SURVEILLANCE GUIDELINES FOR MALARIA ELIMINATION AND PREVENTION OF RE-INTRODUCTION FOR SOUTH AFRICA

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ACRONYMS

CDC	**Communicable Disease Control**
CHAI	**Clinton Health Access Initiative**
EHP	**Environmental Health Practitioner**
GIS	**Geographic Information System**
GPS	**Global Positioning System**
IOM	**International Organization for Migration**
M&E	**Monitoring and Evaluation**
MCP	**Malaria Control Programme**
MIS	**Malaria Information System**
MRC	**Medical Research Council**
NICD	**National Institute for Communicable Disease**
NDOH	**National Department of Health**
PCD	**Passive Case Detection**
PHC	**Primary Health Care**
RDT	**Rapid Diagnostic Test**
SOP	**Standard Operating Procedure**
UNHCR	**United Nations High Commissioner for Refugees**
WHO	**World Health Organization**

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EXECUTIVE SUMMARY

This surveillance guideline outlines a framework to guide surveillance activities in the transition from control to malaria elimination in South Africa.

The guidelines were informed by the National Malaria Elimination Strategy for South Africa, the Monitoring and Evaluation (M&E) Guidelines, the WHO Malaria Elimination Manual, the WHO Epidemiological Approach to Malaria, the Consultative Group on Malaria Eradication, Quality Assurance and Quality Control Guidelines for Malaria Diagnostics, the Malaria Treatment Guidelines for South Africa, and the PHC-Reengineering Document for the National Department of Health.

The purpose of the surveillance guidelines is to ensure the standardization of active and passive surveillance. The document proposes the main activities that should be undertaken during both active and passive surveillance, as well as the reporting thereof. It also describes how to address migrant workers and travelers. Moreover, it describes the malaria foci and how geographic information systems (GIS) and mapping will play a role in planning malaria interventions for elimination.

The document is intended to guide the malaria district manager, environmental health practitioners, surveillance officers, case investigators, information officers, entomologists, primary health care nurses, GIS analysts, programme managers, and the national information officer.

1. BACKGROUND

The South African Malaria Programme has made significant strides in decreasing the number of malaria cases in the last 10 years. Malaria cases decreased by 85% in 2010 compared to the year 2000 (9669 vs 64622 cases), malaria deaths also decreased by 80% (453 to 87) for the same reporting period. In 2007, the African Union and the Southern Africa Development Community identified South Africa as one of the candidate countries for malaria elimination-defined as zero local malaria transmission in a specific geographical area (WHO 2007).

A Malaria Programme Review was carried out in 2009 which indicated that most malaria districts were at the pre-elimination stage (<5 cases /1000 population at risk), hence the National Department of Health is re-orientating its programme from one of control to elimination. From the finding of the review it was noted that only two districts are in the control phase of the WHO's (2007) malaria elimination continuum (>5 malaria cases /1000 population at risk) and two are in pre-elimination whilst the rest are in the prevention of re-introduction phase of malaria.

The National Department of Health subsequently drafted a Malaria Elimination Strategy for South Africa. The goal of the strategic plan is to reach malaria elimination by 2018 in South Africa, and to prevent the re-introduction of malaria into the country. Based on the strategic plan several guidelines are required to be drafted to ensure that the strategic plan can be optimally implemented. This Surveillance guideline is one among several guidelines that has been identified for development by the National Department of Health, to guide provincial and district malaria teams on all aspects of malaria surveillance.

'Surveillance' is defined as the continuous collection, collation, analysis, and interpretation of data on a systematic and ongoing basis, together with the feedback and timely dissemination of information to those who need it for action (WHO, 2011). There are two types of surveillance: active surveillance and passive surveillance.

A Monitoring and Evaluation Plan was developed to track indicators for the Malaria Elimination Strategy for South Africa. The plan has a specific objective to track the surveillance activities towards elimination. The plan includes output indicators for surveillance relating to the notification of all malaria cases in both public and private health facilities within 24 hours. An indicator for investigating each case and reporting on it within 72 hours to provincial and national level, stratification of malaria according to case classification, and an indicator to track the malaria foci identified.

The surveillance guidelines are intended to guide both public and private sector on all aspects for implementation of surveillance as an intervention. The guidelines will also identify the human resource and financial needs, and the operational issues associated with ensuring optimal surveillance.

This guidelines were informed by the National Malaria Elimination Strategy Monitoring and Evaluation (M&E) Guidelines, the Epidemiological Approach to Malaria (WHO 2011), A Research for Malaria Eradication (malERA, 2011), and the PHC-reengineering document for National Department of Health, 2011.

The malaria surveillance guidelines for elimination detail the rationale, goals and objectives, key interventions, and indicators for monitoring and evaluation. The surveillance guidelines address specific surveillance indicators (parasitological and entomological aspects) outlined in the M&E Plan. The guidelines also feature standard operating procedures for malaria surveillance at ports of entry, targeting migrant workers and travelers.

2. RATIONALE

The purpose of the surveillance guidelines is to outline the surveillance requirements and approaches that will be required to support the malaria elimination strategy for South Africa, which is to ensure zero locally transmitted cases by 2018 and prevent re-introduction of cases.

3. OBJECTIVES

The key objectives of the surveillance guidelines are to provide guidelines on:

- The notification and classification of all confirmed malaria cases (local, imported, and unknown)
- Passive and active surveillance for malaria
- The identification and mapping of malaria foci
- Malaria epidemics and how to respond to them
- prevention and re-introduction of malaria into South Africa
- Developing SOP's for surveillance
- identification of "local transmission through local vectors" vs "imported transmission through imported vectors and parasite carriers"

4. MALARIA CASE CLASSIFICATION

After a malaria case is detected and investigated the following definitions will be considered during surveillance:

Local malaria case: this will be due to mosquito-borne transmission and acquired within the country

The local cases should be further divided into:

- An indigenous case: any case contracted locally, without strong evidence of a direct link to an imported case
- An introduced case: a 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).
- Internally imported case: this is to specify whether the case originated in the focus where it was detected or in another part of the country

Imported malaria case: due to mosquito-borne transmission and acquired outside the country. The origin of imported cases can be traced to a known malarious area outside the country to which the case has travelled.

Induced malaria case: not due to mosquito-borne transmission, maybe acquired from a congenital infection or by contamination with infected blood e.g. Blood transfusion, shared syringes).
The Standard Operating Procedures will describe the process for identifying the malaria cases. These will include travel history (taking into consideration the incubation period), visiting or residing in an endemic country, etc.

5. SURVEILLANCE

Malaria surveillance for elimination is considered to be a key intervention that goes beyond routine data collecting. This will include passive surveillance (notification of cases by a health facility or health care provider), active case detection of targeted groups such as migrant workers, refugees, seasonal farm workers and epidemiological case investigation of all notified malaria cases, which includes contact tracing. According to the National Malaria Elimination Strategy it is important to determine asymptomatic parasite carriers in addition to symptomatic cases as this will be a key intervention to preventing local transmission from occurring.

For malaria elimination purposes it is important to classify the malaria cases according to indigenous, imported, introduced, and induced.

