	IRS	LSM

Section 2. Classification of the focus

7. Focus classification Focus classified as:

7.1 Parasite species:

P. falciparum ☐ P. vivax ☐

P. malariae ☐ P. ovale ☐

Mixed ☐ (specify:) Other ☐ (specify:)

7.2 Classification at time of detection (date): ☐

Active ☐ Residual non-active ☐

Cleared ☐ Other ☐

Comment on evidence used for focus classification:

7.3 Classification at time of specified follow up (date):

Active ☐ Residual non-active ☐

Cleared ☐ Other ☐

Comment on evidence used for re-classification of focus:

7.4 Relation of the focus to the malaria case that prompted focus investigation (in time, space and circumstance, e.g. the person in residence, work, etc.)

7.5 Location and total number of households with inhabitants where malaria cases were registered within the focus

Location with GPS	# of House Hold	Total Population	# of malaria cases

7.6 Suggestion and recommendation for controlling and eliminating malaria foci

Section 3. Follow-up of the focus households and neighborhoods, and response measures taken to clear infections and stop transmission within the focus and prevent possible onward spread of the current malaria infections from the focus, if any (provide details)

8. Follow-up actions taken (provide details) :

8.1 Neighborhoods visits (done, dates, map) Household locations (GPS) Household members listed, screened (e.g. fever), tested, results Household members treated (case management, prevention)

Date of follow up visit	House hold location (GPS)	# of HH members	# of Members screened (fever)	Tested by (RDT or microscopy or both)	Number of Positive	Result			Treated as per NMTP
						Pv	Pf	Mixed	

8.2 Vector control and preventive measures taken, if any

8.3 Other follow-up measures taken, if any

9. Reference numbers to relevant focus investigation records and case investigation records

10. Name, title and signature of responsible officer who investigated the focus and completed the form

Name:

Designation:

Signature

Date

Epidemiological information (for the last 5 years)

Table 1: Malaria cases reported from the focus.

ID #	Name	Age/ Sex	Address	Date of onset	Date of detection	Source of Detection	Lab. Diag.	Result	Travel history in India	Malaria in past	Classi-fication

Table 2: Malaria cases in the focus by month

Years	Places	Number of cases by month												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total

Table 3: Malaria cases by species and classification

Year	Place	Total cases	Number of cases by Plasmodium species											
			P. vivax		P. falciparum		P. malariae		P.ovale		P. knowlesi		Mixed	
			Ind	Imp	Ind	Imp	Ind	Imp	Ind	Imp	Ind	Imp	Ind	Imp

Table 4: Malaria cases by age

Year	Place	Total cases	Number of cases by age in years					
			0 - 1	2 - 4	5 – 9	10 - 14	15 - 19	> 19

Table 5: Malaria cases by sex

Years	Males		Females		Total
	Number	%	Number	%	

ANNEX 6:

Foci register

FOCI REGISTER

Health Facility: _____

District: _____

Rural/Urban Municipality: _____

Fiscal Year: _____

Foci ID No.:
Date of foci investigation:

Province No.:_____District:_____ NP/GP_____ HF:_____

Catchment area of foci (Location and total number of households with inhabitants where malaria cases were registered within the focus)

Ward No.	Village/Tole	Population	Total no. of House-hold	No. of Structure	GPS coordinates		Altitude	No. of malaria cases
					Latitude	Longitude		
Total								

Foci Map:

Receptivity: Type of environment in relation to receptivity (urban or rural population, altitude, main geographical features, environmental changes as a result of development, original and current endemicity, etc.) and vulnerability (close proximity to endemic areas within the country or across international border, refugees, etc.) within the focus.

Type of settlement (Urban/Rural):_____ **Altitude:**_____

Geographical Features

Topography: _____Housing condition:_____

Endemicity: Original:_____ Current:_____

Temperature : Summer_____ Winter_____

Relative Humidity: Summer _____ Winter_____

Rainfall:_____

Developmental projects:_____

Focus in proximity with malaria endemic area (name area):_____

Focus in proximity with endemic area outside the country/across international border (name area or border crossing point):_____

Vulnerability: Population characteristics in relation to vulnerability (migration patterns, presence and numbers of temporary workers, typical travel histories, etc.) within the focus.

Migration pattern:

- ○ Migrants from the area to malaria endemic areas within the country or across international border.
- ○ Immigrants coming from malaria endemic areas: _____
- ○ Night halts in border area or malaria endemic areas: _____
- ○ Presence of large numbers of temporary workers: _____
- ○ Forest movement: _____
- ○ Typical travel histories: _____

Entomological Information:

Table 1: *Distribution of vector species within the focus (principal and secondary malaria vectors and their behaviour, including breeding sites with presence or absence of larvae)*

Vector	Present/ Absent	Behavior	Breeding sites with GPS coordinates	Larva Present/ Absent

Epidemiological information (for the last 6 years)

Table 2: *Malaria cases in the focus by month*

Years	Number of cases by month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total

Table 3: *Malaria cases by species and classification*

Years	Total cases	Number of cases by Plasmodium species											
		P. vivax		*P. falciparum*		*P. malariae*		*P. ovale*		*P. knowlesi*		Mixed	
		Ind	Imp	Ind	Imp	Ind	Imp	Ind	Imp	Ind	Imp	Ind	Imp

Table 4: *Malaria cases by age*

Years	Total cases	Number of cases by age in years					
		0-1	2-4	5-9	10-14	15-19	> 19

Table 5: *Malaria cases by sex*

Years	Males		Females		Total
	Number	%	Number	%	

Table 6: *Results of malaria surveys, including active case detection within the focus*

Years	Case detection methods (survey, ACD, etc)	No. of BS or RDT examined	Number of positive case detected	No. treated as per NMTP

Table 7: *Types and dates of vector control and other preventive measures applied within the focus*

Years	LLIN Distribution Date	IRS Date	LSM Date	Remarks

Table 8: *Dynamics of the focus status (active foci versus residual non-active foci versus cleared foci)*

Years	Active focus	Residual non-active foci	Cleared foci	Remarks

ANNEX 7:

Form for updating registration of foci

Focus ID	Province	District	Muncipality	GPS		Population	Number of Household	Number of LLIN distributed	Date of LLIN distribution	Date of last cycle of IRS	Classification		
				Latitude	Longitude						Active	Residual non-active	Cleared

Technical Support