



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

The Malaria Elimination Initiative

UCSF Institute for
Global Health
Sciences

The Malaria Elimination Initiative is an initiative
of the UCSF Institute for Global Health Sciences.

shrinkingthemalariamap.org

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The Malaria Elimination Initiative (MEI) at the
University of California San Francisco (UCSF) believes
a malaria-free world is possible within a generation.
As a forward-thinking partner to malaria-eliminating
countries and regions, the MEI generates evidence,
develops new tools and approaches, disseminates
experiences, and builds consensus to shrink the
malaria map. With support from the MEI's highly-
skilled team, countries around the world are actively
working to eliminate malaria.

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Acronyms

ACT	Artemisinin-based combination therapy	NMP	National Malaria Program
CHW	Community health worker	PPS	Probability proportional to size
DBS	Dried blood spot	RDT	Rapid diagnostic test
ESPT	Entomological Surveillance Planning Tool	SBCC	Social and behavior change communication
HIV	Human Immunodeficiency Virus	SB-RACD	Socio-Behavioral Reactive Case Detection
HRP	High-risk population	SRS	Simple random sampling
ID	Identifier	TLS	Time-location sampling
IRS	Indoor residual spraying	UCSF-MEI	University of California, San Francisco Malaria Elimination Initiative
LLIN	Long-lasting insecticide treated net	UPC	Unique Participant Code
LSM	Larval source management	VDT	Venue-day-time period
MMP	Mobile and migrant populations	WHO	World Health Organization
M&E	Monitoring and evaluation		
NGO	Non-governmental organization		

About the MEI Malaria Elimination Toolkit

The MEI Malaria Elimination Toolkit is a set of proven tools, frameworks, and guides to help malaria endemic countries accelerate progress toward malaria elimination. Developed by the Malaria Elimination Initiative (MEI) at the University of California, San Francisco (UCSF), the toolkit addresses the unique challenges faced by national malaria programs in heterogeneous transmission settings. These tools have been used successfully at the national and/or subnational levels, leading to important changes in malaria policy and practice.

The MEI Malaria Elimination Toolkit focuses on three primary areas: situation assessment, tailored responses, and program management and

sustainability – with the ultimate goal of building capacity and optimizing a country or district’s ability to advance toward elimination. These tools help malaria programs understand the drivers of transmission in a target area and the readiness of the health system for elimination; decide what actions to take and how to tailor the response; and ensure efforts are well-managed and sustainably funded.

The MEI offers direct technical assistance to support the adoption, tailoring, and implementation of its tools, frameworks, and guidelines. Please contact us to learn more at mei@ucsf.edu, or visit our website at <http://www.shrinkingthemalariamap.org>.

The MEI Malaria Elimination Toolkit



Situation Assessment

What are the drivers of transmission?
What is the readiness of the health system for elimination and what are the gaps?



Tailored response

What actions should the program take based on identified and characterized gaps?



Program management and sustainability

How does the program effectively manage and fund malaria elimination?

Introduction

Global malaria deaths and cases decreased by 60% and 37%, respectively, between 2000–2015. Given the unprecedented reduction in malaria transmission, many countries are reorienting their programs to eliminate the disease and will need to address the areas and populations where malaria transmission persists.

As malaria transmission declines, cases cluster in geographic areas and among populations at higher risk of infection. Malaria ‘high-risk populations’ (HRPs) are groups of people who share socio-demographic, geographic and/or behavioral characteristics that place them at higher risk of infection, such as low utilization of health services and interventions, or behaviors associated with increased exposure to *Anopheles* mosquitoes, the primary vector of malaria. Identifying and understanding specific characteristics of populations at high risk for malaria enables national malaria programs (NMPs) to select and target tailored interventions. However, NMPs often do not have the epidemiological evidence and resources they need to determine the optimal selection and delivery of interventions for specific populations. Decreasing and ultimately reducing malaria transmission to zero among HRPs is essential for achieving and sustaining malaria elimination. However, some HRPs may be harder to reach and often require special approaches to ensure all malaria infections are detected and treated.

HRPs often have limited access to quality malaria treatment and prevention because of:

- High levels of mobility, as with mobile and migrant populations (MMPs)
- Poor access to public health facilities
- Socio-economic and cultural factors (lack of financial resources, religious practices, employment that requires them to travel to remote areas, etc.)
- Potential for asymptomatic infections due to repeated exposures, which may limit care-seeking behavior
- Suboptimal outreach by malaria programs
- Limitations of traditional vector control tools in preventing outdoor biting or providing protection in temporary shelters.