5.1 Passive surveillance

Passive surveillance is defined as the regular or periodic collection of data from case reports or registers from health facilities where patients seek care at their own discretion (WHO, 2011).

Patients that present at a health facility with malaria symptoms will be subjected to a malaria parasitological test by a rapid diagnostic test (RDT) or by microscopy If the test is positive for malaria, the patient will receive the appropriate treatment, either with combination therapy for uncomplicated malaria or mono-therapy for severe or complicated malaria, as described in the treatment guidelines for South Africa (2010). In some cases, a blood sample will also be sent to the laboratory to verify mix infections and for quality assurance and control according to the Quality Assurance and Control Guidelines for South Africa (2011).

5.2 Active surveillance

Active surveillance is defined as the active search for malaria cases (of patients with fever, history of fever, history of travel to and from malaria endemic countries, or new migrant workers in endemic areas) at community or at household level, either through regular or random visits by health workers (WHO, 2011). There are two types of active case surveillance.

Firstly, reactive case surveillance (epidemiological case investigation) which implies that all cases reported at health facility should be investigated at the community level and secondly proactive surveillance where communities at risk based on predefined criteria are screened and positive cases treated.

5.2.1 Reactive case investigation and case detection

The aim of the reactive case investigation should be to classify the case, help find other cases, to explain the reason for transmission, to evaluate the presence of control interventions, to identify vector breeding and to provide suitable interventions to break transmission.

All the confirmed malaria cases at health facilities will be investigated at the patient's home within 48 hours upon receipt of the notification. During the investigation information on the travel history will be recorded to assess whether the case was imported or locally transmitted. The investigation should also determine if the treatment provided is effective and not showing indications of resistance. During the home visit the surveillance officer should undertake entomological investigations to collect information on IRS spraying and identify the potential vector breeding sites. Community members in three households adjacent to the patient's home in each direction (subjective, depending on density of area and position of breeding sites) should be screened, and travel history obtained if travelled to malaria endemic areas. When a positive case of malaria is identified at community level by RDT the community health worker/ surveillance officer should take a blood smear and also inform the staff nurse at community level to provide treatment for the patient at home. The case investigation form and the blood smear should be given to the community staff nurse when she goes to the homestead to treat the patient. At the health facility, the notification form should be completed when the blood smear indicates a positive malaria case. The notification form should be sent to the surveillance unit for reporting and to the malaria control program (MCP).

Mapping of the positive cases should be done by using a GPS to record the longitude and latitude coordinates. This data will be provided to the GIS officer to use when plotting the maps to indicate distribution of malaria cases.
The information obtained during the investigation should also be used to determine the implementation of control interventions eg IRS, larvae control, community awareness or increased proactive surveillance.

5.2.2 Proactive surveillance

The aim of doing proactive surveillance is to find community members, migrant workers and travelers that could be asymptomatic carriers of the parasite without feeling sick. The case investigator should carry out house to house visits in his/her catchment area to screen people using malaria RDTs. They will screen people with high-risk travel history or visitors from endemic malaria areas. Screening should also be carried out in areas where entomological surveillance identifies malaria foci. When a positive case is detected, the community staff nurse will be informed and will go to treat the patient. A blood smear will be taken and returned to the laboratory for confirmation. The community staff nurse should complete the notification form and return it to the health facility in his/her catchment area.

The malaria programme in endemic provinces and the communicable disease control (CDC) coordinators in the non-endemic provinces should liaise with the mining companies and the farming community or industries using migrant workers to implement surveillance and health promotion activities in order to create awareness amongst their employees. Screening amongst these groups should be carried out actively in order to identify any carriers, and positive malaria cases. The screening should be done by rapid test and when a positive case is identified, a blood smear should be carried out. The community staff nurse should accompany the case investigators when they do screening in order to provide treatment when a positive case is detected.

Travelers entering South Africa from endemic malaria countries should be screened at the ports of entry with a RDT and when the RDT is positive, a blood smear should be carried out. A community staff nurse in the catchment area will assist with treating the positive cases detected.

5.3 Entomological surveillance

Entomological investigations are an important and essential aspect of malaria vector control and elimination, as these investigations provide information on vector species, their distribution, identifying foci of transmission, density, bionomics and susceptibility/resistance to insecticides used for malaria control.
Sentinel sites should be selected to carry out entomological surveillance. These sites should be mapped and updated regularly for presence of vectors and breeding sites. The sentinel sites should be monitored at regular intervals to determine seasonal changes in vector densities and also changes in vector bionomics and characteristics. The sentinel site should be an area where transmission risk has been available for over a period of two years, where the potential for vector breeding is already well established, or, lastly, a malaria epidemic prone area. This should be determined by the entomologist by analysing entomology data and malaria cases. Spot checks should also be carried out when a malaria case is reported, or there is a change in climate to favour vector breeding and migratory populations from malaria endemic areas are present.

5.4 Surveillance during outbreaks and epidemics

When a malaria case is notified during the pre-elimination and elimination phase it should be considered an outbreak. Reactive case investigation should take place and proactive case detection should be conducted. The screening will be done by using RDTs. Once a positive case is detected the community nurse who should form part of the outbreak and response team should treat the positive cases and do the notification.

6. MALARIA MAPPING

Geographic information system (GIS) should be used as an application for mapping the malaria disease, distribution, modeling risk, and managing interventions. Maps are suited to show

incidence trends over time, resistance mapping and to demonstrate spray progress. Mapping should thus be used as a planning tool.

6.1 Classification of malaria foci

Malaria epidemiology is based on the level of malaria endemicity. The following three zones are recognized: No malaria transmission, low seasonal transmission with SPR < 5%, and moderate seasonal endemic transmission with SPR ≤ 5%. Since the transmission is not homogenous across each zone they will be further divided into malaria transmission foci. The current WHO classification of foci is based on whether it is an old focus (residual) or a new foci and the presence of malaria transmission either active or non-active.

Foci	**Description**
Endemic	Low transmission currently present, but transmission is not effectively controlled.
Residual active	Ongoing transmission in an area that has had transmission within the last 2 years (or last 2 transmission seasons). Transmission is controlled.
New active	Ongoing transmission in an area that has not had transmission for more than 2 years (or more than 2 transmission seasons), or has never had local transmission. New active foci can be further subdivided as active first degree, in which only the first generation of transmission took place (i.e. only introduced cases are present) and active second degree, where second or later generation of malaria and indigenous cases are present.
Residual non-active	Local transmission within the last 2 years (or last 2 transmission seasons), but no local transmission currently. Only relapse cases that were infected before transmission ceased. If there is no local transmission after one year, then these areas would cease being new potential foci and would revert to "cleared-up".
New potential	Isolated imported, induced, and relapsing cases in a focus that has no transmission in the past 2 years or longer.
Cleared-up	No cases of any type, including local or imported cases, recorded in the previous 2 years (or two transmission seasons).

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6.2 Geographical reconnaissance

The aim of geographical reconnaissance is to inform the planning and operations of interventions. The objective of geographical reconnaissance is firstly to produce a map of the area showing the location of the foci, hydrological features and networks, landscape divisions, altitudes, roads and health facilities, all houses, breeding sites, etc. and, secondly, to determine the type of structures, distribution of structures, number of structures, average size of structures, total surface area to be sprayed and also to give each house a reference number with GPS coordinates.

