



A Malaria Elimination Guide to Targeted Surveillance and Response in High-Risk Populations

Module 4: Adapting Reactive Case Detection

The Malaria Elimination Initiative

UCSF Institute for
Global Health
Sciences

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Key Terms

Active case detection (ACD)	Detection by health workers of malaria cases at community and household levels, sometimes in population groups that are considered at high risk. Active case detection can consist of screening for fever followed by parasitological examination of all febrile patients or as parasitological examination of the target population without prior screening for fever.
Case, imported	Malaria case or infection in which the infection was acquired outside the area in which it is diagnosed. In keeping with the WHO Surveillance operations manual, the origin of imported cases can be traced to a known malarious area outside of the elimination area to which the case has travelled.
Case, index	A case of which the epidemiological characteristics trigger additional active case or infection detection. The term “index case” is also used to designate the case identified as the origin of infection of one or a number of introduced cases.
Case, locally acquired	A case acquired locally by mosquito-borne transmission.
Community health worker (CHW)	Community members who provide essential population-based health services to the communities in which they live, particularly in under served and vulnerable populations. CHW is an umbrella term that encompasses workers with diverse roles and activities; service delivery areas include a wide range of basic health services and specialist areas such as maternal and child health, HIV/AIDS, TB and malaria.
Confirmed malaria case	Malaria case (or infection) in which the parasite has been detected in a diagnostic test, i.e. microscopy, a rapid diagnostic test or a molecular diagnostic test.
Case notification	Compulsory reporting of all malaria cases by medical units and medical practitioners to either the health department or the malaria control programme, as prescribed by national laws or regulations
Exposure	A term used to indicate that a study subject has a particular risk factor. For example, exposure to cross-border travel was defined as travelling internationally within the past 30 days.
Passive case detection (PCD)	Detection of malaria cases among patients who, on their own initiative, visit health services for diagnosis and treatment, usually for a febrile illness.
Reactive case detection (RACD)	Screening and testing provided to a subset of a population in a given area in response to the detection of an infected person. Typically carried out around the index case household within a given radius
Socio-behavioral reactive case detection (SB-RACD)	An approach for reactively targeting screening of specific sites and social contacts as part of routine surveillance, based on a set of risk criteria applied to an index case. This is a form of active case detection (ACD) and a refined version of reactive case detection (RACD).

Overview of Module 4

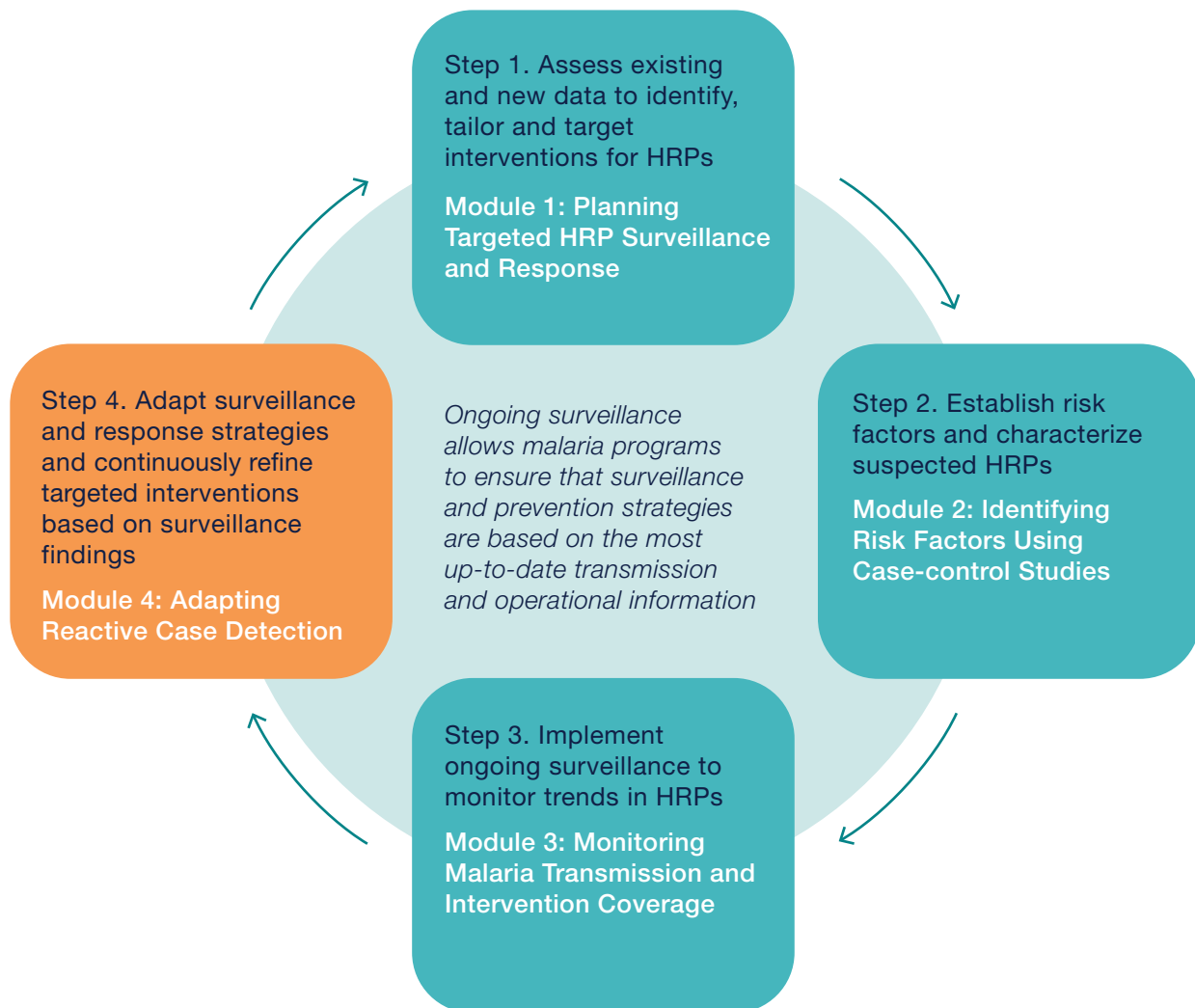
Module 4 provides a framework and approach for targeted screening of specific sites and social contacts as part of routine surveillance. It is based on a set of risk criteria applied to an initial, or index case identified at a health center or in the community. This form of active case detection can also be called "socio-behavioral reactive case detection (SB-RACD)".

Module 4 describes SB-RACD where high-risk individuals are identified, tested and treated through peer networks or specific locations ("venues") where they congregate. The Module will be useful

in contexts where transmission occurs away from home, such as in the forest, worksites, or travel destinations, and where household reactive case detection is likely to have a low case yield.

Implementation of this SB-RACD approach can improve targeted surveillance and response in known high-risk and hard-to-reach groups. Module 4 links with the other modules in the HRP Guide (Figure 1). The Module should be adapted to the specific goals and context of the high-risk population (HRP) of interest and findings from the formative assessment (Module 1).

Figure 1: Generating and using evidence: steps in the surveillance cycle for targeting HRPs



Module 4 is designed to guide surveillance staff in adapting reactive and active case detection to HRPs who may be challenging to access through routine community and household visits. The Module is written for a target population of forest workers, but can be adapted for use with other HRPs.

The module contains four components:

1. Planning the SB-RACD, including ethical considerations, conducting the formative assessment, adapting the rationale and objectives, identifying the target population and geographic area, determining logistics, and conducting fieldwork.
2. Implementation of SB-RACD, including case screening, eliciting information on venues and referrals, and pre-screening activities.
3. Conducting follow-up at venues and with contacts, including venue and peer investigations, specimen collection, and monitoring and supervision.
4. Managing, analyzing and using the data, including data management, analysis and using data for programming.

Introduction to SB-RACD

What is SB-RACD?

Active case detection is the WHO-recommended process of testing individuals in the community based on risk or other criteria, and treating all positive individuals to reduce onward transmission. When active case detection is triggered in response to an index case at a health facility, it is referred to as reactive case detection. Usually, reactive case detection is conducted in households that are close to the location of the index case. This is because of the potential for cases to cluster together geographically. However, in settings where the primary risk factors for malaria transmission include occupational exposure and other behaviors (e.g., work in the forest or travelling together), reactive case detection needs to be adapted to those individuals, populations, and locations at highest risk.

SB-RACD is a form of active surveillance, designed to identify cases among HRPs who may have had a common exposure with an index case at shared worksites. SB-RACD is preceded by a formative assessment conducted to map worksites and determine the feasibility and logistical requirements of surveillance through venues or peer networks. Procedures for conducting the formative assessment are detailed in *Module 1 Formative Assessment for Planning Targeted HRP Surveillance and Response*.

This Module 4 of the HRP Guide presents the key considerations and procedures for adapting reactive case detection to HRPs, using the example of forest workers. It is based on evidence from a setting where a majority of transmission occurs in the forest. Malaria cases among forest workers are likely to be missed by passive surveillance due to low access to health services care and treatment-seeking behavior. Working in the forest may also mean that the cases are likely to be missed in routine household reactive case detection. Although the material presented is specific to forest workers for illustrative purposes, this Module can be adapted to suit other HRPs in different settings.

Who Should Use SB-RACD?

SB-RACD was developed for use by health decision makers, malaria program managers, non-governmental organizations, and researchers who want to

generate evidence to improve surveillance and support targeted intervention strategies for populations at increased risk of malaria.

Who Should be Targeted with SB-RACD?

SB-RACD could be appropriate for the populations outlined in [Table 1](#). Details on the HRPs and specific venues will ultimately depend on local conditions. SB-RACD will be triggered for any index case that is diagnosed at a participating health facility and meets a pre-determined risk criteria identified using [Modules 1 and 2](#). Criteria can be adapted based on the local context and population of interest.

Table 1. HRPs and recommended SB-RACD venues

HRP group	Potential venues for SB-RACD
Forest workers	<ul style="list-style-type: none"> • Forest worksites • Sleeping camps • Processing plants • Permit offices • Supply stores
Truck drivers	<ul style="list-style-type: none"> • Common rest stops • Weighing stations • Border crossing
Agricultural workers	<ul style="list-style-type: none"> • Worksites • Roads leading to work sites
Construction workers	<ul style="list-style-type: none"> • Construction sites
Security guards	<ul style="list-style-type: none"> • Worksites
Fishing populations	<ul style="list-style-type: none"> • Fishing camps
Miners	<ul style="list-style-type: none"> • Mining camps
Seasonal migrant workers	<ul style="list-style-type: none"> • Border crossings • Worksites

SB-RACD Design

SB-RACD is triggered for any index case that is diagnosed at a participating health facility and meets pre-determined risk criteria. In the case of forest workers, criteria include:

- Patient reports working in the forest or forest fringe, away from a village setting.
- Patient was present in the forest or forest fringe anytime between sundown and sunrise in the past 60 days.

These criteria can be adapted based on the local context and population of interest.

Timing of SB-RACD

Once SB-RACD is triggered, designated staff will attempt to find and test other workers who worked or currently work at the sites where the index case was in the past 60 days and thus may have similar exposure to malaria. Staff will try to find these other workers within a set time period through peer networks or venues. The purpose of the time window is to ensure that individuals found at venues or through peer networks are likely to have been exposed during the same period and that testing is done in time to quickly identify and treat any secondary infections. A time window of 7 days may be appropriate where *P. falciparum* predominates and a longer period may be more appropriate where *P. vivax* is more common.

Aims of SB-RACD

SB-RACD is important in elimination settings to detect asymptomatic cases among populations considered to be at higher risk of malaria infections. The aims of implementing SB-RACD as a routine part of malaria surveillance are:

1. To expand case finding to include other forest workers who may have had similar exposure to the index case.
2. To identify forest work locations where transmission may be occurring, and where it may be beneficial to improve access to regular testing and/or prevention interventions.
3. To enhance the national capacity to conduct targeted surveillance among HRPs in order to identify and eliminate remaining reservoirs of malaria.

Follow-up Methods for SB-RACD

SB-RACD employs specialized follow-up methods determined to be appropriate for the population of interest through a formative assessment (Module 1). The follow-up methods include:

1. Peer networks – Follow-up and testing is conducted for co-workers whose details are provided by the index case.
2. Venues – Follow-up and testing is done at worksites where detected cases have recently worked.

SB-RACD using peer networks

Active surveillance through peer networks is appropriate when members of the HRP tend to know one another and are willing and able to refer others by providing contact information. Peer network surveillance has two approaches:

1. Peer referrals
2. Peer navigators

1. Peer referrals

In this method, follow-up and testing is conducted for co-workers whose details are provided by the index case.