As outlined in WHO's Global Technical Strategy for Malaria 2016–2030, surveillance is a core intervention required to detect outbreaks, identify programmatic and coverage gaps, assess the impact of interventions, and target a locally-tailored response. However, most malaria programs rely on passive case detection as the foundation of malaria surveillance. The quality of information in these surveillance systems varies widely and relies on parasitological confirmation of cases as well as prompt reporting and case investigation to determine likely sources of infection. Even where strong passive surveillance systems are in place, they often do not adequately capture specific HRPs who are less likely to present at health facilities or mobile populations who may be absent at follow up.

To be effective, surveillance and response strategies must keep pace with changing transmission patterns. Over time, the relative importance of different HRPs in maintaining transmission, and effective methods to reach them, may change. NMPs must adapt surveillance components, data collection methods, and interventions to effectively address transmission. At the same time, NMPs may shift from a broad approach to a person-centered approach to targeting and tailoring interventions. NMPs frequently request epidemiological support to identify specific attributes of HRPs, and improve tracking, access, and delivery of malaria interventions. While some HRPs are often known to programs in a general sense (such as adult males or forest goers), reliance on anecdotal evidence can overlook important variation within these broad groups.

Leveraging approaches that UCSF colleagues developed to address HIV transmission in HRPs, the MEI created the *Malaria Elimination Guide to Targeted Surveillance and Response in High-Risk Populations* (HRP Guide) to support NMPs in refining their understanding of HRPs, improving the targeting of interventions to reach the unreached, and ultimately reducing malaria transmission.

What is the HRP Guide?

The HRP Guide provides NMPs with a set of approaches to review transmission patterns and surveillance gaps, gather detailed epidemiological evidence on risk factors and behaviors of populations likely at high risk for malaria, adapt surveillance

activities, track epidemiological trends in HRPs, and improve targeting of interventions.

The HRP Guide contains four modules that align with the steps of the surveillance cycle, which is a process to iteratively improve surveillance systems, identify and track the highest risk populations, and refine targeted malaria interventions. When used in sequence, the Guide's modules aim to incorporate evidence, tracking, and targeting of HRPs in broader surveillance and response strategies.

The surveillance cycle enables NMPs to ensure that surveillance and response strategies are based on the current evidence on how, where, and why transmission is occurring. Throughout the surveillance cycle, programs should:

- Be flexible and adapt to evolving transmission dynamics
- Collect and analyze data on the risk behaviors driving the epidemic
- Review diverse sources of information to complete the picture
- Track trends in identified HRPs over time
- Collect the strategic information needed to focus the response where it will have greatest impact

The HRP Guide is comprised of four modules:

Module 1: Planning for Targeted HRP Surveillance and Response

Module 1 guides the step-by-step implementation of a formative assessment to gather, update, review, and analyze current NMP knowledge of HRPs. It provides guidance in analyzing existing case data and qualitatively assessing characteristics and risk behaviors of potential or known HRPs. Characteristics include: travel and work patterns (seasonality, occupation, transit), social network connectivity and other factors that will help to optimize implementation of **Modules 2–4**.