7. SURVEILLANCE REPORTING

This is essential to prevent further transmission of malaria in both endemic and non-endemic provinces. According to the health Act 61 of2003, malaria is notifiable disease, thus all malaria cases should be reported. There are key indicators that should be reported on for malaria from endemic and non-endemic provinces. The data flow should be able to track the information from start to end point. The current database at the provincial level will be used to complete the data collation and analysis. The non-endemic provinces should use the CDC Directorate at the provincial level to collate all the data from the different districts.

7.1 Passive surveillance

The passive cases should include people that present at health facilities at their own discretion.

The following process will be followed for passive surveillance:

- The health worker will complete the notification form at the health facility.
- Within 24 hours, the EHP will send the notification form and promptly inform the district manager about each case as it is presented at the health facility.
- The data capturing should be done at the district level and sent to the information officer at the provincial level. The information at district level could also be sent to the provincial information officer before capturing by telephone, fax or email.
- The information officer will collate data for each health facility, districts and sub-districts (municipalities), and report to the provincial manager on a weekly basis.

7.2 Reactive surveillance and case detection reporting

Reactive case surveillance and case detection should follow after a passive malaria case is detected at the health facility, or during proactive case detection. Reactive surveillance and case detection is an appropriate intervention in areas where malaria endemicity is low. The aim is to ensure that no secondary transmission occurs.

The following process will be followed for reporting:

- The case investigator should collect the notification form from the health facility and check whether all relevant data is collected. The form should be collected at least 24 hours after diagnosis of a positive malaria case was detected.
- The case investigator should start the follow up procedures at the patient's house within 24 hours after being notified of the case, and the full report should be submitted 48 hours later.
- The report should include information on the entomological surveillance as well.
- If a positive case is detected while screening, the case investigator will record the data on an investigation form which is then reported to the nearest health facility. The case investigator will then complete the notification form. Treatment should be provided by the community nurse and the drugs dispersed to the patient should be documented.
- This form is collected by the EHP and the information is then passed onto the district manager who will analyse it and then send to the information officer to collate and verify.

7.3 Proactive surveillance reporting

Proactive malaria surveillance is a process where the case investigator undertakes to actively screen community members, migrant workers, travelers to find symptomatic and asymptomatic positive cases and treat according to the Malaria Treatment Guidelines 2010.

The following process will be followed during proactive case surveillance:

- The case investigator should have a predefined catchment area with a number of households to visit regularly.
- Screening should be carried out if someone in the household has travelled to a malaria endemic area or has signs and symptoms of malaria.
- On getting a positive RDT result, the case investigator will inform the community staff nurse and he/she will visit the patient at home and provide treatment. The notification form will be completed and a blood-smear taken to confirm and report the malaria case.
- The case investigator will continue screening people in the same area who have travel history to an endemic area or who present with signs and symptoms of malaria.
- When a positive case is detected with an RDT a blood smear should also be taken and sent to the laboratory for confirmation while the patient receive treatment
- The case investigation form should be completed and sent to the health facility in order for the notification form to be completed.
- The EHP collects the notification form and gives it to the district manager who then sends it to the information officer.

7.4 Outbreak and epidemic reporting

The number of malaria cases in South Africa has decreased significantly and thus once the district is in the pre-elimination and elimination phase, a single malaria case should be considered as an outbreak.

The following process should be followed during and outbreak:

- During outbreaks the active case investigation and case detection will be undertaken and the reporting will flow as described for proactive case surveillance.
- The entomological team will also be going out to investigate if any adult mosquitoes and breeding sites are present in order to respond with correct interventions.
- Daily reporting from health facilities to district manager and then to the provincial manager.
- Health promotion is an important intervention during an outbreak and activities undertaken should also be recorded and sent to district manager.
- The entomological data will be sent to the information officer to enter into the malaria database and report should be written within 72 hours.
- The outbreak will need to be reported within 24 hours and the response should take place within 48 hours.

8. HUMAN RESOURCES FOR SURVEILLANCE

A team of skilled staff is required to carry out surveillance for malaria elimination. The following human resources are required.

Provincial manager

Will be responsible for supervising the district managers and provide them with support as required. He/ She will report to the supervisors at the provincial health offices and also inform the NDOH of the malaria situation at regular intervals as agreed upon. The provincial manager will inform the NDOH if an alert threshold is reached during a possible epidemic.

District manager / CDC Coordinator

The district manager holds regular meetings with EHPs. Conduct periodic field visits and visits to health facility to discuss the way case investigators work and ensure quality of work. Supervise the EHPs. Analyse surveillance data to inform the EHP and assist with prioritizing case investigations. Also do administrative work where they liaise with stakeholders (traditional healers, Department of Public Works, etc). The district manager is also responsible for all supplies and equipment.

Environmental Health Practitioner (EHP)

The EHP supervises the case investigators. Hold regular meetings either weekly or biweekly. Receive updates on new cases, potential hotspots and updates on health facility stock. They also assist with planning, prioritizing and scheduling of field visits for case investigation. Check the quality and completeness of forms from case investigators. Conduct field visits to monitor performance and to do refreshers training and to address problems encountered. They also liaise with the health facilities and also oversee the health promotion personnel. The EHPs carry out administrative duties.

Case investigator

The case investigator carry out regular visits to assigned health facilities to collect complete notification form to do case investigation. Complete the notification form and classify the cases into local or imported. Do case investigations of notified cases. Visit homestead and gather community members in the area to do health promotion and teach them the signs and symptoms of malaria as well as how to prevent. After the health information session the community members present are tested for malaria parasites usually with blood smear. Also identify vector breeding sites for the presence of larvae. Positive breeding sites treated with larvacide and IRS will be conducted at homestead. Assist the vector control team during case investigation. Deliver blood smear to microscopist. Also do administrative work and supervise the assistant case investigators. Do monthly reporting as well.

Assistant Case Investigator

The assistant case investigator plays a supportive role. They assist with health facility visits and collect and check notification forms. Support case investigator during contact screening, health promotion, identifying vector breeding sites. Take blood smears to microscopist. Also deliver notification forms to data capturer. Support vector control activities when required. Help maintain the malaria offices, camps and equipment, like the cleaning of slides.

Primary Health Care (PHC)

The PHC nurse is responsible for diagnosis and completion of the notification form and reporting at the health facilities. Diagnosing with an RDT and drawing blood for further investigation when a case is positive. The nurse will also be responsible for taking the patient travel history in order to screen for malaria.

Data capturer

The data capturer verifies information on notification forms and clarifies with case investigators if necessary. Update the data with information recorded during case investigation. The capturer also queries monthly reports on surveillance data.

Information officer

Collate malaria information weekly and monthly. Analayse data and disseminate and generate reports. Provide malaria information to all levels. Manage the integrated malaria information system. Do capacity building for data capturers. Maintain the information system and do back up of the data.

Entomologist

The provincial entomologist will lead the vector control team during the entomological surveillance and outbreaks and epidemic response. When the case investigator identifies possible vector breeding sites the entomologist will visit the site and make an informed decision on which intervention to use.