Staff ask the index case to provide contact information (name, telephone numbers, and household location) of any co-workers with them at the same worksite between sundown and sunrise, or traveled with them, in the past 60 days.

Staff then follows-up with these “peer referrals” to pre-screen them for the following:

- Confirm they were at the same sites or traveled with the index case.
- Confirm their willingness to be tested and provide information about their potential exposure.
- Arrange a convenient meeting place to undergo testing and the brief interview.

2. Peer navigators

Peer navigators are community members with full-time, paid positions, who have shared socioeconomic status, racial/ethnic identity, language and 'lived experience' as target groups. Peer navigators seek

out their peers and encourage them to undergo testing and treatment (if necessary).

SB-RACD through venues

Active surveillance through venues is appropriate when potentially high-risk individuals tend to work, sleep, or congregate at locations that are identifiable, and where it is safe and feasible to conduct malaria testing and treatment.

To conduct SB-RACD through venues, staff ask the index cases for information about all worksites where they have worked at any time between sundown and sunrise in the past 60 days. Staff pre-screen the worksite by contacting worksite officials (owner/manager) to determine whether:

- The worksite is safe and accessible to visit
- The worksite has the minimum number of usual workers expected at the time of visit (usually 6)
- The officials authorize the visit

If the venue is eligible and permission is granted, designated staff will travel to the worksite and offer testing and a brief risk interview to all workers present. If the worksite cannot be visited, staff will coordinate with the officials to arrange an alternative location where workers from the site can be tested and interviewed within the 7-day time window. Participants tested by RDT will receive their test results immediately and, if positive, will receive treatment on-site, as well as information on local prevention and testing services.

Peer network and venue-based active surveillance approaches are not mutually exclusive. They can be applied together to reach the most individuals at potential risk as possible.

SB-RACD Implementation

SB-RACD procedures ([Box 1](#)) should be completed within a set timeframe (e.g., seven days after diagnosis of the index case). This is to increase the chances of detecting new cases linked with the case and limit onward transmission.

A flowchart of the detailed steps of SB-RACD is presented in [Appendix 1](#).

This Module was developed in order to ensure consistent and rigorous case finding methods. Adherence to SB-RACD procedures will ensure that case finding is carried out effectively and appropriately for the target HRP.

The following sections of this Module provide details on the steps followed to prepare for and conduct the SB-RACD procedures.

Box 1. SB-RACD procedures

1. Interview and screen cases to determine if they are eligible for SB-RACD
2. Obtain information from cases (in the last 60 days) on:
 - Worksites
 - Co-worker referrals
3. Pre-screen worksites and peer network contacts for eligibility
4. Conduct venue investigations:
 - Travel to eligible worksites
 - Conduct parasitological testing with RDT
 - Brief interview of all eligible workers present
 - Arrange an alternative location with venue officials (if the worksite is not accessible)
5. Conduct peer follow-up:
 - Meet each peer network contact at an agreed-upon convenient location (with conditions to ensure confidentiality)
 - Conduct parasitological testing with RDT
 - Brief interview with peer contacts
6. Collect specimens
7. Prepare dried blood spot (DBS) if required
8. Provide treatment for individuals who test positive during the worksite visits/meetings

Component 1: SB-RACD Planning

SB-RACD is important in elimination settings to detect asymptomatic cases among populations considered to be at higher risk of malaria infections. SB-RACD requires careful planning that includes the following:

- Ethical considerations
- A formative assessment
- Review of the rationale for SB-RACD
- Adaptation of objectives
- Identification of the target population
- Definition of the geographic area
- Determination of staffing needs
- Pre-implementation fieldwork and piloting

Ethical Considerations

SB-RACD can be implemented as part of routine surveillance or conducted as a research activity with collaborating institutions. When SB-RACD is conducted as a research activity, ethical review and approval is required before starting implementation.

Requirements for ethical review and approval for programmatic SB-RACD will vary depending on country context. However, informed consent is required for all eligible participants before any SB-RACD procedures can be carried out whether as a research or programmatic activity. Measures must be taken to ensure confidentiality of all data collected from cases and contacts.

Conduct the Formative Assessment

A formative assessment is an important step for planning SB-RACD and other targeted surveillance strategies in HRPs. [Module 1](#) provides detailed guidance on how to conduct a formative assessment for malaria HRPs. A formative assessment prior to the SB-RACD will define the following:

- Venues where identified HRPs are likely to congregate
- Days and times of high attendance at those venues
- Feasibility and acceptance of venue-based and peer networks surveillance approaches

[Box 2](#) summarizes key information obtained from the formative assessment phase for planning SB-RACD.

Box 2. Key Information gathered from a formative assessment to use in planning SB-RACD

- Analysis of past trends in malaria cases
- Operational definitions of HRPs based on activities and behaviors likely to increase exposure to malaria infections
- Presence of a large enough HRP that is not covered by household reactive case detection to justify SB-RACD
- HRPs likely to be missed by the existing surveillance systems due to asymptomatic infections or limited testing
- Acceptability of SB-RACD, such as willingness to participate, possible obstacles and how to overcome them
- Gatekeepers who may facilitate or impede access to HRPs
- Minimum incentive levels (if any) required for participation
- Measures to provide adequate confidentiality, privacy or legal protection to vulnerable groups (e.g., illegal migrant workers, ethnic minorities) in case of any illegal activities, mistrust or stigmatized behavior
- Feasibility and effectiveness of venue-based and peer networks surveillance approaches
- Initial mapping of venues and estimates of attendance levels to inform logistics and staffing requirements
- Preferences for testing locations, hours and profile of SB-RACD staff

Review the Rationale for SB-RACD

Before implementing SB-RACD, a clear rationale for the approach should be defined. There should be evidence of a large enough population of HRPs who are likely missed by existing passive and active

surveillance approaches. The rationale can be established during the formative assessment, which includes methods of direct observation, mapping and enumeration of forest worksites and other places where forest workers gather, key informant interviews with employers, forest rangers, community leaders, health leaders and focus groups discussions with forest workers and health workers.

Box 3 presents an example rationale for SB-RACD among forest workers, based on example results of a formative assessment.

Box 3. Example rationale for SB-RACD among forest workers

Findings from the formative assessment:

- Locations of forest worksites
- Employers were interested in workers being tested
- Forest workers expressed interest in being tested at their worksites
- Most forest worksites were accessible
- Forest workers tended to work and travel in groups and knew co-workers/travellers by name
- Individuals were willing to refer others for testing
- Household reactive case detection, was likely to miss forest workers due to their extensive work and travel away from their households

Passive surveillance missed cases among forest workers because:

- Many forest workers reported presenting to public health facilities only when symptoms became severe.
- Forest workers frequently took antimalarial medications with them to worksites and self-medicated when ill.
- Some forest work employers reported sending their workers to private clinics, which were not involved in case reporting.

Adapt the Objectives

The objectives below are specific to forest workers, but can be easily adapted to conform to whichever HRPs are suspected or known to be important in continuing local transmission. These could be HRPs who may benefit from more targeted or alternative surveillance and response strategies (e.g., students studying outside at night, cross-border travelers, security guards, fisherman).

The objectives below should be reviewed and adapted to suit the findings of the formative assessment. Confirm whether the objectives are realistic, focused and relevant to the available data and top priorities for the malaria program.

The aims of implementing SB-RACD as a routine part of malaria surveillance are:

1. To expand case finding to include other forest workers who may have had similar exposure to the index case.
2. To identify forest work locations where transmission may be occurring, and where it may be beneficial to improve access to regular testing and/or prevention interventions.
3. To enhance the national capacity to conduct targeted surveillance among HRPs in order to identify and eliminate remaining reservoirs of malaria.

Identify the Target Population

SB-RACD is a form of active case detection that targets a specific HRP. To be included in SB-RACD, index cases and contacts must meet specific criteria to ensure they belong to the HRP (e.g., forest workers) and have exposures that could potentially increase malaria risk. Example criteria for forest workers are listed below and should be adapted to suit the needs of the local situation.

SB-RACD eligibility criteria

Individuals must meet all of the criteria outlined in Box 4 to be included in SB-RACD, either as a case or contact.

Exclusion criteria

- All individuals:
 - » Previous participation as an index case in the past 30 days (since in a short time span co-workers and worksites are unlikely to have changed significantly)

- » Not capable of providing informed consent (e.g., due to sleep deprivation or under the influence of alcohol or drugs)
- Referrals:
 - » Previous participation in any SB-RACD investigation in the past 30 days

Notes on eligibility

- After 30 days, an index case or contact can again be included in SB-RACD, either as a case or contact.
- Repeat participation is allowed due to the possibility of malaria re-infection or relapse.

Nationality and citizenship should not be the basis for excluding anyone because malaria may affect foreigners working in the area and they may be involved in transmission.

Worksite (“venue”) eligibility criteria

Staff will approach forest workers at worksites at specific times. Surveillance through venues will only be carried out at worksites that meet the criteria below:

- SB-RACD has not been conducted at the venue in the past 30 days
- The venue is geographically accessible
- It is safe for surveillance staff to conduct testing at the venue
- Permission is provided by the venue owner/manager (if applicable)
- The number of workers expected at the time of the investigation is at least six (See Box 5 on choosing a minimum expected number of workers for venue-based surveillance).

Define the Geographic Area

The choice of area for SB-RACD is informed by the findings of the venue mapping component of the formative assessment (Module 1). Based on the venue mapping, define the areas in which SB-RACD will be implemented. Venue mapping generates the following key information to guide selection of SB-RACD area:

- Identifies and verifies possible venues where different high-risk subgroups gather for various activities
- Enumerates the high-risk individuals present at the venue during peak hours

- Determines accessibility and safety of identified venues
- Establishes willingness of the high-risk individuals in the venues to participate in malaria surveillance activities and to refer their peers
- Secures the venue managers’ permission for surveillance activities to be conducted at the premises

Using the forest worker SB-RACD example, included geographic areas were chosen based on these factors:

- Passive surveillance, case investigation or case-control study (Module 2) suggested risk factors related to forest work in the location
- The formative assessment suggested there were many forest workers present in the forest during mosquito biting hours
- The formative assessment suggested surveillance through venues or peer networks to be viable methods for following up with and testing forest co-workers because:
 - » Most forest worksites in the area were safe and accessible to conduct testing
 - » Venue owners/managers interviewed suggest they are willing to support malaria testing
 - » Interviews with forest workers suggested they were willing to be tested and refer co-workers for testing

The SB-RACD approach should be piloted at a small number of health facilities, and once implementation issues have been addressed, rolled out to others. Participating health facilities will identify the index cases that will trigger SB-RACD. There is no residential requirement for index cases or contacts; cases and contacts should be included regardless of where they live as long as they meet the eligibility criteria.

Box 4. Eligibility criteria for SB-RACD

All Individuals:

- Age 15 years or older
- Provides informed consent to participate

Index cases:

- Tests positive for malaria by microscopy, RDT or other national diagnostic standard at a participating health facility or by a community health worker
- Worked in the forest or forest fringe in the past 60 days*
- Was at a forest worksite sometime between sundown and sunrise in the past 60 days (working or sleeping)

Peer network referrals:

- Knows the index case by name
- Was with the index case at a forest or forest fringe worksite in the past 60 days
- Worked at the site and was present there some-time between sundown and sunrise in the past 60 days**

Venue referrals:

- Present at a forest or forest fringe worksite during a venue investigation
- Worked at the site in the past 60 days
- Worked at the site and was present there sometime between sundown and sunrise in the past 60 days

*“Work” is defined as follows: the individual is being paid to be at the location and/or is producing or extracting materials (e.g., gold, teak wood, fruits, vegetables, animals) primarily for sale or personal use.

**The purpose of the 60 days time window is to increase the chance that infection is actually due to forest work

Box 5. Choosing a minimum expected number of workers for venue-based surveillance

Venue-based surveillance activities should set a minimum number of expected participants for a venue to be considered eligible for logistical reasons, to avoid wasting valuable staff time and resources at venues where there are few workers. Consider setting a minimum of six expected workers.

However, there is no fixed rule, and in some settings a lower or higher figure may be appropriate. Choose a minimum that makes sense for your context by reviewing the enumeration results and other information you have about expected numbers of workers collected during the formative assessment.

Be careful not to set a threshold that is too high. A high threshold might exclude sub-groups that may be relevant to transmission, such as family-based work groups or informal workers.