Microscopist

Receive the slides from contact tracing together with the relevant form. Prepare the slides for viewing. Examine the slides to identify malaria parasite. Record all results and inform the case investigators of all positives. Carry out regular reporting to medical technologist. Maintain the microscope equipment.

GIS analyst

The GIS analyst will be responsible for mapping disease trends from the data collected by the surveillance officers. Together with the EHP and the district manager they will be able to decide on the correct intervention to implement. The GIS analyst will also work closely with the information officer to obtain data on malaria morbidity, mortality and entomological data to produce and update the maps.

9. PREVENTION OF RE-INTRODUCTION OF MALARIA CASES

South Africa currently is experiencing an increase migrants and travelers from other malaria endemic countries in Africa. Endemic malaria areas are currently situated close to the borders of Zimbabwe and Mozambique. It is therefore important to have a cross-border initiative between Zimbabwe, Mozambique and South Africa in order to harmonise interventions, data collection and sharing of information to inform the programmes.
Awareness amongst transport sector will need to be made about transporting mosquitoes in vehicles from endemic areas.

When South Africa has reached malaria elimination an alert and response system will need to in place. There are three main areas of intervention are the management of malaria foci and importation of parasites and lastly the prevention of onward transmission.

The management of malaria foci should include: vigilance, carrying out surveys, geographical reconnaissance, vector control and entomological investigations, carrying out IRS where required and larvaciding mainly during the dry season, and the community and local authority involvement for vector control.

The following tools should be used for the management of imported malaria parasites:
Inter-country coordination mechanisms, prevention such as chemoprophylaxis, prevention of mosquito bites, treatment and case management, screening using proactive case detection for targeted groups (international travellers and migrant workers, etc), health promotion on signs and symptoms,

For the prevention of onward transmission the following interventions should be applied: reducing human - vector contact, case management including radical treatment with primaquine to reduce the period of infectivity and the occurrence of secondary infections, primaquine antirelapse treatment for 14 days for all *P. vivax* infections.

10. MONITORING AND EVALUATION

The indicators for surveillance are in the monitoring and evaluation plan that was developed by the National Malaria Control Programme.

List of indicators for surveillance

Indicator	**Indicator type**	**Data Source**	**Frequency of Reporting**	**Responsible Person**
Percent of Public Health facilities reporting within 24 hours	Output	PMIS/NMIS	24 hours facility to district/municipality Province report monthly to National	Provincial National Manager/CDC Coordinator
Percent of Private Health facilities reporting within 24 hours	Output	PMIS/NMIS	24 hours facility to district/municipality Province report monthly to National	Provincial National Manager/CDC Coordinator
Percent of confirmed malaria cases stratified by source of infection (local or imported)	Output	DHIS/PMIS/NMIS	24 hours facility to district/municipality Province report monthly to National	Provincial National Manager/CDC Coordinator

Percent of all confirmed malaria cases of unknown origin (taxi malaria)	Output	DHIS/PMIS/NMIS	24 hours facility to district/municipality Province report monthly to National	Provincial National Manager/CDC Coordinator
Percent of malaria cases that are fully investigated within 7 days of notification	Output	DHIS/PMIS/NMIS	7 Days health facilities	Provincial National Manager/CDC Coordinator
Number of malaria pharmacovigilance reports	Output	Pharmacoviigilance Report	Annual	Pharmacovigilance unit
Number of drug resistance studies conducted in accordance to WHO protocol	Process	National Programme/Research Institute	Annual	National and Pharmacovigilance unit
Number of insecticide resistance studies conducted in accordance to WHO protocol	Process	National Programme/Research Institute	Annual	National and Provincial Managers
Number of annual review and planning meetings conducted	Process	National Programme	Annual	National Manager

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12. ANNEXURES

Standard Operating Procedures

12.1 Passive Case Detection and Passive Surveillance

Passive Case Detection (PCD) is the World Health Organisation term for **malaria case diagnosis** that takes place at a **health facility. PCD** and the **Case Notification process** together make up the **Passive Surveillance** system for malaria cases. The purpose of this document is to outline a **Standard Operating Procedure** for **PCD** and **Passive Surveillance** so that the intervention may be **standardised** and **strengthened**. These SOPs should be followed by **all private and public health sector** staff responsible for malaria case notifications, as well as those with relevant positions in the malaria programmes.

Passive Case Detection (PCD) is a process by which malaria cases are identified when a person **presents themselves** to a health facility due to illness. The **health facility** then **parasitologically confirms** the presence of malaria parasite as the cause of illness through diagnosis using **RDT or blood smear**.

The main **Goals of Passive Surveillance** are that once malaria cases are identified through **PCD** (**parasitological diagnosis at a health facility)**, the cases are given immediate and appropriate **treatment**, and **detailed patient information** is collected and passed on **immediately** to the **provincial malaria** control office for analysis. The **Information** gathered and analysed is **necessary to inform planning** for other malaria programme interventions. Both **early treatment** and **informed planning** together can help to **stop malaria transmission**.

The Passive Surveillance Process

Patient with malaria **symptoms**, and/or recent **travel** to/from malarious areas

Presents him or herself to

Health Facility

Patient is **diagnosed (PCD)** and **treated** or referred

Case Notification form with patient information is immediately forwarded through

Case Investigator and Team

The **case investigation team** will use the information provided on the **notification** to locate a patient and conduct a **Case Investigation** and **Reactive Case Detection**

Through these channels the Case Notification information will reach

Area Specific Data Flow Channels

**for more specific information on data flow, please see later section on Data Flow*

Provincial Malaria Control Office

Data analysis will be conducted based on **Case Notifications and patient information** in order to inform **Active surveillance** (see later SOPs) and other malaria **programme interventions**

Passive Surveillance is an important part of stopping malaria transmission. However, in order for this process to achieve impact there must be:

- **Health Care Workers** with the **knowledge** to detect the **signs and symptoms** of malaria in order to **rapidly diagnose** and provide **appropriate treatment** or referral
- A **rapid reporting** system for case **notifications**
- **Accurate and detailed patient information** collected on Case Notification forms

As **PCD** relies on people in the community **bringing themselves** to a facility for **testing and treatment**, there **must also be** a strong **Health Promotion** component to **all activities** to ensure that people in the **community**:

- Know the **signs and symptoms** of malaria
- And know the importance of **seeking early treatment**
- Know that **any person** from **anywhere** (**including illegal migrants**) have the right to access **free malaria testing and treatment** at any public Health Facility

Information Officer

- Ensure data from **Case Investigation forms** is correctly entered into **MIS**
- Use data provided on Case Investigation forms to create **reports**
- **Analyse information** collected during case investigation, including: **IRS** information for patient's house and surrounding community; **travel history**; **pregnancy** status; **source of infection** and it's **IRS** information; **breeding sites**, etc
- If **GIS** capacity exists, ensure proper **mapping of source of infection locality** and **provide maps** to relevant managers for planning of interventions