Determine Staffing Structure and Roles

Step 1. Determine staffing needs

Staffing requirements will depend on the following key variables:

- Number of cases expected over time
- Number of worksite and peer contacts that will need follow-up

The findings from the formative assessment can help to determine staffing requirements by estimating the time needed to:

- Travel to and from each worksite
- Travel to and from meeting places with peer contacts in the community
- Carry out testing and the brief survey (usually 30 to 60 minutes)
- Pre-screen a worksite owner and peer contact (usually about 20 minutes, if they can be contacted by phone)

The size of field teams to conduct venue investigations should be planned based on the number of workers that are expected to be present at the worksite, taking into account the time required to complete procedures (testing and interviewing) per person. These times should be estimated during pilot testing. [Box 6](#) provides an example of estimation of the field team size.

Box 6. Example to estimate the size of field team

In an SB-RACD pilot in Indonesia, a single field team of three people was able to follow up with three to five peer contacts per day. The same team could visit at most one worksite per day, given that most were 2–6 hours from the clinic where staff were based. After accounting for the time to travel to and from worksites, a 3-person team was able to test and interview ten workers per day, at most.

Basic field teams carrying out venue and peer investigations should consist of:

1. Venue investigation team of a Local Coordinator, Interviewer, a Nurse/Laboratory Technician, and an entomologist (if available)
2. Peer investigation team consisting of an Interviewer and a Nurse/Lab Technician.

Step 2. Identify staff roles and responsibilities

SB-RACD will be successful only if each team member understands and follows correct procedures, described as follows and in [Box 7](#).

Coordination and supervision

An SB-RACD team lead should be designated. The team lead will have overall responsibility for the SB-RACD strategy, supervision of case procedures (at health facilities) and SB-RACD investigations (in the field).

Additional Local Coordinators should be designated for each area/district/region where SB-RACD is implemented to manage and supervise local field teams. Surveillance officers may be good candidates for the coordination roles.

Case procedures

Existing staff at health facilities, such as nurses and/or laboratory technicians, can carry out SB-RACD case procedures, including:

- Identifying newly diagnosed cases
- Assessing eligibility of cases for SB-RACD
- Identifying worksites and co-worker referrals.

Pre-screening

Pre-screening requires contacting venue officials and peer referrals by phone to determine whether to proceed with carrying out site visits, testing and brief interviews. These phone calls can be done by existing staff, such as nurses or surveillance officers. However, if there are many cases, worksites or contacts, pre-screening may be assigned to a Local Coordinator or other designated staff member.

Carrying out SB-RACD investigations

Additional individuals will be required to staff field teams that travel to worksites and other meeting places with peer-referrals and to carry out testing and brief interviews. Teams should include at least one individual able and authorized to conduct malaria testing. In some settings, existing community health workers (CHWs) may be good candidates to staff field teams.

Combining staff roles

In settings with few or infrequent cases and small worksites, certain roles may be combined. For example, the Interviewer and Nurse/Lab Technician roles can be combined and carried out by a CHW, nurse, or surveillance officer. [Box 5](#) provides detailed descriptions of the specific tasks and roles of the SB-RACD field staff.

Step 3. Ensure ethical and professional conduct of field staff

Surveillance staff must adhere to ethical principles and standards when conducting SB-RACD. Most importantly, they must respect and protect the privacy, confidentiality, and autonomy of cases and contacts. In addition, staff should conduct themselves in a professional manner when interacting with cases and contacts, fellow staff members, and the general public.

Box 7: Roles and responsibilities of SB-RACD staff

SB-RACD Coordinator

- Train and conduct refresher trainings for field teams
- Manage and support the Local Coordinators
- Onsite supervision and support to ensure strict adherence to protocols
- Monitoring and reviewing progress of the SB-RACD implementation
- Data management and quality assurance
- Develop monthly progress reports
- Coordinate invoicing for equipment and supplies
- Liaise and communicate with local partners and other stakeholders
- Support hiring of field teams
- Support local ethical approval submission and extensions
- Note that the SB-RACD coordinator role may be filled by a district health officer or M&E officer

Local Coordinator(s)

- Ensure adequate site preparation, including procurement of supplies and training on study procedures
- Supervise local field staff
- Manage overall day-to-day operations and data collection in the local area (e.g., district)
- Select cases, organize SB-RACD visits and data collection (interviews and sample collection)
- Conduct quality assurance of SB-RACD procedures, including case procedures and field investigations
- Ensure proper documentation of all SB-RACD activities using the tablets, spreadsheets and/or forms
- Review, tabulate and reconcile data collection forms and logs used in the field
- Manage data files and document any data errors
- Maintain inventory of supplies, materials, receipts, incentives and equipment
- Report any deviation from standard

operating procedures and any problems in the field to the SB-RACD coordinator within 48 hours of occurrence

- Develop progress reports for the local area (shared with SB-RACD Coordinator for overall monitoring of the project)
- Communicate with Coordinator on a regular basis on SB-RACD implementation

Interviewers

- Screen cases for eligibility
- Interview cases at health facility (to obtain information on worksites and peer referrals)
- Pre-screen worksites and peer referrals to confirm eligibility
- Interview contacts in the field
- Administer informed consent (if applicable)
- Document data, including case and contact interviews in tablets or paper forms, and complete tracking forms
- Enter case and contact IDs onto data collection forms and match ID labels on malaria RDTs and blood samples
- Comply with guidelines to maintain data integrity, safety, security, and confidentiality
- Implement local safety procedures and report field incidents to the Local Coordinator immediately.
- Note that Interviewers should be designated for placement at health facilities (for case procedures) and for field work (to interview contacts).

Nurse/Lab Technicians

- Take blood samples from cases and contacts
- Prepare slides and DBS for analysis
- Document laboratory and clinical data on appropriate forms
- Manage storage and shipping of samples
- Conduct daily inventory of all laboratory supplies, and ensure timely replenishment
- Perform RDT at sites/with contacts with symptoms of malaria
- Administer treatment of positive cases as per national guidelines

Prepare Materials and Supplies

All the materials and supplies required for SB-RACD investigations should be procured in good time. Appropriate storage facilities should be identified in the field to enable quick replenishment. [Appendix 2](#) provides a checklist of supplies required for SB-RACD.

Conduct Preparatory Fieldwork

Step 1. Finalize referral mechanisms

The SB-RACD team should meet with the key staff from participating health facilities. The team should ensure the health facility staff are aware of the SB-RACD strategy and timelines. The team should also review the process for identifying index cases and referring participants for SB-RACD surveillance.

Step 2. Conduct pilot test

The SB-RACD procedures and data collection forms should be pilot tested on 6-10 individuals who are members of the target population. The pilot should be as realistic and complete as possible (i.e., done with real cases and contacts in an actual venue). All data collection forms and procedures should be completed and any adjustments done based on the findings of the pilot. Other logistics and operational considerations should be modified based on the pilot (e.g., estimated time to complete all the procedures with a contact).

Step 3. Engage with target community

Ensuring a good relationship with the target population and the larger community can improve participation of cases and contacts. The following are some steps that can prove useful:

During the formative assessment:

- Inform community leaders of plans for SB-RACD and seek their advice.
- Include key informants from both the target population and the larger community.
- Hold a community meeting to discuss the proposed surveillance strategies and elicit approaches to improve and ensure community participation.

During SB-RACD implementation:

- Each month, contact 2-3 of the key informants who were interviewed during the formative assessment to get their sense of how the tracing and testing efforts are being perceived by the community and whether there are any problems that may need to be addressed.

- Before and after each SB-RACD investigation, contact venue officials to discuss the investigation. Close coordination will ensure any problems are identified and addressed promptly.
- If there are regular meetings of community leaders, community members, or members of the target population (e.g., a forest workers' group), consider making a presentation at the meeting periodically, perhaps every 1 to 6 months (depending on how often SB-RACD investigations are occurring), to describe aims, progress and challenges, and to seek input.

Step 4. Engage peer navigators

In some settings, it may be useful to directly engage the community in malaria surveillance through the recruitment of peer navigators – see [Box 8](#) for an example of their use.¹ These are identified members of the HRP who can participate in surveillance activities and help to ensure reactive case detection approaches are targeting the right individuals and locations, as well as improve community acceptability. The peer navigator approach has been used with substantial success for HIV surveillance.²

Box 8. Example of using peer navigators

Peer navigators who engaged in forest-based activities themselves were used to actively seek out HRPs in forested areas, rice fields, and other non-village sites, for focal testing and treatment in Champasak Province, Southern Laos. This strategy targeted both symptomatic and asymptomatic parasite reservoirs, with the aim of accelerating progress toward the 2030 national elimination goal.

1 Lover et al. Study protocol for a cluster-randomized split-plot design trial to assess the effectiveness of targeted active malaria case detection among high-risk populations in Southern Lao PDR. *Gates Open Res*, 2019 Dec 17;3:1730.

2 AIDS United, *Best Practices for Integrating Peer Navigators into HIV Models of Care*. Washington, DC. 2015

Component 2: Implement SB-RACD

Implementation of SB-RACD entails ensuring that all individuals suspected of malaria are parasitological diagnosed as per national guidelines. An individual who has a positive test result is defined as an index case. Recommended WHO malaria case definitions are provided in Box 9 below. Local surveillance definitions may also be considered.

Box 9. Case definitions for active elimination areas

Suspected malaria case

Illness suspected by a health worker to be due to malaria, generally on the basis of the presence of fever with or without other symptoms.

A suspected malaria case cannot be considered a malaria case until parasitological confirmation. Criteria must be established to define which patients attending health facilities (whether public or private) should be given a parasitological test. Common criteria include:

- all febrile patients from malaria foci, especially during the transmission season
- people with a history of malaria in the past 3 years and any increase in body temperature
- 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 *Plasmodium vivax*
- patients with fever, malaise and chills
- people with anaemia of unknown cause
- patients with hepatomegaly or splenomegaly (or both)
- recipients of blood donations who have fever during the 3 months after the transfusion.

Uncomplicated malaria case

Confirmed malaria case: Confirmed malaria case - Malaria case (or infection) in which the parasite has been detected via a diagnostic test, i.e. microscopy, a rapid diagnostic test or a molecular diagnostic test.

All persons with parasitaemia (including gameto-cythaemia only), regardless of the presence or absence of clinical symptoms.

- It is possible that some patients who test negative by microscopy or RDT have very low levels of parasitaemia that are detectable only by more sensitive techniques, such as polymerase chain reaction (PCR) testing. Microscopy or RDT might have to be repeated if no other source of fever is identified and the symptoms continue.
- Such low levels of parasitaemia are generally considered not to be clinically significant in most settings, and diagnostic testing with microscopy or RDT should allow adequate tracking of malaria trends.

Source: WHO, Malaria Surveillance, monitoring and Evaluation: A Reference Manual

Conduct Eligibility Screening

Designated health facility staff should screen the case to determine whether criteria for initiating SB-RACD are met.

Step 1. Assemble data collection forms

- Case Eligibility Screening Form ([Appendix 3](#))
- Interview Guide for identification of venues and contacts ([Appendix 4](#))
- Venue Pre-screening Form ([Appendix 5](#))
- Peer Referral Pre-screening Form ([Appendix 6](#))
- Worksite Tracking Form (VB-1) ([Appendix 7](#))
- Peer Network Contact Form (PR-1) ([Appendix 8](#))

Step 2. Conduct eligibility screening procedures

1. Assign a unique ID to the index case and record the ID on the Case Eligibility Screening Form (See [Appendix 9](#) for guidance on generating unique IDs).
2. Record the case's complete name and place of residence.
3. Review the patient's records to verify there is a positive malaria diagnosis.
4. Administer the screening questions ([Appendix 3](#)). The questions should be adapted to meet the specific eligibility criteria defined for SB-RACD.
5. If the case meets the eligibility criteria, administer informed consent and record the case's ID on the consent forms.
6. If the case does not provide consent, SB-RACD will not be conducted. Thank them for their time.

Step 2. Conduct procedures to gather information on venues

1. Using the questionnaire form in [Appendix 7](#), interview the case on all worksites where they have been in the past 60 days.
 - Complete one tracking form per worksite (form VB-1) and number the worksites consecutively (e.g., 1, 2, 3, etc.). A unique ID will be assigned later if eligible for SB-RACD.
 - Calculate the risk score for each site. The risk score is used to prioritize worksites, so that highest risk sites are considered first and lowest risk sites last. The risk score should be calculated by summing up the risk "points" listed next to specific responses as shown in [Figure 2](#).
2. Determine if the worksite is eligible for venue surveillance based on the items on the form. If the worksite is eligible, record the information below ([Box 10](#)) onto form VB-1.