12.2 Reactive Case Detection and Case Investigation

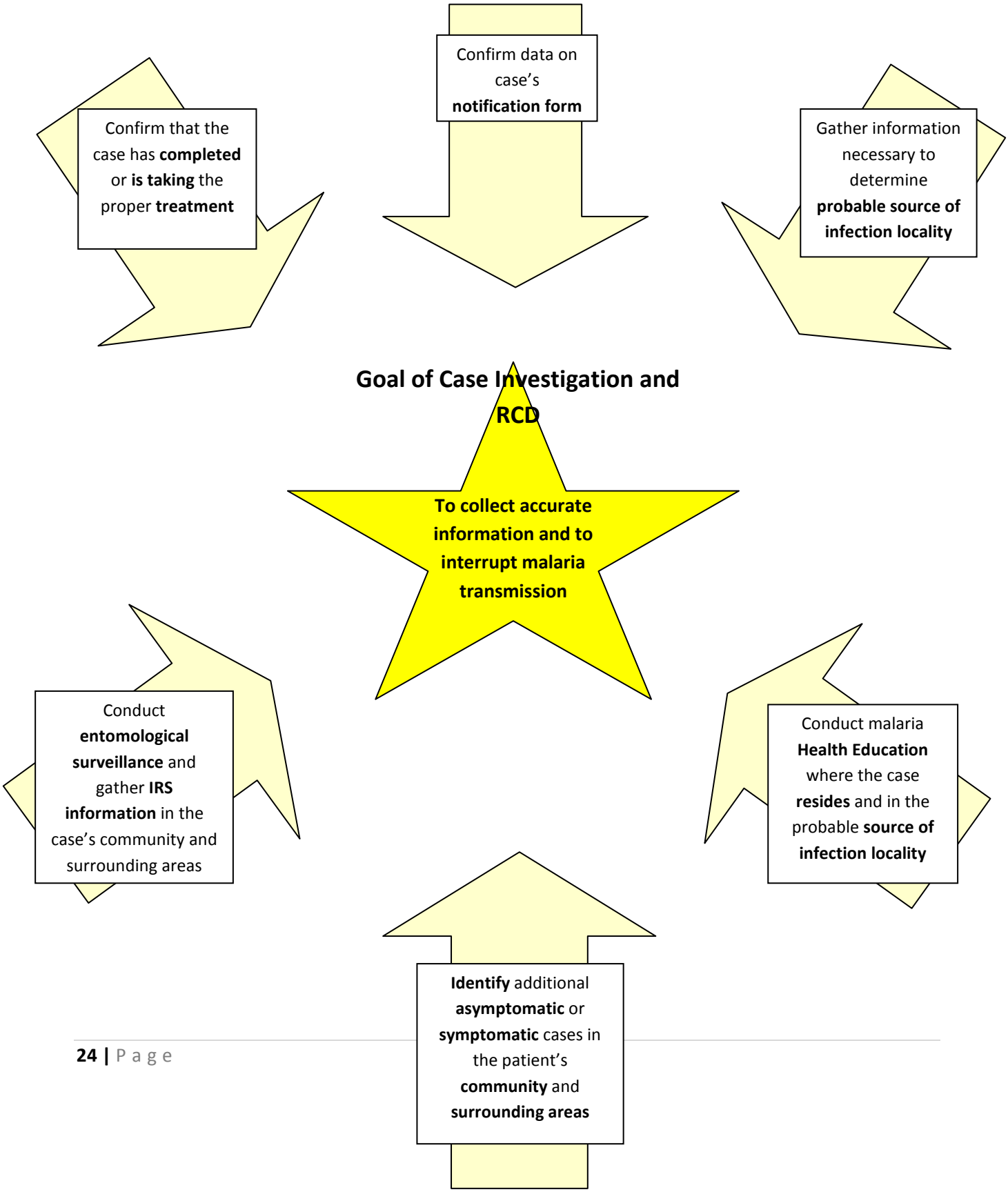
Reactive Case Detection (RCD) is the World Health Organisation term for one of the steps in the Case Investigation process. The purpose of this document is to outline a **Standard Operating Procedure** for **RCD and Case Investigation** so that the intervention may be **standardised** and **strengthened**. Once strengthened, RCD can become one of our best tools in **eliminating malaria in South Africa**, and preventing its re-introduction.

Reactive Case Detection (RCD) is a process in which malaria cases are identified within communities through **parasitological diagnosis** by rapid diagnostic test (RDT) or microscopy. The process is triggered by the **notification of a confirmed malaria case** at a health facility, which causes a **case investigator** to travel to the patient's community to carry out a **case investigation**.

The main **Goal** of **RCD** is to **identify** and ensure **treatment** of all **asymptomatic** and **symptomatic** cases of malaria as immediately as possible in order to **prevent** the parasite from **spreading**. Without **RCD**, the rest of the activities in the **Case Investigation** process are not enough to **stop onward transmission**.

Case Investigation is the process of collecting **information** about a specific malaria **case** and their surrounding **community** in order to inform programming, interventions, epidemiological analysis, and entomological analysis. In addition to collecting information, the Case Investigation also conducts other activities that can have a **direct** and **immediate effect** on local malaria **transmission**.

The Case Investigation Process



Summary of Roles and Responsibilities

**It is important to remember that some of the roles and responsibilities may vary across the provinces. However, standardisation of these roles within districts can increase efficiency, and it is important that these roles and responsibilities are clearly established by the District Manager and Programme Manager*

District Manager

- Assign "Active" **case numbers** to new cases identified by **RCD**
- Ensure the forwarding of **notification** of Active cases using Malaria Programme Case Notification form to **data capturers** for entry into MIS
  **in some areas, case numbers are assigned by data capturers*
- Ensure all **information** collected during the Case Investigation is forwarded to data capturers, or is filed appropriately

Environmental Health Practitioner/Officer

- Conduct **supervisory visits** with surveillance agents
- Conduct **case investigation** and **RCD** during times of **high case load,** if necessary
- Supervise the **prioritization, planning,** and **scheduling** of health facility visits and case investigations
- Ensure **accurate completion** of case investigation and RCD forms
- Ensure proper **classification of source of infection**
- **Analyse data** in catchment area
- Provide **updates**, as well as forward all **Case Investigation** and **Microscopy forms**, to the sub-district or district managers
- Promptly **report** any **issues** that arise in the field that may **impact** the **quality** of **surveillance** operations (lack of supplies, high malaria testing refusal rate, etc)

Case Investigator

- **Collect notification** information from the passive surveillance system at **health facility** level (ensuring that forms have all information, including pregnancy status and travel history)
- **Conduct case investigation and RCD**
- Use **patient data** and **travel history** to properly classify the case's source of infection as **local** or **imported** (this should be verified the EHP)
- Test **symptomatic** and **asymptomatic** people and facilitate early **treatment** of malaria for those who are **positive**
- **Educate community** members on the **prevention** of malaria, it's **signs** and **symptoms**, and **how to seek treatment**
- **Timely** submission of **accurate investigation**, **notification**, **RDT** usage forms to the supervising **EHP**

Assistant Case Investigator

- Help **facilitate all aspects** of **Case Investigation** and **RCD**
    - Gather **community** members
    - Conduct malaria **Health Education**
    - Malaria **testing**
    - Completing and delivering **forms**
    - **Transporting** patients (where allowed)