Gather Information on Venues

Step 1. Assemble data collection forms

- Questionnaire on venues and contacts ([Appendix 4](#))
- Worksite Tracking Form (VB-1) ([Appendix 7](#))

Figure 2. How to calculate venue risk scores

Question	Response	Risk score
Were you bitten or bothered by mosquitoes at [place]?	Yes (2 points)	2
	No (0 points)	
Did you see any monkeys/macaques around [place]?	Yes, show pictures and specify (1 point)	1
	No (0 points)	
What did you do to protect yourself from mosquitoes while you worked at [place]?	<ul style="list-style-type: none"> • Chemoprophylaxis/Medicine • Bed net • Hammock net • Mosquito repellent or coil 	0 points if response is 1 – 4
	<ul style="list-style-type: none"> • Wearing covering clothes • Fire • Other, specify 	1 point if response is 5-7
Total risk score		4

Box 10. Information to be recorded on the worksite tracking form (VB-1)

- Risk score: The total summed risk score for the worksite.
- Worksite location/ address
- Venue type
- Venue official's name and phone
- Number of co-workers expected
- Index case's unique ID, name, and village of residence form

Gather Information on Co-worker Referrals

Step 1. Assemble data collection forms

- Questionnaire on venues and contacts ([Appendix 4](#))
- Peer Network Contact Tracking Form (PR-1) ([Appendix 8](#))

Step 2. Conduct procedure to gather information on contacts

1. If co-worker referrals are mentioned, record their names and contact information on form PR-1.
- Record the name and village of residence of each co-worker referral on the form.
- Record as many forms of contacting the referral as possible, such as phone numbers, primary or other addresses.
2. Record the index case's unique ID, name, and village of residence onto the VB-1 and PR-1 forms.
3. Calculate and record the deadline date for completing SB-RACD onto the VB-1 and PR-1 forms. The deadline is seven days from the diagnosis of the index case. After seven days, no further testing or interviewing of contacts should be conducted.

Pre-screen Worksites and Peer Network Contacts

SB-RACD staff should contact and pre-screen all worksites and individual co-worker referrals to determine whether to go forward with testing and interviews. When a worksite or referral passes

pre-screen, schedule the time, place and other details of a visit to conduct testing and brief interview. [Box 11](#) describes a strategy to maximize coverage.

Box 11. Maximizing coverage through venues and peer networks

SB-RACD field teams should conduct follow-up at all worksites and with all individual co-worker/peer referrals mentioned by the case in order to achieve as high coverage of potentially exposed contacts as possible.

All workers who work/ worked at any of the same worksites mentioned by the index case in the past 60 days, and who were there anytime between sundown and sunrise should be followed up.

Step 1. Pre-screen the venues

Pre-screen all worksites in order of risk score starting with those with the highest risk score. Use these data forms to conduct the pre-screening:

- Venue Contact Tracking Form (VB-2) ([Appendix 10](#))
- Venue Pre-screening Form ([Appendix 5](#))

Procedure for venue pre-screen:

1. The Local Coordinator should contact the venue official (owner, manager) to:
 - Describe the purpose of the SB-RACD active surveillance approach
 - Explain that participation is voluntary and confidential
 - Explain that SB-RACD will include a brief interview, free malaria testing, and treatment if the contact returns a positive test result
 - Emphasize that even if the contact does not feel ill now, testing is important because they worked at the same site as the index case
2. Complete the venue pre-screen form ([Appendix 5](#)) and find out the total number of workers expected at the site during the next seven days, including any support staff.
3. Verify other pre-screen criteria ([Box 12](#)).

Box 12. Venue pre-screen criteria

Schedule and conduct a venue investigation only when a worksite meets all of these criteria:

- A venue investigation has not been conducted at the site in the past 30 days
- At least 6 workers are expected to be present, including support staff
- The site is safe and accessible (or an alternative location can be arranged)*
- A venue official (owner, manager) grants permission (if applicable)
- The visit can be conducted within the dead-line (7 days from diagnosis of the index case)

*If the worksite is not safe or accessible to visit, but meets all other criteria, explore conducting the investigation at an alternative location, such as the employer's office in town or a processing plant, when most workers are likely to present. If conducting surveillance at an alternative location, be sure to only include workers from the targeted worksite.

4. Record whether the site passed the pre-screen on form VB-1. If not, record all reason code(s) on the form that apply.
5. Record the date and location of the scheduled visit on form VB-1.

A sample script for calling the venue officials and conducting pre-screen is in [Appendix 11](#).

Step 2. Pre-screen the peers

Pre-screen all co-worker referrals mentioned by the index cases using the following data collection forms:

- Peer Referral Pre-screening Form
- Peer Network Contact Tracking Form (PR-1)

Procedures for peer pre-screen:

1. Check whether the contact already participated in any SB-RACD investigation in the past 30 days by reviewing names of previous participants on past PR-1 and VB-2 forms. If someone with the same name and village is on these forms in the past 30 days, do not continue with pre-screen.
2. Call the contact by phone to conduct pre-screen and, if eligible, schedule a meeting.

3. If the contact is not reachable by phone, ask for help from the venue official, nurse or community leader to get in touch with the contact. Once on the call, describe the purpose of testing and the brief interview.

Complete the Peer Referral Pre-screening Form ([Appendix 6](#)) to determine if the contact meets pre-screen criteria (See [Box 13](#) for a list of criteria). Explain that participation is voluntary, confidential and includes a brief interview and free testing for malaria, with treatment if the contact returns a positive test result. Emphasize that even if the contact does not feel ill now, testing is important because they worked at the same site as the index case.

4. If the contact passes the pre-screen, schedule a time and place to meet that is convenient for the contact and where confidentiality can be ensured (e.g., the contact's home, a health facility, a confidential area at a coffee shop).
5. Emphasize that you will ask additional questions at the start of the meeting to confirm whether surveillance staff can provide free testing.
6. Record whether the contact passed the pre-screen on form PR-1. If not, record all reason code(s) on the form that apply.
7. Record the date and location of the scheduled visit on form PR-1.

Box 13. Peer pre-screen criteria

Schedule a meeting only when the co-worker referral meets all of these criteria:

- Age 15 or older
- Knows the index case by name
- Worked with the index case in the forest or forest fringe in the past 60 days
- Willing to meet for a brief interview, free malaria testing and treatment
- Can meet within the deadline (seven days from diagnosis of the index case)

Step 3. Use incentives to improve participation

In some settings where cases or contacts are hesitant to participate in SB-RACD, incentives may be provided to encourage participation. [Box 14](#) provides details on use of incentives.

Box 14. Using incentives to improve participation – key considerations

Reasons why individuals may be hesitant to participate in SB-RACD:

- Fear of blood draw
- Belief that a person who feels healthy doesn't need testing
- Suspicions of how the blood sample will be used (e.g., that testing is actually for illicit drug use or HIV)

Incentives can help overcome such barriers. They may be non-monetary—token gifts such as a malaria prevention item or items appreciated by the target population (e.g., a small flashlight for forest workers).

Incentives should be appealing enough to encourage participation without being so attractive that they lead to manipulation (i.e., referring friends who did not work at the same worksite in the time frame stipulated).

Use the formative assessment to identify potential barriers, and what types of incentives may be needed.

When incentives are used, consider adding “insider knowledge” questions to pre-screening. These are questions very specific to the setting and type of work used to determine whether the person truly belongs to the target population to guard against manipulation.

Interviewers should never reveal to contacts that they are being screened for eligibility or reveal the specific criteria.

Box 15. Summary of SB-RACD case procedures

Case procedure	Data collection tools required
Screen cases for eligibility	<ul style="list-style-type: none"> • Case eligibility screening form
Gather information on venues and peer contacts	<ul style="list-style-type: none"> • Questionnaire to identify venues and contacts • Work Site Form (VB1) • Peer Network Contact Tracking Form (PR-1)
Pre-screen worksites	<ul style="list-style-type: none"> • Venue pre-screen Form • Venue Contact Tracking Form (VB-2)
Pre-screen peer contacts	<ul style="list-style-type: none"> • Peer pre-screen Form • Peer Network Contact Tracking Form (PR-1)

Component 3: Conduct Follow-up at Venues and with Contacts

Venue Investigations

A venue investigation at an eligible worksite can be conducted as soon as a site passes pre-screen. If multiple worksites pass pre-screen, aim to visit highest-risk worksites first, based on the risk score assigned to the venue during the interview with the case. The team should complete testing and interviewing at all worksites (or alternative locations arranged with venue officials) within seven days of the date of diagnosis of the index case. Steps to conduct venue investigations are as follows:

Step 1. Prepare for the venue visit

The Local Coordinator should first fill out the top part of Venue Contact Tracking Form (VB-2) with details of the site and the index case. The second step is to make arrangements for the field staff (the Interviewer and Nurse/Lab Technician) to travel to the site and ensure the venue officials are aware of the visit.

Step 2. Conduct venue procedures

1. Introduction: Upon arrival at the site, the Local Coordinator should announce their arrival to the venue official.
2. Site preparation: The team should liaise with the venue officials to identify and set up a confidential area where contacts can be interviewed and blood samples taken with required level of privacy.
3. Invite participants: The Local Coordinator should work with the venue officials to identify all persons present at the site in order to invite all of them to participate. The objective is to achieve 100% coverage of all individuals present during the visit. Once a worker has agreed to discuss participation, the Local Coordinator should accompany the participant to the interview area.

Step 3. Complete procedures with each worker at the venue

1. Screen for eligibility: The Local Coordinator should then screen the participant for eligibility, using the first section of the brief interview Form for Contacts ([Appendix 7](#)).

2. Confirm eligibility: Confirm whether the participant has already participated in SB-RACD in the past 30 days. If so, do not conduct testing or interview again.

Note that, regardless of eligibility status, it is necessary to add the participant's details to the enrollment form VB-2 and circle the appropriate code (if not eligible).

1. Interview the participant: If the participant is eligible, administer the remaining sections of the brief interview. See [Appendix 13](#) for guidance on conducting brief interviews with participants.
2. Conduct testing: The Interviewer accompanies the participant to the testing area.
 - The Nurse/Lab Technician sets up the microscopy slide and DBS with the appropriate ID codes and forms
 - The Nurse/Lab Technician takes blood (finger prick) and prepares the slide and DBS samples (if applicable).
3. Provide treatment (if needed): If the participant has malaria symptoms, the Nurse/Lab Technician performs a RDT and provides treatment if positive.
4. Provide incentives/information material: The Local Coordinator gives the participant informational materials on malaria, an incentive (if applicable), records the participant signature in the logbook, and thanks the participant for their time.

Step 4. Conduct repeat visits if needed

If there are too many workers at the site to include during one visit, the team should consider making additional visits to include as many workers as possible within the seven-day time window.

Peer Investigations

The field team should meet with the peer referrals who pass the pre-screen within seven days of the date of diagnosis of the index case to complete testing and the brief interview. The following steps should be taken:

Step 1. Travel to the meeting location

1. The Interviewer and the Nurse/Lab Technician should travel to the agreed upon meeting point. For safety, it is important that at least two team members are present.
2. The team should arrive 15 to 30 minutes early to set up the place and ensure conditions for confidentiality.

Step 2. Confirm eligibility

1. Once the contact arrives, the Interviewer should screen for eligibility using the first section of the brief interview questionnaire (Appendix 7) even if the contact already passed pre-screen by phone.

Confirm that the participant has not already participated in SB-RACD in the past 30 days (See Box 16). If the participant is not eligible, thank them for their time and end the visit.

Step 3. Conduct the interview and blood sample collection

1. If the participant is eligible, the Interviewer conducts the brief interview. For guidance on best practices for interviewing, see Appendix 13.
2. The Nurse/Lab Technician sets up the microscopy slide and DBS (if applicable) with the appropriate forms.
3. The Nurse/Lab Technician takes blood (finger prick) and prepares the slide and DBS samples (if applicable).

Step 4. Wrap up

1. The Interviewer gives informational materials on malaria and incentive (if applicable), has the participant sign the incentive log and thanks them for their time.

The key steps to conducting SB-RACD investigations are summarized in Figure 3.

Box 16. Detecting repeat participation within 30 days

As part of the eligibility section of the brief interview, when an individual says they already participated in the past 30 days, the Interviewer should ask additional questions to determine if the person:

- Was actually tested for malaria and/or interviewed as a part of SB-RACD in the past 30 days.
- Was an index case or contact.

Follow these guidelines to avoid collecting data that are unlikely to lead to new cases or provide new information:

1. An index case who is later encountered as part of SB-RACD should not be tested or interviewed again within 30 days.
2. A contact who is tested and/or interviewed as a part of SB-RACD:

»» Should not be tested or interviewed again as a part of the same or any other SB-RACD investigation, within 30 days.

»» Should be considered as a potential index case if he/she presents to a health facility with malaria later.

Figure 3. Key steps to carry out SB-RACD investigations

Venue investigation	
Before venue investigations	<ul style="list-style-type: none"> • Contact venue owner/manager • Prepare materials
At a venue investigation	<ul style="list-style-type: none"> • Introduction to venue owner/manager • Ensure conditions at venue are safe to conduct the survey • Set up interview area • Determine intercept strategy (list of workers or designate intercept areas or lines) • Approach potential participants • Intercept potential participants • Forward contact to interview area

Venue and peer investigations	
Each contact	<ul style="list-style-type: none"> • Check eligibility status • Create contact ID • Administer informed consent • Administer the questionnaire • Take blood samples • Create slides and DBS • Perform rapid diagnostic test • If malaria positive, administer treatment and provide referral if applicable • Provide prevention materials and incentives (if applicable) and thank contact
After each investigation	<ul style="list-style-type: none"> • Debrief meeting with field staff • Review all records of each contact • Store all forms, documents, and test results in a secure, restricted-access location if using electronic data capture (e.g., tablets): <ul style="list-style-type: none"> » Make a backup copy of all electronic files (tracking forms, interviews) » Send data files to data manager (within 24 hours of the investigation)
Weekly or monthly	SB-RACD coordinator and field team meet to review plans, progress and lessons learned

Specimen Collection, Testing, and Treatment

Adapt local laboratory procedures for specimen collection, testing, and treatment. [Appendix 14](#) provides safety procedures for data and specimen collection, and [Appendix 15](#) provides a standard operating procedure for sample collection and storage. Consider procedures for storage and transport of specimens and quality assurance measures. Furthermore, consider providing referrals to appropriate health facilities for any positive contacts, treatment on-site for any RDT-positive contacts, and conducting a follow-up visit to provide results, treatment and referral to any slide- or PCR/LAMP-positive contacts.

Monitoring and Supervision

Monitoring and supervision of all aspects of SB-RACD, including case procedures and contact tracing, are critical to ensure that the strategy is being carried out as planned and to solve any unexpected problems.

Debrief sessions

The Local Coordinator and field team should meet briefly after each venue investigation/meeting with referral to review the data collected and discuss any matters of concern arising from the visit. The brief meetings are a good opportunity to plan the subsequent visits, check inventory of supplies, equipment, and other data collection materials. Issues that should be escalated to the SB-RACD coordinator should be identified and feedback provided on previous communication.

In addition, the Local Coordinator should:

- Observe 10% of all interviews with cases and contacts, including consent (if applicable) and recording (or data entry) of responses
- Review all forms from cases and contacts for consistency and completeness
- Prepare a weekly report to track monthly and cumulative figures. [Figure 4](#) shows the data that should be included in the SB-RACD monthly report.

The SB-RACD team lead, Local Coordinators and field teams should meet monthly to discuss goals, progress reports, modifications, data issues, confidentiality and other issues of project concern. Any instances of deviations from the standard operating procedures or other problems identified during the meetings should be addressed. In settings where there are three or more investigations per week, weekly meetings should be considered.

Figure 4. Sample data to include in monthly SB-RACD report

	Past month		Cumulative	
	No.	Percent	No.	Percent
Case procedures				
Index cases found eligible				
Eligible index cases who participated				
Worksites identified by cases				
Referrals provided by cases				
Venue surveillance				
Worksites pre-screened within the deadline within the deadline				
Worksites that passed pre-screen				
Worksites that were visited within the deadline				
Workers present at the worksite during the visit				
Workers present who were found eligible				
Eligible workers who were tested				
Eligible workers who were interviewed				
Tested workers who were found to have malaria				
Workers with malaria who were provided treatment				
Reasons worksites were not eligible				
Peer network surveillance				
Referrals pre-screened within the deadline				
Referrals that passed pre-screen				
List of reasons why referrals were not eligible				
Eligible referrals who were tested				
Eligible referrals who were interviewed				
Tested referrals who were found to have malaria				
Referrals with malaria who were provided treatment				
Reasons referrals were not eligible:				
Observations				
Incidents in the field and resolution				
Suggestions for improving the strategy				

Component 4: Data Management, Analysis and Use

Data Management

The designated Interviewers should review all the relevant data collection forms for each peer referral and venue contact to ensure they are completed appropriately. The Interviewer should recheck the case and venue IDs to ensure they are appropriately assigned to allow the data to be linked to the respective index cases, venue and health facility. The Nurse/Lab Technician should ensure the blood samples are prepared as per the standard operating procedures and labeled with the correct IDs to allow the results to be linked appropriately.

The data collection forms and blood samples should be handed over to the Local Coordinator to recheck before syncing the data to the SB-RACD server or entering into the database (if using paper forms). The Local Coordinator then sends all the data files to the data manager for further cleaning and analysis. The Local Coordinator ships the laboratory samples to the SB-RACD reference laboratory for analysis.

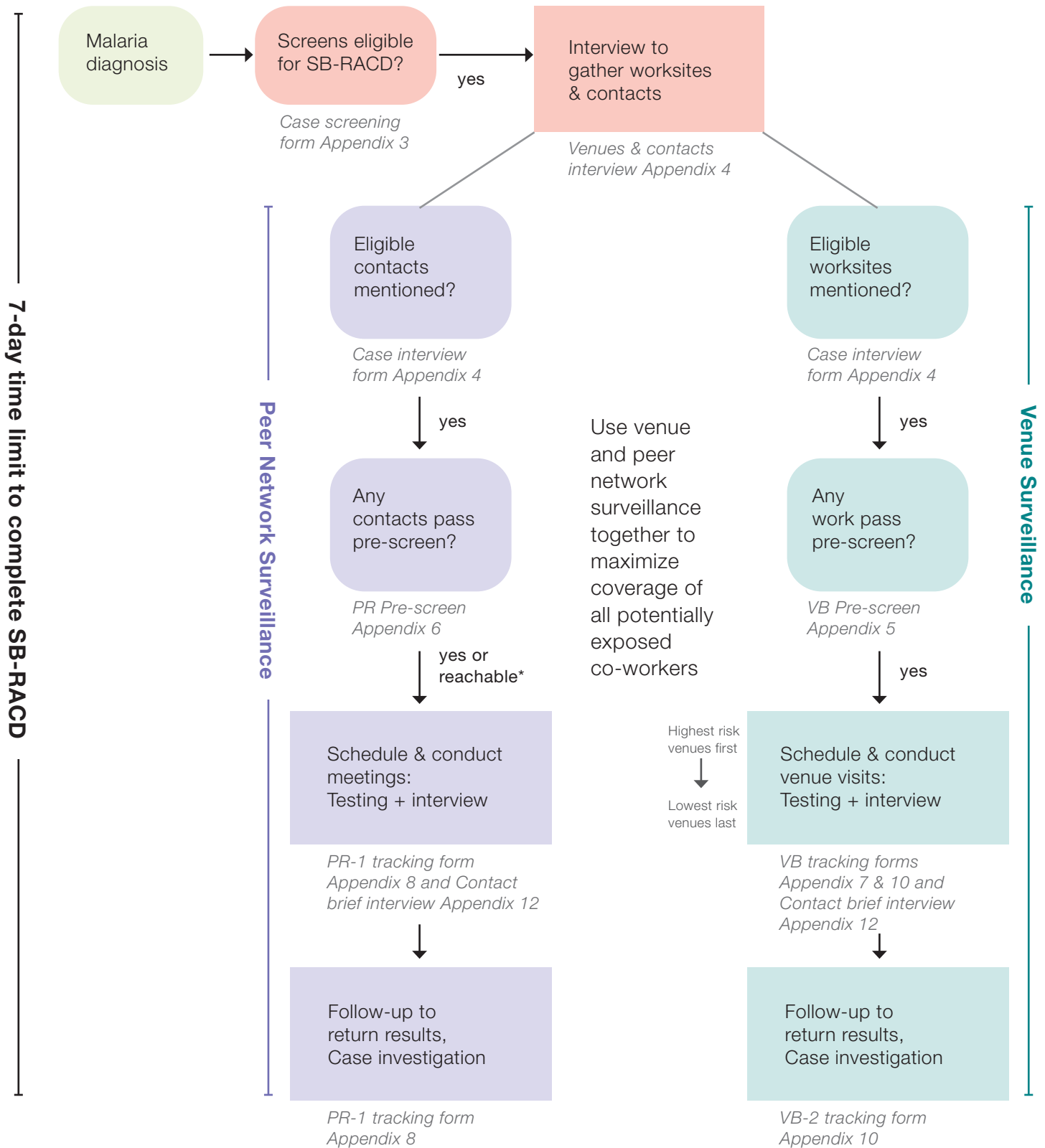
Data Analysis

An efficient reporting system should be established to enable automated analysis of key SB-RACD data to generate information for programming. More detailed analysis should be conducted at regular intervals to assess trends, high-risk occupations and behaviors, prevention, treatment-seeking and profile of index cases and symptomatic and asymptomatic contacts detected through the SB-RACD. Analysis should determine the extent of importation of malaria attributable to particular HRPs and the risk they pose to elimination. Locations and venues where most of the symptomatic and asymptomatic cases are detected should be identified from the data and mapped. Additional analysis should seek to establish possible risk factors attributable to detected cases.

Data Use for Programming

Risk factors and profiles of the detected cases should inform design of appropriate and targeted response strategies. For example, if cases are attributable to night-time outdoor activities, response strategies could be designed around preventive measures such as use of personal mosquito repellants rather than household-based interventions like bed nets and IRS. If detected cases are found to be common among migrants with little or no knowledge about malaria, health messages can be designed to target the identified HRPs, such as messages delivered in the language of the migrant groups. If poor access to treatment is a risk factor, interventions around improved access such as mobile clinics and use of community health workers to deliver testing and treatment could be designed. If costs are a barrier to accessing care, health financing interventions such as health insurance for low-income population groups could be designed. If majority of the cases are imported, this may inform design of cross-border intervention strategies. The SB-RACD surveillance system can be used to assess implementation of the targeted interventions by monitoring trends in number of detected cases.

Appendix 1: SB-RACD Flowchart



*PR contacts unreachable by phone should be visited at home or at other known locations

Appendix 2: Checklist of Supplies for SB-RACD Investigations

- Information from the Immediate Health Facility Notification Log for Malaria Cases and Controls
- Consent forms for Socio-behavioral RACD
- Backpack
- Tablet
- Tablet charger
- Paper copies of questionnaires
- Slides and slide-box
- Dried Blood Spot (DBS) cards
- 250uL microtainers
- 3mL EDTA vacutainers
- Gloves
- Alcohol swabs
- Lancets
- Syringes
- Butterfly needles
- Cotton or gauze
- Biohazard plastic bag (red)
- Plastic bag for other trash (black)
- Sharps container

- Coolbox with frozen gelpacks
- RACD barcodes
- Pencils, pens, and permanent markers (sharpies)
- Backup paper questionnaires
- Clear plastic zip bags for samples
- Drying racks for slides and DBS
- Vouchers

If the field team needs to stay overnight at worksite:

- Tent
- Malaria protection equipment (bednet, coils, spray)
- Food/water
- Flashlights

Appendix 3: Case Eligibility Screening Form

- Follow steps 1-3 below to determine if a malaria case is eligible to participate in SB-RACD.
- If the case is not eligible for SB-RACD, record the corresponding code on the SB-RACD case log.

Name:

Village/town/city of residence:

	Eligible	Ineligible (code)
Step 1. Review the individual's malaria test result		
A. Does the individual have a positive malaria diagnosis by RDT, microscopy, or LAMP?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (D)
Step 2. Ask the individual the following questions:		
B. What is your age?	<input type="checkbox"/> 15 or older	<input type="checkbox"/> 14 or younger (A)
C. In the past 60 days, did you work at any place that is in the forest or forest fringe?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (W)
D. In the past 60 days, were you at any of these places anytime between sundown and sunrise, either working or sleeping?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (W)
Step 3. If the individual passes all of the above eligibility criteria, administer informed consent:		
E. Did the case consent to participate in SB-RACD?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (R)

Appendix 4: Interview Guide for Identification of Venues and Contacts

Instructions: Conduct this interview with index cases that have screened eligible for SB-RACD.