Microscopist

- Accurately determine **parasite** presence in blood smears taken during RCD
- Submit reports of **positive and negative test results** to case investigators and EHPs in a **timely manner**

Data Capturer

- Accurately enter all **Case Investigation information** into **MIS** in a timely manner
- Make a note if any information on the **Case Investigation form** is **different** from that on the **notification form**

Information Officer

- Ensure data from **Case Investigation forms** is correctly entered into **MIS**
- Use data provided on Case Investigation forms to create **reports**
- **Analyse information** collected during case investigation, including: **IRS** information for patient's house and surrounding community; **travel history**; **pregnancy** status; **source of infection** and it's **IRS** information; **breeding sites**, etc
- If **GIS** capacity exists, ensure proper **mapping of source of infection locality** and **provide maps** to relevant managers for planning of interventions

12.3 Proactive Case Detection

To achieve **elimination of malaria in South Africa by 2018**, extreme vigilance and innovative interventions are required to **reduce local transmission to zero**. **Proactive Case Detection** will become one of these key interventions to ensure **imported** parasitemia is **detected promptly** and **treated effectively** to **prevent any onward transmission**. The purpose of this document is to outline a **standard operating procedure** for **proactive case detection (PACD)** so that the process may be **standardized, strengthened** and employed as an integral intervention in the **elimination and the prevention of reintroduction of malaria.**

Proactive case detection (PACD) involves the **screening** of focal populations without **the trigger of a passively identified case**. This approach is based on the knowledge that transmission is more likely during a particular **time of the year**, in **specific high-risk groups** (e.g. travelers or migrants from malaria endemic countries), or **in target geographical areas.**

Proactive case detection can take place **regularly** (e.g. when migrant workers arrive in South Africa from malaria-endemic regions) or **in response to new surveillance data** (e.g. high rainfall in certain regions makes certain communities more susceptible to malaria.)

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Summary of Roles and Responsibilities

Within PACD, Environmental Health Practitioners and Case Investigators will work with the District Managers and the Entomologist Assistants to identify a specifically defined area for PACD. Case investigators will then be dispatched to the predefined area to screen the residents for malaria. As with reactive case detection, all individuals testing positive for malaria will be referred to the nearest health facility.

Health facilities and communities can also recommend areas for proactive case detection within their catchment areas if there is suspicion of malaria transmission with a high-risk community.

Provincial Malaria Control Manager

- Overall **coordination** and **management** of surveillance operations
- Track **sources of transmission**
- Monitor **population movement** in the province
- Liaise with relevant **partners and stakeholders** (e.g. International Organization for Migration (IOM), Department of Home Affairs (DHA), taxi associations, mine owners, farm owners, etc)
- Support **mobilization** of appropriate **resources**

District and Sub-District Manager

- Monitor **population movement** in the district and sub-district
- Support **mobilization of appropriate resources** in collaboration with the Provincial Manager for PACD activities
- **Identify high-risk populations** based on 'intelligence' from communities, health facilities, farm and mine managers, and other partners
- **Supervise PACD** activities in the district
- **Collect and forward PACD** reports using Malaria Programme PACD form to Provincial Office for **entry into MIS**

Environmental Health Practitioner/Officer

- Undertake 'intel' operations with surveillance agents to identify high risk populations for PACD
- Conduct PACD among high risk populations and during peak malaria transmission
- Assist in the prioritization, planning, and scheduling of PACD activities
- Ensure accurate collection and entry of PACD forms
- Analyse data in catchment area
- Provide updates to the sub-district managers and promptly report any issues that arise in the field that may impact the quality of PACD operations
- Monitor population movement in the district and sub-district
- Support mobilization of appropriate resources in collaboration with the Provincial Manager for PACD activities
- Identify high-risk populations based on 'intelligence' from communities, health facilities, farm and mine managers, and other partners
- Supervise PACD activities in the district
- Collect and forward PACD reports using Malaria Programme PACD form to Provincial Office for entry into MIS

Case Investigator (Surveillance Agents)

- Undertake 'intel' operations with EHPs to identify high risk populations for PACD
- Conduct PACD among high risk populations and during peak malaria transmission
- Complete the PACD form and RDT usage forms and submit completed forms to EHPs in a timely manner
- Educate community members on the prevention of malaria, it's signs and symptoms, and how to seek treatment

Assistant Case Investigator

- Support the Case Investigators and EHPs in all PACD activities
- Assist in gathering community members for screening
- Conduct health education and promotion
- Assist in screening of the high risk population for malaria
- Assist in the completion and delivery of all relevant forms
- Transport malaria-positive individuals to the nearest facility for treatment

Microscopist

- Accurately and promptly read slides for determination of parasitemia
- Timely report both positive and negative test results to case investigators and EHPs

South African Weather Services

- Compile and send weekly detailed weather data to district, provincial and national managers to predict conditions for potential outbreaks

Emergency Preparedness and Response Team (EPR)

- Coordinate the response measure to any outbreaks once identified by the PACD teams
- Liaise with relevant stakeholders and partners, including private sector (e.g. farms and mines) to respond to cases to prevent onward transmission
- Communication routinely with the malaria programme at district and provincial levels about response activities

Health Facility

- Recommend areas for PACD within their catchment areas if there is suspicion of malaria transmission with a high-risk community
- Promptly treat positive cases identified through PACD and transported to the facility for treatment

Community

- Recommend areas for PACD if there is suspicion of malaria transmission with a high-risk community
- Inform EHPs and health facilities if there are new migrant communities from malaria endemic regions

12.4 Malaria Surveillance in the Private Sector

The purpose of the document is to provide a **supplement** to The National Surveillance Guidelines: **Standard Operating Procedure for Passive Case Detection and Passive Surveillance**, with a focus on better **defining and strengthening Passive Surveillance in private health facilities**. In addition to the SOPs for Passive Case Detection, private sector facilities are expected to adhere to the **National Guidelines for Malaria Diagnosis and Treatment.** If your facility does not have a copy of this document it is available **online** at the National Department of Health website, or you may contact your nearest **Malaria Control Office** to obtain a print copy.

To achieve **malaria elimination** in South Africa, **all malaria infections**, symptomatic or asymptomatic, must be **rapidly detected, treated, and reported** to inform response activities and prevent local malaria transmission. Given the level of vigilance that is required, it is **imperative that all private sector facilities are actively collaborating with the public health system and the Provincial and District Malaria Programmes to appropriately diagnose, treat and report malaria cases.**

Malaria is a **notifiable disease** in South Africa and, as such, **must be reported** on a **weekly** basis to provincial **Malaria Control Programmes** and **Communicable Disease Control (CDC) Units**. Since malaria is targeted for **elimination** in South Africa, **confirmed malaria cases** must now be **notified within 24 hours**, including from private facilities.

12.5 Entomological surveillance

The purpose of this document is to provide a supplement to the National Surveillance Guidelines: Standard Operating Procedure for entomological surveillance during case investigation. This SOP will identify the activities of the entomology team during the active case investigation during reactive surveillance.