- Fill out the table for each worksite mentioned. For example, if the case mentions 3 worksites you should fill in 3 tables, one for each site.
- Use question #24 to determine if the venue/ worksite is eligible to proceed to venue pre-screen.
- If so, calculate the total risk score for the worksite (question #25) by summing up the numbers in the last column.
- If the case mentions any co-worker referrals (question #26), record contact information (names, phone numbers, etc.) on form PR-1.
- After completing the interview with the case, move on to the next step: pre-screen worksites and co-worker referrals.

Case Name: _____ **Case ID:** _____

“Think about all of the places where you worked in the forest or forest fringe in the past 60 days between sundown and sunrise. I will ask you about each of these places, beginning with the worksite where you worked most recently.”

Worksite # _____ (use consecutive numbering: 1, 2, 3, etc.)

#	Question	Record response	Enter points for risk score (Gray cells only)
1	Name of worksite If the worksite doesn't have a name, think of a memorable detail to distinguish it from other places where you worked, such as "mining site by river" or "logging site deep forest"		
	Where is this worksite located?		
2	Country		
3	Province		
4	District		
5	Sub-district		
6	Nearest village		
7	What kinds of transport did you take to get to [PLACE] from the nearest village?	1. By foot/walked 2. By motorcycle/moped (2-3 wheel vehicle) 3. By car/truck (4 or more wheel vehicle) 4. Other, specify: _____	
8	How long did it take you travel to [PLACE] from the nearest village?	____ days OR ____ hours OR ____ min	

9	How many nights did you spend at [PLACE] in the last 60 days?		
10	When was the last time you were at [PLACE] between sundown and sunrise?	___/___/_____	
11	What is the main kind of work that is done at [PLACE]?	1. Logging 2. Mining 3. Farming or plantation work 4. Cattle raising or breeding 6. Hunting 7. Fishing 8. Other, specify: _____	
12	Is this worksite managed by an employer?	1. Yes 0. No	
13	How far is [PLACE] to the nearest road (in kilometers)?	_____Number	
14	Were you bitten or bothered by mosquitos at the place where you did work at [PLACE]?	1. Yes (2 points) 0. No (0 points)	
15	Did you see any monkeys/macaques around the place where you did work at [PLACE]?	1. Yes, show the pictures and specify (1 point) 0. No (0 points)	
16	What, if anything, did you do to protect yourself from mosquitos while you WORKED at [PLACE]? Record whatever the participant says, even if you do not believe it helps prevent malaria.	1. Chemoprophylaxis/ Medicine Specify: _____ 2. Bed net 3. Hammock net 4. Mosquito repellent or coil	0 points if response is 1–4
		5. Wearing covering clothes 6. Fire 7. Other, specify _____ 8. Nothing	1 point if response is 5–8
17	Did you sleep while in [PLACE]?	1. Yes 0. No	
18	Where did you sleep while in [PLACE]?	1. In a hammock tied to a tree 2. Tent 3. Plastic makeshift tent	2 points if not a structure (responses 1–3)
		4. Hut 5. Barracks 6. House 7. Other, specify: _____	0 points if a structure (responses 4–6)
19	Were you bitten by mosquitos in the place where you SLEPT while in [PLACE]?	1. Yes (2 points) 0. No (0 points)	

20	What, if anything, did you do to protect yourself from mosquitos while you SLEPT at [PLACE]? Record whatever the participant says, even if you do not believe it helps prevent malaria.	1. Chemoprophylaxis/ Medicine Specify: _____ 2. Bed net 3. Hammock net 4. Mosquito repellent or coil	0 points if an effective method (responses 1–4)	
		5. Wearing covering clothes 6. Fire 7. Other, specify _____ 8. Nothing	1 point if not an effective method (responses 5–8)	
21	How many other people typically slept in the same structure with you or near where you slept while in [PLACE]?	Number of people: _____		
22	Do you think anyone is working at [PLACE] now or will be sometime in the next 7 days?	1. Yes, now (venue eligible) 2. Yes, in the next 7 days (venue eligible)		
	If within next 7 days, ask when	2a. When: _____ 0. No, site is not active (not venue eligible)		
23	How many people typically work at [PLACE] at one time?	Number of people: _____ (Must be ≥6)		
24	Eligible to conduct venue pre-screen? Yes, only if all of the following are true: <ul style="list-style-type: none"> Place is located in [SB-RACD Area] People are expected to be working there now or in the next 7 days (#22 =1 or 2) There are typically at least 6 people working there (#26 ≥ 6) 	1. Yes 0. No		
25	If eligible to conduct Venue pre-screen, SUM UP RISK SCORE:			Risk score total:

Peer Network Surveillance

26	How many other people do you know by name who have worked at [PLACE] in the past 60 days and who live in [Name of SB-RACD area]?	Number of co-worker referrals: _____ Record contact information on form PR-1 for all co-workers mentioned.
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Appendix 5: Venue Pre-screening Form

- Pre-screen each worksite mentioned by the case by following the steps below.
- If the venue fails pre-screen, record the corresponding code on form VB-1.

	Passes pre-screen	Fails pre-screen (code)
Step 1. Review SB-RACD records to determine:		
A. Has an investigation already been conducted at the venue in the past 30 days?	<input type="checkbox"/> No	<input type="checkbox"/> Yes (P)
Step 2. Contact venue officials (owner, manager) to determine the following. If there are no officials or they are not available, contact peer referrals or community leader:		
B. Is the venue accessible and safe to conduct an investigation?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (A)
C. If not safe or accessible, can an alternate location be arranged in the next 7 days?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (A)
The venue passes Step 2 if either B or C are Yes.		
Step 3. If the venue passes Steps 1 and 2, continue to the questions below:		
D. Will at least 6 workers be at the site (or alternative location) during the next 7 days?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (E)
E. Does the venue official provide permission (if applicable)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (R)
Step 4. Result of pre-screen. Does the venue pass Steps 1, 2 and 3?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Appendix 6: Peer Referral Pre-screening Form

- To pre-screen each co-worker referral mentioned by the index case follow the steps below.
- If the contact passes pre-screen, schedule a meeting to do testing and the brief interview.
- If the contact fails pre-screen, record the corresponding code on form PR-1.
- If the contact cannot be reached by phone, try to approach him/her at the household or other known location.

	Passes pre-screen	Fails pre-screen (code)
Step 1. Ask the contact the following questions:		
A. In the past 30 days, did anyone ask to interview you and test you for malaria? If yes, follow up to determine: did this person really participate in an SB-RACD investigation in the past 30 days?	<input type="checkbox"/> No	<input type="checkbox"/> Yes (P)
B. What is your age?	<input type="checkbox"/> 15 or older	<input type="checkbox"/> 14 or younger (A)
C. Do you know [name of index case]?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (C)
D. In the past 60 days, did you work with [name of index case] at any place that is in the forest or forest fringe?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (W)
E. In the past 60 days, were you at any of these places anytime between sundown and sunrise, either working or sleeping?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (W)
Step 2. If the contact passes all questions in Step 1, continue to ask:		
F. Does the contact agree to meet to be tested for malaria and complete a brief interview?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (R)
Step 3. Result of pre-screen. Does the contact pass all questions above?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Appendix 7: Worksite Tracking Form (VB-1)

Health Facility: _____ Index Case: ID _____ Name _____
 Village _____

Date case diagnosed: ___/___/___ Deadline for SB-RACD follow-up (7 days after diagnosis): ___/___/___

Worksites

Instructions: 1) List all worksites mentioned by case, highest risk score first. 2) Conduct pre-screen. 3) Schedule and conduct investigation(s), highest risk first.

Venue ID	Risk score	Location/address	Venue type (code) ¹	Venue officials Name & phone	# workers expected	Passed pre-screen? ²	Investigation(s) scheduled and completed
						<input type="checkbox"/> Yes <input type="checkbox"/> No Code: __	1. scheduled ___/___/___ completed ___/___/___ #tested: ___ 2. 3. Investigation conducted at: <input type="checkbox"/> worksite <input type="checkbox"/> alternative location <input type="checkbox"/> Not conducted. ³ Code: _____
						<input type="checkbox"/> Yes <input type="checkbox"/> No Code: __	1. scheduled ___/___/___ completed ___/___/___ #tested: ___ 2. 3. Investigation conducted at: <input type="checkbox"/> worksite <input type="checkbox"/> alternative location <input type="checkbox"/> Not conducted. Code: ³ _____
						<input type="checkbox"/> Yes <input type="checkbox"/> No Code: __	1. scheduled ___/___/___ completed ___/___/___ #tested: ___ 2. 3. Investigation conducted at: <input type="checkbox"/> worksite <input type="checkbox"/> alternative location <input type="checkbox"/> Not conducted. Code: ³ _____

1 Worksite type: M=mine; L=logging; A=agriculture (farm or plantation); C=cattle; O=other (Specify)

2 Failed pre-screen codes: P=SB-RACD already conducted in past 30 days; A=Inaccessible or unsafe; R=venue refused (could not arrange alternate location); E=< 6 workers expected;

3 Did not conduct visit codes: F=could not find location; W=no workers present/available during visit O=other (Specify)

Appendix 8: Peer Network Contact Tracking Form (PR-1)

Health Facility: _____ Index Case: ID _____ Name _____
 Village _____

Date case diagnosed: ____/____/____ Deadline for SB-RACD follow-up (7 days after diagnosis): ____/____/____

Co-workers Contacts

Instructions: 1) List all co-workers mentioned by case. 2) Contact co-worker to conduct pre-screen. 3) Schedule and conduct peer investigation.

#	Co-worker referral information			Steps during 1st encounter				Lab & follow-up			
	Name & phone	Village of residence (other ways to contact)	Passed pre-screen?	Meeting dates	Parti- pant ID assigned	Brief interview	RDT	Tx provided	Slide	LAMP	Tx provided
1			<input type="checkbox"/> Yes <input type="checkbox"/> No: code ____	Scheduled ____/____/____ Location: ____ Completed ____/____/____		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
2			<input type="checkbox"/> Yes <input type="checkbox"/> No: code ____	Scheduled ____/____/____ Location: ____ Completed ____/____/____		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
3			<input type="checkbox"/> Yes <input type="checkbox"/> No: code ____	Scheduled ____/____/____ Location: ____ Completed ____/____/____		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
4			<input type="checkbox"/> Yes <input type="checkbox"/> No: code ____	Scheduled ____/____/____ Location: ____ Completed ____/____/____		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
5			<input type="checkbox"/> Yes <input type="checkbox"/> No: code ____	Scheduled ____/____/____ Location: ____ Completed ____/____/____		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
6			<input type="checkbox"/> Yes <input type="checkbox"/> No: code ____	Scheduled ____/____/____ Location: ____ Completed ____/____/____		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
7			<input type="checkbox"/> Yes <input type="checkbox"/> No: code ____	Scheduled ____/____/____ Location: ____ Completed ____/____/____		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>

Appendix 9: Unique Identifiers

Unique identifiers facilitate analysis and verification of surveillance data and monitoring of results and outcomes.

Case ID

Each index case should be assigned an ID that identifies the health facility of diagnosis and a consecutive number assigned to each case at that facility. The ID is not unique to the individual: if the same person returns with a new diagnosis after a few months, he/she will receive a new consecutive number. The case ID will be linked to all worksites and contacts who are tested and/or interviewed in response to the SB-RACD investigation triggered by the case.

Box 4. Detecting repeat participation within 30 days

As part of the eligibility section of the brief interview, when an individual says they already participated in the past 30 days, the Interviewer should ask additional questions to determine if the person:

- Was actually tested for malaria and/or interviewed as a part of SB-RACD in the past 30 days (and not thinking of something else that may have happened to them)
- Was an index case or contact

Follow these guidelines to avoid collecting data that are unlikely to lead to new cases or provide new information:

1. An index case who is later encountered as part of SB-RACD should not be tested or interviewed again within 30 days.
2. A contact who is tested and/or interviewed as a part of SB-RACD:
 - » Should not be tested or interviewed again as a part of the same or any other SB-RACD investigation, within 30 days.
 - » Should be considered as a potential index case if he/she presents to a health facility with malaria later.

Health Facility	Consecutive number for cases at the facility	Case ID
A	1	CA001
A	2	CA002
B	1	CB001
B	2	CB002
B	3	CB003

Venue ID

Each worksite (venue) should be assigned a venue ID that reflects the location (in terms of the health facility catchment area). A venue should receive only one ID that does not change even if the same venue is mentioned by different cases.