To achieve malaria elimination in South Africa it is important to map all vector foci. This should be updated on a monthly basis to inform the programs in the endemic areas. The mapping will give a clear distinction of the different foci. Together with the vector mapping will be the case mapping. It is not only the vectors that should be mapped but also the water bodies in the area. Vector control is to be more for prevention and when an outbreak occurs.

Malaria is a **notifiable disease** in South Africa and, as such, **must be reported** on a **weekly** basis. The reporting system for entomological investigations should be completed within 7 days from start of the case investigation. The information is critical and need to be mapped.

Summary of the roles and responsibilities

The entomology surveillance team comprise usually of an entomologist and field assistants. The entomologist lead the team together with the EHP assigned to vector control. The main aim is for the case investigators to identify breeding sites to further investigate. There is a direct link between the case investigators and the EHPs to inform them of the situation in the field while undertaking investigations.

Environmental Health Practitioner/Officer

- Request the case investigators when visiting the homestead of a confirmed malaria patient to undertake and record the following information on entomological indicators as required on the form to be completed.
- Ensure that all equipment and supplies is available in the event that mop-up spraying or larvaciding need to be carried out.
- Liaise with case investigator to get an update while in the field.
- Inform the entomology team to visit the area if breeding sites were identified
- Collect all completed form and check for completeness.

Assistant Case Investigator

- Support the Case Investigators and entomology teams during active case investigation and proactive case investigation
- Assist in going around in the community to identify breeding sites
- Conduct health education and promotion on importance of filling water bodies
- Assist in recording the information on water sites.
- Assist in the completion and delivery of all relevant forms
- Assist with mop-up spraying and larvaciding where required.

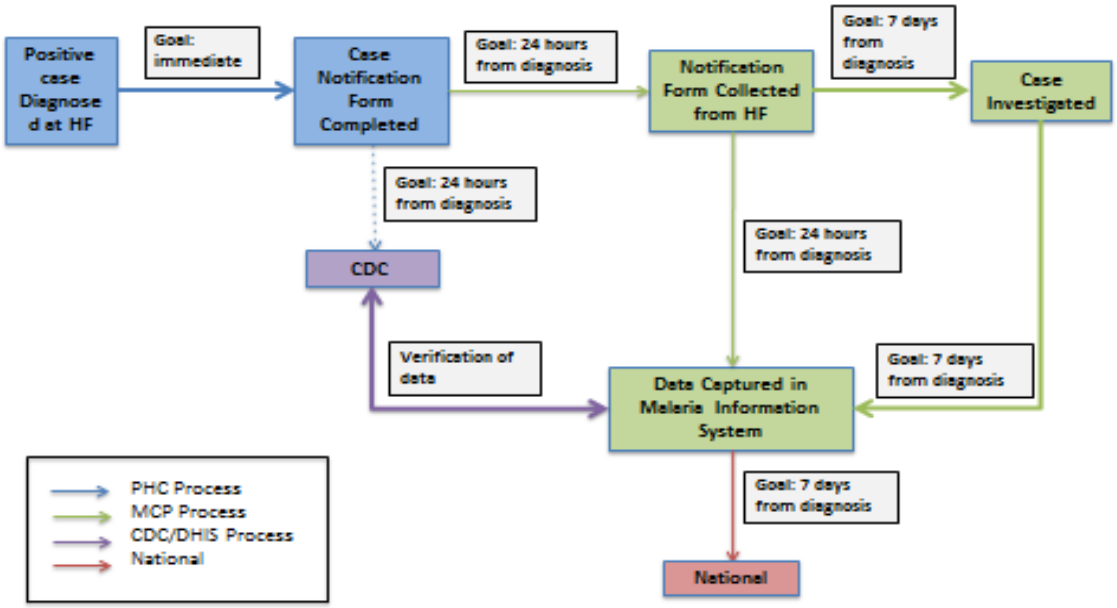
Entomologist and assistants.

- Receive a report on the situation in the field about the spraying history and availability of breeding sites.
- Visit the sites together with CI and their assistants
- Check especially for the presence of larvae in the water bodies
- If present collect some samples to take back to the laboratory
- Advice on whether mop-up spraying should take place and also larvaciding if required.
- Complete all forms and record any other observations that may impact on vector control
- Enter the information into the data MIS.

Case Investigator (Surveillance Agents)

- Identify the homestead, and then ask the following questions to complete the form
- When last was the homestead sprayed with insecticide? Check for evidence (signed card)
- Ask community if any water bodies where mosquitoes can breed is available in the area
- Check for water bodies in the vicinity of the house and within 500m.
- Inform the EHP of the situation and wait for instruction
- Accompany the entomology team on visit to carry out investigations when breeding sites are identified.
- Assist with mop-spraying and larvaciding when required.

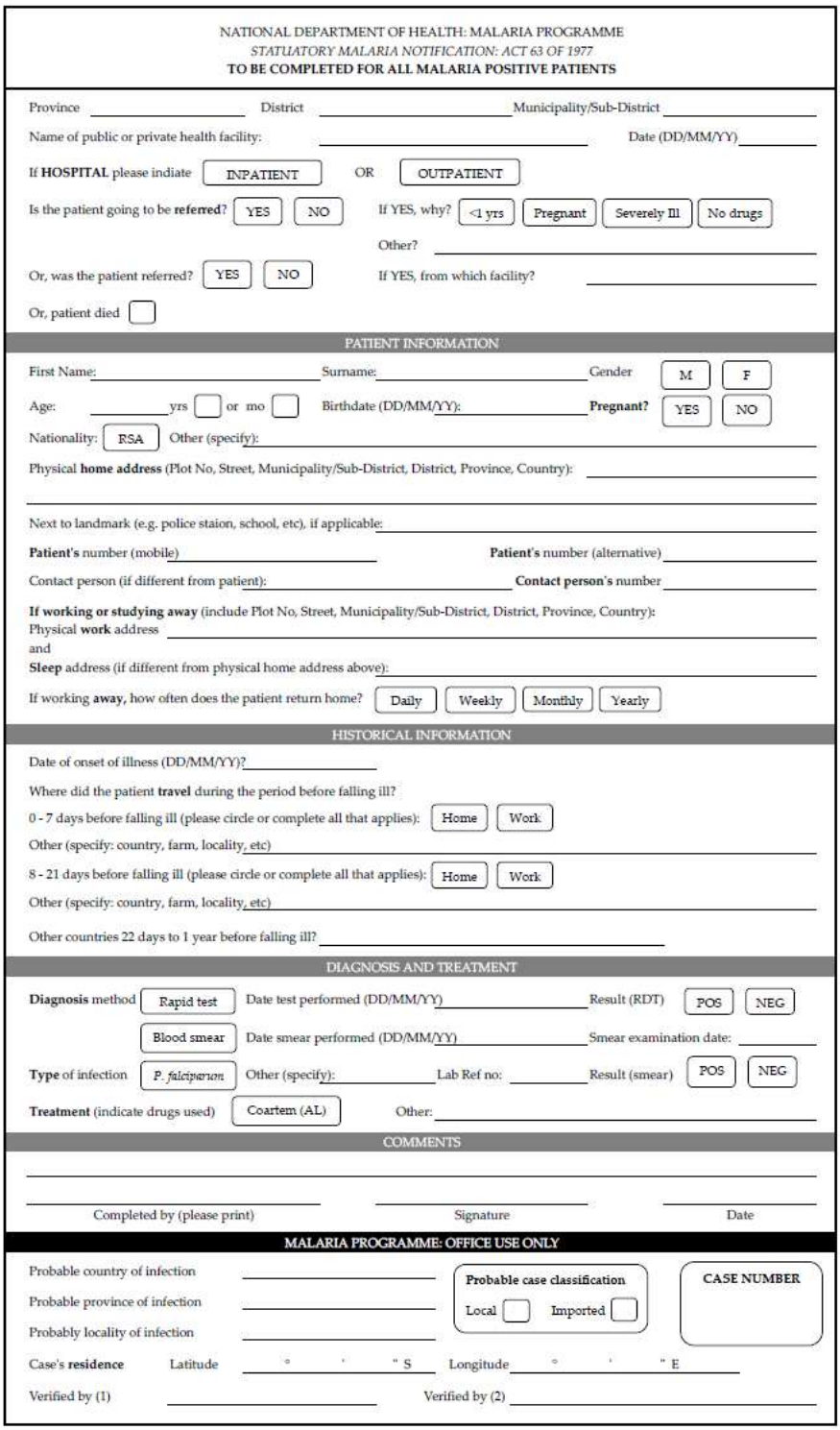
12.6 Data flow chart with time lines



12.7 Key Indicators

24 hours	• All cases must be notified and entered into the information system within 24 hours of diagnosis
48 hours	• All outbreaks must be responded to within 48 hours of outbreak identification
7 days	• All cases must be investigated (and investigation form submitted) within 7 days of diagnosis

12.8 Notification Form



NATIONAL DEPARTMENT OF HEALTH: MALARIA PROGRAMME
STATUATORY MALARIA NOTIFICATION: ACT 63 OF 1977
TO BE COMPLETED FOR ALL MALARIA POSITIVE PATIENTS

Province _____ District _____ Municipality/Sub-District _____

Name of public or private health facility: _____ Date (DD/MM/YY) _____

If **HOSPITAL** please indiate [INPATIENT] OR [OUTPATIENT]

Is the patient going to be **referred**? [YES] [NO] If YES, why? [<1 yrs] [Pregnant] [Severely Ill] [No drugs]

Other? _____

Or, was the patient referred? [YES] [NO] If YES, from which facility? _____

Or, patient died [ ]

PATIENT INFORMATION

First Name: _____ Surname: _____ Gender [M] [F]

Age: _____ yrs [ ] or mo [ ] Birthdate (DD/MM/YY): _____ **Pregnant?** [YES] [NO]

Nationality: [RSA] Other (specify): _____

Physical **home address** (Plot No, Street, Municipality/Sub-District, District, Province, Country): _____

_____

Next to landmark (e.g. police staion, school, etc), if applicable: _____

Patient's number (mobile) _____ **Patient's** number (alternative) _____

Contact person (if different from patient): _____ **Contact person's** number _____

If working or studying away (include Plot No, Street, Municipality/Sub-District, District, Province, Country):
Physical **work** address _____
and
Sleep address (if different from physical home address above): _____

If working **away,** how often does the patient return home? [Daily] [Weekly] [Monthly] [Yearly]

HISTORICAL INFORMATION

Date of onset of illness (DD/MM/YY)? _____

Where did the patient **travel** during the period before falling ill?

0 - 7 days before falling ill (please circle or complete all that applies): [Home] [Work]

Other (specify: country, farm, locality, etc) _____

8 - 21 days before falling ill (please circle or complete all that applies): [Home] [Work]

Other (specify: country, farm, locality, etc) _____

Other countries 22 days to 1 year before falling ill? _____

DIAGNOSIS AND TREATMENT

Diagnosis method [Rapid test] Date test performed (DD/MM/YY) _____ Result (RDT) [POS] [NEG]

[Blood smear] Date smear performed (DD/MM/YY) _____ Smear examination date: _____

Type of infection [*P. falciparum*] Other (specify): _____ Lab Ref no: _____ Result (smear) [POS] [NEG]

Treatment (indicate drugs used) [Coartem (AL)] Other: _____

COMMENTS

_____

_____ _____ _____
Completed by (please print) Signature Date

MALARIA PROGRAMME: OFFICE USE ONLY

Probable country of infection _____

Probable province of infection _____

Probably locality of infection _____

Probable case classification Local [ ] Imported [ ]

CASE NUMBER

Case's **residence** Latitude ° ' " S Longitude ° ' " E

Verified by (1) _____ Verified by (2) _____

12.9 Glossary

Active case detection for malaria: a process in which malaria cases are identified within communities through parasitological diagnosis by rapid diagnostic test (RDT) or microscopy.

Proactive active case detection: the detection process is triggered by strong suspicion of malaria transmission within a defined detection area.

Reactive active case detection: the detection process is triggered by the identification of a confirmed malaria case at a health facility.

Active case investigation for malaria: a process in which confirmed malaria cases are followed up with a visit at the patient's household to identify the travel history of the patient and to ensure the efficacy of the drugs prescribed for treatment.

Active surveillance: is an active search for malaria cases (fever with parasitemia) at the community or at household level, either through regular or random visits by health-care providers.

Case, malaria (as defined in elimination programmes): a person in whom, regardless of the presence or absence of clinical symptoms, malaria parasites have been confirmed by quality-controlled laboratory diagnosis.

- Classification of a case as "imported" also depends on the probability of local transmission in the area of living and working of the patient classified as a confirmed case / Or a case, the origin of which can be traced to a known malarious area outside the country in which the case was diagnosed.

Case, local: a case, the origin of which from local transmission cannot be disproved. It includes delayed first attacks of *P. vivax* due to locally acquired parasites with a long incubation period.

Case, induced: a case, the origin of which can be traced to a blood transfusion or other form of parenteral inoculation, but not to normal transmission by a mosquito.

Case, introduced: a case in which it can be proved that the infection is a first step (first generation) of local transmission subsequent to a proved imported case, i.e. in which the mosquito was infected from an imported case.

Cases classified as "introduced" require that the index case and all other infections found during the field investigation of the index case can be linked to a single imported case.

Malaria outbreak or epidemic: a situation in which the number of malaria cases within a given timeframe and specifically defined locality surpass an established threshold; the number of outbreak cases.

Outbreak or epidemic preparedness: operational preparation for implementation of outbreak or epidemic response.

Malaria surveillance: a system of monitoring the number malaria cases and comparing ongoing caseload to the outbreak or epidemic threshold.

Outbreak or epidemic response: an established set of procedures and activities to scale up preventive measures and strengthen case management when an outbreak or epidemic has been identified.

Passive surveillance: is the regular or periodic collection of data from case reports or registers from health-care facilities where patients seek care at their discretion. The health-care facilities (public and private) include stationary facilities for outpatient or inpatient services. However, some countries with inadequate health service coverage, or with mobile populations (e.g. immigrants, nomadic populations), often organize mobile health services (outreach sessions) at a defined post to reach remote communities on a regular basis.

The prevention of re-introduction of malaria is to ensure that the re-establishment of local transmission does not occur.