Examples of venue ID codes:

Health facility (catchment area)	Venue consecutive number	Venue ID
A	1	VA1
A	2	VA2
B	1	VB1
B	2	VB2
B	3	VB3

For instance:

- VA1 represents the 1st venue identified in the catchment area of health facility A
- VA2 represents the 2nd venue identified in the catchment area of health facility A
- VB3 represents the 3rd venue identified in the catchment area of health facility B

Venue Investigation ID

Each venue should be assigned an ID that reflects the case that triggered the investigation and the specific venue. The investigation ID is different from the venue ID because there might be several investigations at the same venue.

Examples of investigation ID codes:

Case ID	Venue ID	Investigation ID
CA001	VA1	CA001.VA1
CA001	VB2	CA001.VB2
CA002	VA1	CA002.VA1
CA002	VA2	CA002.VA2
CA002	VB3	CA002.VB3

For instance:

- CA001.VA1 is the venue investigation that was triggered by case CA001 at the 1st venue in catchment area A.
- CA001.VB2 is the venue investigation that was triggered by case CA001 (the same case as above) at the 2nd venue in catchment area B. Note the catchment area where the case was diagnosed can be different from the catchment area of the venue. In this instance, the case was diagnosed at health facility A and reported working at a worksite located in the catchment area of health facility B.
- CA002.VA1 is the venue investigation that was triggered by case CA002 at the 1st venue in catchment area A. Note this is the same worksite where case CA001 triggered an investigation; thus both cases (CA001 and CA002) reported work at the same worksite, triggering two investigations at that same site.

Venue Contact ID

Each contact who is tested and/or interviewed during a venue investigation should be assigned an ID that reflects the investigation ID, which in turn identifies the case that triggered the investigation and the venue where screening took place. This ID does not uniquely identify the individual; the same worker who is encountered at two different worksites will get assigned two different IDs.

However, the worker ID does allow testing and interview data to be linked; and allows these data to be linked with data from the case and with other data from the same venue. These linkages are important to support analysis.

This kind of ID supports confidentiality because it does not contain the individual person's name or other identifying information. However, the person's name appears on the tracking form so that positive test results can be returned to the right person and that person can be offered treatment.

Investigation ID	Worker tested/ interviewed at the investigation	Worker ID
CA001.VA1	1	CA001.VA1.1
CA001.VA1	2	CA001.VA1.2
CA001.VA1	3	CA001.VA1.3
CA001.VA1	4	CA001.VA1.4
CA002.VA2	1	CA002.VA2.1
CA002.VA2	2	CA002.VA2.2
CA002.VA2	3	CA002.VA2.3

For instance:

- CA001.VA1.3 represents the 3rd worker tested or in-interviewed at investigation CA001.VA1; from the work-er ID, it is clear that this worker was encountered at venue VA1, the first venue in health facility A's catch-ment area; and the case that triggered the investigation was CA001, the first case at health facility A.

Peer referral ID

Each referral tested or interviewed as part of peer network surveillance should be assigned an ID which reflects the index case that triggered the investigation. This ID does not uniquely identify the individual; the same person who is referred by two different cases will get assigned two different IDs. Also, the same person traced through peer network surveillance could also be encountered at a venue, in which case he/she would get assigned a referral ID and a worker ID that are different.

Case ID	Referral consecutive number	Referral ID
CA001	1	CA001.1
CA001	2	CA001.2
CA002	1	CA002.1
CA002	2	CA002.2
CA002	3	CA002.3

For instance:

- CA001.1 is the 1st referral to be referred by case CA001 (the 1st case at health facility A)
- CA002.3 is the 3rd referral to be referred by case CA002 (the 2nd case at health facility A)

Appendix 10: Venue Contact Tracking Form (VB-2)

Venue ID _____ Index case ID _____ Investigation ID _____

#	Worker information			Steps during 1st encounter				Lab & follow-up			
	Date	Name	Age	Eligible	Participant ID assigned	Brief interview	RDT	Tx provided	Slide	LAMP	Tx provided
1				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
2				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
3				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
4				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
5				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
6				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
7				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
8				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
9				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
10				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
11				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
12				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
13				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
14				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>
15				<input type="checkbox"/> Yes <input type="checkbox"/> No: code__		<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/> + <input type="checkbox"/> -	<input type="checkbox"/>

Individuals who already participated in SB-RACD in past 30 days: Fill out Worker Info section only - Do not test/interview - Fill out Previous Participation Form. Eligibility codes: P=participated in past 30 days; A=age<15 years; W=does not meet worker or "sundown-to-sunrise" criteria; R=refused.

Appendix 11: Script for Contacting Venue Officials for Pre-screening

1. *Check records to determine if venue has already been conducted at this site in the past 30 days. If so, do not continue with Pre-Screen. If unsure, contact venue officials to confirm.*
2. Hello, my name is _____ from **[name of health facility]** in **[name of district/locale]**. I am calling you because we recently had a case of confirmed malaria in a patient who says he/she worked at one of your forest worksites. This health facility is part of a malaria control strategy for forest workers, in coordination with the **[name of local health authority, i.e., district health office]**, to understand more about malaria in this area. As a part of this strategy, we are coordinating with forest worksites to provide free malaria testing and treatment to all workers at worksites linked to new cases, even if they are not sick now, because many people with malaria do not have symptoms. This involves a brief interview with forest workers at the worksite to help us understand forest malaria. May I please ask you a few questions to help us decide about conducting testing at your worksite?
3. First, can you please clarify your position or role at **[name of worksite]**?
4. The patient said the worksite was **[name of worksite]** at [location of worksite] and the type of work is **[type of worksite]**. Is this correct?
5. Has a health facility already tested workers from this worksite? *[If so, gather more information to confirm if it was in the past 30 days. If venue surveillance was not done in the past 30 days, continue.]*
6. Will there be people working at this site between now and **[deadline date for SB-RACD]**? *[If so, continue.]*
7. Approximately how many people will be working at this site between now and **[deadline date for SB-RACD]**? Please count anyone working there, even support staff such as cooks, drivers and assistants. *[Record number on Form VB-1. If 6 or more, continue.]*
8. With your permission, we will send a health team to your worksite as soon as possible to offer a free malaria test and conduct a brief interview with all workers present at the site during the team's visit, whether healthy or sick. This will last about 45 minutes with each worker. The purpose of the interview is to understand malaria risk at home and worksites. Free treatment will be provided if a worker is found to have malaria. The team may need to visit more than once to include all workers. But testing must be done before **[deadline date for SB-RACD]**. Can you tell me how we can get to your worksite and if it would be safe?
9. ***If not safe:*** I understand it will not be safe for us to travel to the worksite. However, is there another place where we can test and interview the workers, such as a camp where they sleep or an office where they usually meet away from the worksite? Our goal is to test and interview as many workers as possible before **[deadline date for SB-RACD]**.
10. What are the days and times when will we be able to reach the most workers? *[Continue scheduling and coordinating details. Record details on Form VB-1.]*

Closing statement if not eligible:

Thank you for speaking with me. We are unable to conduct malaria surveillance at this worksite at this time, because of our standard procedures about where surveillance should be conducted. We appreciate your cooperation. Sometime in the future we may contact you again if another patient mentions previous work for you.

Appendix 12: Brief Interview Form for Contacts

Section 0. Identifiers			Skip pattern
1	Date of interview	DD / MM / YYYY	
2	Index case ID		
3	Worksite ID (venue surveillance only)		
4	Name of participant		
5	Participant ID		
Section 1. Eligibility screen			
6	What is the month and year of your birth?	MM / YYYY	
Peers only			
7	Do you know [index case's name]?	1. Yes 0. No	
8	In the past 60 days, did you work with [index case's name] at any place that is in the forest or forest fringe?	1. Yes 0. No	
9	In the past 60 days, were you at any of these places anytime between sundown and sunrise, either working or sleeping?	1. Yes 0. No	
Venue only			
10	Are you working here at [name of worksite] now or have you worked here in the past 60 days?	1. Yes 0. No	
11	In the past 60 days, have you been here at [name of worksite] anytime between sundown and sunrise, either working or sleeping?	1. Yes 0. No	
All participants			
12	Administer Informed Consent Participant provided informed consent?	1. Yes 0. No	
13	Please tell us your reasons for not giving consent. (select all that apply) Do not prompt.	1. Too busy / no time 2. Afraid of needles or giving blood 3. Worried about confidentiality or privacy 4. Don't want to be tested for malaria 5. Other (specify: _____)	
Eligibility criteria			
All participants must:			
<ul style="list-style-type: none"> • be aged 15 years or older • provide informed consent (Q7=yes) 			
Also:			
<ul style="list-style-type: none"> • Peer network participants must respond Yes to questions 2,3 and 4 • Venue participants must respond Yes to questions 5 and 6 			
14	Is respondent eligible by these criteria?	1. Yes 0. No	If no, thank respondent and end interview

Section 2. Demographics			
15	Participant gender	1. Female 2. Male 3. Other (specify: _____)	
16	What countries are you a citizen of?	1. [Insert country presently in] 2. [Insert common travel or malaria-endemic destinations] 3. Other (specify: _____)	
17	Where is your main place of residence, where you maintain a household and usually live?	List: Province District Sub-district Village	
18	How long have you lived at this residence?	1. Less than 3 months 2. 3-6 months 3. 6 months – 1 year 4. 1 year or more	
19	What is the highest level of education that you have attended or completed?	1. No education 2. Elementary/primary school 3. Junior high school 4. Senior high school 5. Higher than senior high school	
20	What is your main occupation or income generating activity?	1. Professional/technical/managerial 2. Teacher 3. Small business/retail 4. Government staff 5. Factory labourer 6. Logger 7. Miner 9. Farmer 10. Plantation worker 11. Cattle breeder 12. Fisherman 13. Military personnel 14. Forest ranger 15. Police 16. Construction 17. Other: specify: _____	
Section 3. Malaria history			
21	Have you been ill with fever at any time in the past 6 months?	1. Yes 0. No	->NEXT SECTION
22	Have you been ill with fever at any time in the past 2 weeks?	1. Yes 0. No	

23	The last time you had fever, did you seek advice or treatment for the illness from any source?	1. Yes 0. No	->Q7
24	The last time you had fever, where did you seek advice or treatment from? Select all that apply Anywhere else? PROBE TO IDENTIFY EACH SOURCE	1. Pharmacy 2. Health center 3. Private clinic 4. Private nurse/midwife (home-based) 5. Traditional healer 6. Public hospital 7. Private hospital/laboratory 8. In the home only 9. Other: specify	
25	What treatment, if any, did you receive?	1. DHA/Pip 2. Chloroquine 3. Quinine by mouth 4. IV Quinine 5. Primaquine (1 day) 6. Primaquine (14 days) 7. Artesunate amodiaquin 8. Artesunate mono 9. Sulfadoxin pyrimethamin 10. Other (specify) 11. Received treatment, but don't know what kind 12. No treatment received	If no treatment, skip to Q8
26	Did you complete that treatment?	1. Yes 0. No	
27	The last time you had fever, did you receive a blood test for malaria?	1. Yes 0. No	If no, skip to Q9
28	Were you diagnosed with malaria?	1. Yes 0. No 88. Don't know	
29	Why didn't you receive a blood test for malaria the last time you had fever? Tick all that apply.	1. Could not get permission to go for care 2. Cost of medical consult too expensive 3. Cost of testing too expensive 4. Cost of treatment too expensive 5. Health facility too far / transport too expensive 6. Not able to travel alone 7. Did not know where to go for testing 8. Did not trust health providers 9. Did not trust malaria testing 10. Did not think testing was necessary 11. Other: specify	

Section 4. Travel		
30	How long have you been in [SB-RACD area]	____ days ____ months ____ years
31	Have you spent any nights elsewhere in the past 8 weeks?	1. Yes specify: _____ 0. No
Section 5. Intervention use		
32	What, if anything, did you do to protect yourself from mosquitos while you WORKED at [name of worksite]? Do not probe for different answers. Record whatever the participant says, even if you do not believe it helps prevent malaria.	1. Chemoprophylaxis/ Medicine (specify) 2. Bed net 3. Hammock net 4. Mosquito repellent or coil 5. Wearing covering clothes 6. Fire 7. Other (specify) 8. Nothing
33	Where did you sleep while in [name of worksite]?	1. In a hammock tied to a tree 2. Tent 3. Plastic makeshift tent 4. Hut 5. Barracks 6. House 7. Other (specify)
34	What, if anything, did you do to protect yourself from mosquitos when you SLEPT in [name of worksite]? Do not probe for different answers. Record whatever the participant says, even if you do not believe it helps prevent malaria.	1. Chemoprophylaxis/ Medicine (specify) 2. Bed net 3. Mosquito repellent or coil 4. Wearing covering clothes 5. Fire 6. Other (specify) 7. Nothing 99. Decline to answer
Section 6. Lab results (to be completed by nurse / lab technician)		
35	RDT result	1. Positive 2. Negative
36	Referred to health facility	1. Yes 0. No
37	Reason not referred	
38	DBS collected	1. Yes 0. No
39	Reason no DBS	
40	LAMP results	1. Positive 2. Negative

Appendix 13: Guidance on Conducting Brief Interviews with Participants

Successful interviewing is an art and should not be treated as a mechanical process. Each interview is a new source of information, so make it interesting and pleasant. Follow general guidelines below on how to build rapport with the participant and conduct a successful interview.

Building Rapport

The participant's first impression of you will influence their willingness to cooperate. Be friendly, respectful and smile as you introduce yourself. You will also be given a letter (and an identification badge to wear at all times) that states that you are working with the [name of institution or organization] on malaria surveillance.

Assure Confidentiality

If the participant is hesitant about responding or asks what the data will be used for, explain that the information you collect will remain confidential, their name will not be used for any purpose, and all information will be grouped together for statistical analysis and reports about malaria by the [name of institution or organization]. This information will help them to prevent malaria.

Never mention information from other interviews or show completed interview forms in front of a participant or anyone else.

Interview the Participant Alone

The presence of other people during an interview can prevent you from getting frank, honest answers. It is, therefore, very important that the individual interview be conducted privately and that all questions be answered by the participant.

Answer Questions Frankly

Before agreeing to be interviewed, the participant may ask you about the interview or why they were selected to be interviewed. Be direct and pleasant when you answer.

The participant may also be concerned about the time or length of the interview. If they ask, tell them that the interview usually takes about 30 to 60 minutes.

Never Suggest Answers

Participants who work in the forest may be concerned that you will ask them about illegal activities or testing for drug use. Explain to them that:

- Testing is for malaria, not illegal drug use, or other diseases
- They will not be asked about illegal activities, only forest work; if the forest work they are engaging in is illegal, they will not be asked any of those details and they can choose not to provide any details at any time.
- Remind the participant that the interview is completely confidential and you will not be sharing any of the information with anyone outside of the surveillance team.

Participants may ask questions or want to talk further about the topics you bring up, such as indoor residual spraying or how to use a mosquito net. It is important not to interrupt the flow of the interview, so tell them that you will be happy to answer their questions or to talk further after the interview. After the interview is over, if you feel comfortable doing so, you may answer basic health or other questions to the best of your ability while informing the participant that you are not a nurse, doctor or expert on the topic. Give the participant the health information materials and refer them to local health staff for more information.

Maintain a Neutral Attitude

Interviewers should be sympathetic listeners and avoid giving the impression of having strong views on the subject under discussion. Neutrality is essential because some participants, trying to be polite, will say what they think the Interviewer wants to hear.

If the participant gives an unclear answer, try to probe in a neutral way, asking questions such as the following:

- “Can you explain a little more?”
- “I did not quite hear you. Could you please tell me again?”
- “There is no hurry. Take a moment to think about it.”

If a participant’s answer is not relevant to a question, do not prompt them by saying something like “I suppose you mean that...Is that right?” In many cases, they will agree with your interpretation of their answer, even when that is not what they meant. Rather, you should probe in such a manner that the participant comes up with the relevant answer. You should never read out the list of coded answers to the participant, even if they have trouble answering.

Phrase Questions Carefully

Avoid questions that can be answered by a simple yes or no. For example, questions such as “Please tell me about malaria prevention?” are better than “Do you know about malaria prevention?”

Do Not Force Participants to Answer Questions

If the participant is reluctant or unwilling to answer a question, explain once again that the same question is being asked of all participants and that the answers will all be merged together. If the participant is still reluctant, select the “Refused to answer” option on the question and proceed as if nothing had happened. Remember, the participant cannot be forced to give an answer.

Use Probing Techniques

Encourage participants to detail the basis for their conclusions and recommendations. For example, a participant’s comment such as “The malaria program has really changed things around here,” can be probed for more details, such as “What changes have you noticed?” “Who seems to have benefitted most?” “Can you give me some specific examples?”

Appendix 14: Safety Procedures

General Principles

- Always carry an official badge, credential or identity card.
- Plan ahead.
- Always be alert.
- Be prudent .

Plan ahead

- Have an emergency contingency plan.
- Know what to do well ahead of time.
- Know who to contact in an emergency.
- Adopt a code word to use in case you need the help of a work colleague.
- Be aware of what is going on around you.
- Position yourself closer to the exit than interviewees.
- Be friendly but also careful if you suspect anything.
- Pay attention to your sixth sense.

Measures of prudence

- Limit the quantity of valuable items on site.
- Do not carry guns.
- Do not work under the influence of alcohol or drugs.
- Do not offer or accept gifts from participants or any people visiting the office.
- Interrupt the interview at any moment in case of threat.

Aggressive participants

- Use calming techniques.
- Let aggressive interviewees express themselves without interruption.
- Look for opportunities of interaction.
- Listen and acknowledge the participants' concerns.
- Avoid being defensive.
- Reply to legitimate complaints.
- Lower your voice tone and volume.

Sexual harassment

- Remind the interviewee the purpose of the interview.
- If they persist in harassing then terminate the interview.
- Avoid shaming them.

Drunk or intoxicated interviewees

- They are not eligible if they are incoherent during eligibility screening.
- If they become incoherent, thank them for their time and terminate the interview.

Protect electronic equipment

- When not in use, electronic equipment should be stored in a safe location.
- Do not leave electronic equipment unattended.
- Do not leave interviewees alone in any room with notebooks and cell phones.
- Send encrypted data electronically at the end of each business day.

Adverse events

An adverse event is any event that causes serious physical or psychological damage to an interviewee or a staff member. Examples are:

- Violation of confidentiality
- Harassment or violence
- Negative reaction from the community (loss of job as a result of participating in testing or interview)

Notification of adverse events

- In case of an adverse event, notify the relevant people/institutions.
- Fill out a report of adverse event form.

Biosafety

Measures to be followed during handling of any potentially infectious material:

- Always be aware of what you are doing.
- Always wash your hands before and after handling any infectious materials.
- Always use individual protection equipment like nurse's gowns and gloves to prevent contamination when conducting any activities.
- Do not eat, drink or smoke during blood collection.
- Use basic protective measures.
- Prevent pricks, cuts and scratches.
- Protect wounds and lesions on skin and mucous membranes.
- Control contamination of work surfaces by following disinfection procedures.
- Properly dispose biohazard waste.
- Disinfect (with a disinfectant solution based on sodium hypochlorite, see at the end of this section) the work surface (bench or table) whenever you finish a procedure and at the end of the work day.
- Avoid using cutting objects (blades, knives or scissors) to open packages or other purposes. In order to collect samples securely, follow the instructions included in this guide to the letter.
- Always use appropriate accessories (for example, pipette bulbs).
- Follow all the technical procedures in order to minimize the chance of creating aerosols, droplets and spills.

Precautions

- Always wear gloves and glasses when handling infected or potentially infected materials or when there is a possibility of exposure and/or contact with this type of material.
- Dispose of used gloves in appropriate containers, whether they are knowingly contaminated or not.
- Do not touch the eyes, nose, mouth, other mucous membranes and the skin with the gloves.
- Do not leave the work area wearing gloves.
- Immediately wash your hands with plenty of soap after any contact with infected or potentially infected material, and after finishing work. If this contact takes place when wearing gloves, immediately remove the gloves and wash your hands with plenty of soap.
- Do not open or close doors or handle personal objects while wearing gloves.
- Always use your gown to protect your clothes and wear closed shoes. Do not leave the work area wearing your gown. Try to disinfect your gown with a disinfectant solution before washing.
- Leave the gown overnight in a receptacle completely covered with a disinfectant solution. Wash it the following morning.
- Always keep the work room clean, dry, with good ventilation and free from unnecessary materials and furniture.

Droplets/spills and accidents

- In case of droplets and spills of potentially infected materials, initially cover with absorbent materials (gauze, cotton or toilet paper).
- Pour a disinfectant solution around the area and then over the absorbent material (gauze, cotton or toilet paper) and wait 10 minutes.
- After that time has elapsed, remove the mix of droplet or spill and the absorbent material and place it in a recipient for contaminated materials.
- Clean the surface again with a disinfectant solution.
- Always wear gloves when following these procedures.
- Immediately wash wounds from needle pricks or other puncture objects, cuts, and skin that has been contaminated by droplets or spills from samples, with plenty of soap and water.
- Immediately communicate all accidents (pricks, cuts), droplets/spills involving direct contact of the skin with potentially infected materials to the health unit director.
- Whenever possible, provide counseling to the injured person and provide a medical evaluation (including HIV testing on the spot and after four weeks).

Handling and disposal of contaminated materials and waste

- Needles from blood collection systems must be placed in the receptacle for puncture materials (provided specifically for the duration of the survey). When full, the receptacles should be incinerated.
- Gloves and other materials used for blood collection must be placed in the plastic bag for biological waste.

Appendix 15: Sample Collection and Storage Procedures

Background

Malaria is caused by parasites from the *Plasmodium* genus. There are 5 species that are known to cause malaria in humans. *Plasmodium falciparum* is the most predominant species. Malaria parasites infect human red blood cells, and can be isolated from blood samples.

If blood samples are not stored properly, the malaria parasites may not be able to be identified. It is important that the blood samples are collected and stored properly so that malaria parasites can be reliably identified.

Sample Collection

In most countries, blood samples will be drawn from patients by a qualified health practitioner, who may be an enrolled/registered nurse, medical laboratory technologist or medical doctor. This may vary in different contexts but should always align with national guidelines.

Sample coding

Every blood sample should be linked to the correct person, so that the malaria test results can be matched to the completed questionnaire. Once an individual consents to SB-RACD, they are assigned a unique code comprised of characters that conceal their identity while at the same time linking the person's data to their venue, health facility, test results and index case that triggered their investigation

Rapid Diagnostic Testing (RDT) cassette:

A cassette that detects parasite antigens/antibodies depending on the working principle. Results are readily available and can be read through a screen by the presence or absence of a line.

Dry Blood Spot (DBS)

A folded paper containing a filter paper with equally sized, stamped rings on which finger-prick blood is collected on the circles, this blood is allowed to dry and the paper is subsequently folded to close.

Storage and Preservation

Blood samples should be stored in appropriate boxes to ensure they are not subjected to damage due to the surrounding environmental conditions (e.g., temperature, moisture, pH, chemicals). Samples should be kept away from moisture and direct sunlight. Three labels have been printed, which should be put on the 1) informed consent form, 2) blood slides and 3) DBS. The label with two barcodes should be put on the DBS, as shown on the pictures below.

Example: If participant X has consented to be in the study, then the informed consent form, the Blood slide and the DBS from Patient X should all have the same barcode label with the same Participant ID.

DBS

DBS cards will need to be labeled prior to giving them to the nurse so that they may take the blood sample. It is best to request this sample at the end of the interview so that you can move on to interviewing the next person.

Sample Handling

Although the nurses will be responsible for conducting the malaria test and collecting the DBS, Interviewers may need to handle the samples in order to dry and store them. The following protocol should be followed.

- Samples should be left to dry in an area that has good ventilation and is protected from the wind or people touching them. The samples should be left to dry until the blood spot appears brown (approx. 10 minutes). Samples should not be exposed to direct sunlight.
- After they are dry, fold the flap down to cover the blood spots.
- The white filter paper should never be touched. Only touch the yellow cardstock cover when handling the DBS samples.
- It is mandatory to wear gloves when handling samples. Always disinfect your hands with methylated spirits after handling samples, even if you have not come into direct contact with them.

Sample Organization and Storage

The DBS samples should be neatly stacked into trays for organization and storage. Ideally, stacks of filter paper cards should remain stable and organized, and not shift within a box. Samples should be sorted in order of the Participant ID. Blood slides should be appropriately coded and stored in slide boxes.

The tray of samples should be placed in a zip lock bag, containing a humidity sponge/desiccant. Two trays should fit into a zip lock bag. Squeeze out excess air before sealing the zip lock bag. The zip lock bags should be clearly labeled (using a Sharpie pen) with the dates on which the samples were collected and the health facility name. Immediately store in the cool box to preserve sample.

Barcode placement on DBS