Module 2: Identifying Risk Factors: Case-control Study

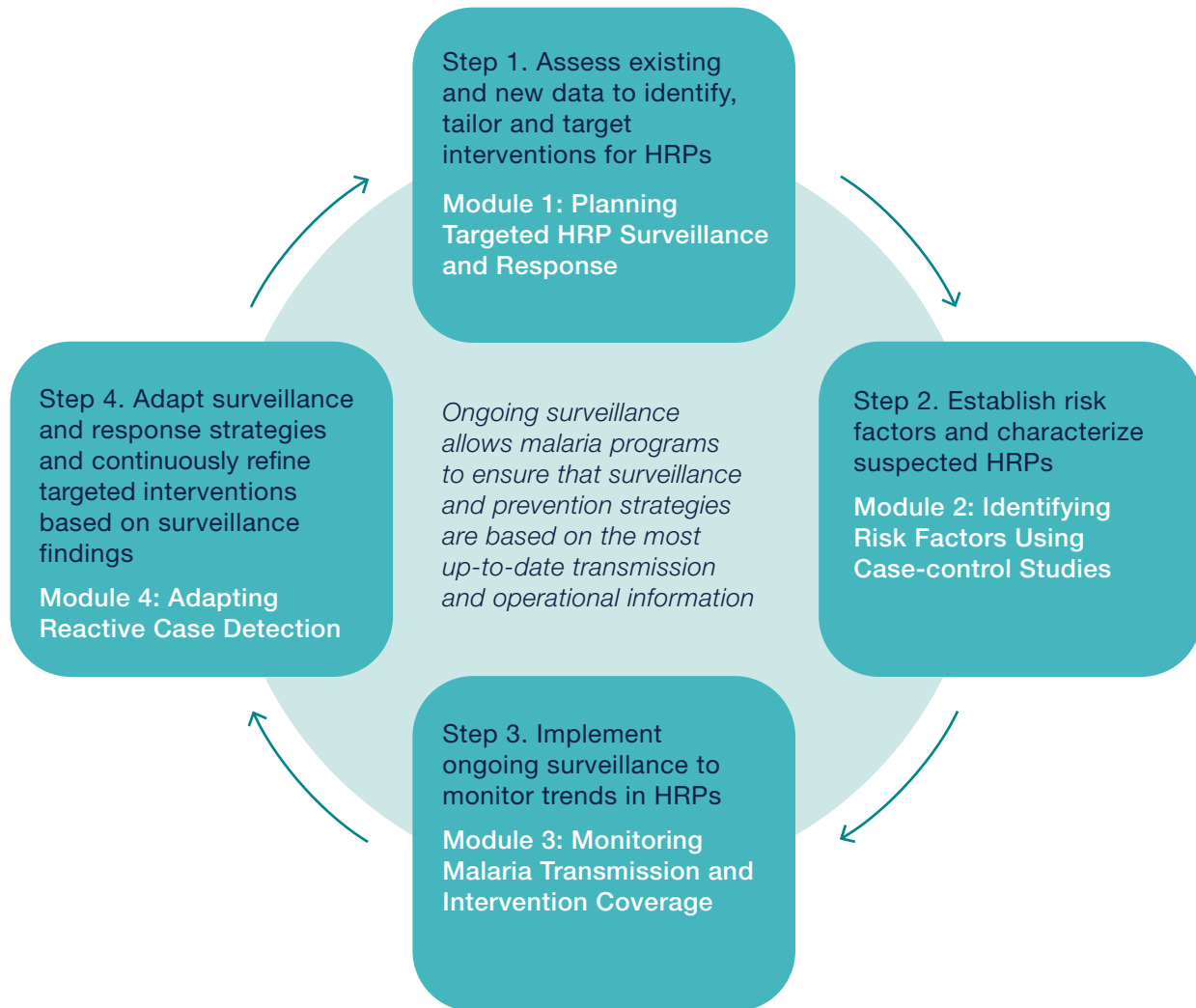
Module 2 provides instructions to conduct a study on malaria risk factors and collects data on a core set of essential indicators. The data are collected using a questionnaire administered to malaria cases and a comparison group of controls identified at health facilities. This module provides a way to identify and quantify the importance of key actionable risk factors to guide program surveillance and response.

Module 3: Monitoring Malaria Transmission and Intervention Coverage

This module provides guidance on implementing time-location sampling to access and survey people at specific venues and times where HRPs are more likely to be present (i.e. forest worksites or border crossing points). **Module 3** supports programs to quantitatively assess the prevalence of malaria infection among HRPs in these sites, and evaluate other key indicators such as intervention use and associated risk behaviors. Through repeat surveys using this approach, programs can monitor these indicators over time in specific HRPs.

Module 4: Adapting Reactive Case Detection

Socio-behavioral reactive case detection (SB-RACD) provides a framework and approach for targeted screening of specific sites and social contacts as part of routine surveillance, based on a set of risk criteria applied to the index case. **Module 4** will be useful in contexts where transmission occurs away from home, such as in the forest, worksites, or travel destinations, and where household RACD is likely to have a low case yield. Implementation of this approach can improve targeted surveillance and response in known high-risk and hard-to-reach groups.

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

Each module in the HRP Guide includes:

- An overview of the purpose and best uses of each tool
- A detailed operations manual
- Sample protocols
- Survey questionnaires or thematic guides for qualitative interviews and focus groups for formative assessment
- Forms, including information sheets for informed consent
- Tools to assist with site selection, sample size calculation, selection of controls, and analysis
- Links to additional references and resources

Who Should Use the HRP Guide?

The HRP Guide is for NMP program managers, M&E officers, and their implementing partners, including non-governmental organizations (NGOs), local organizations and researchers in countries with low malaria transmission.

Technical assistance is available to support the tailoring and implementation of all MEI tools. Please visit our website and contact us for more information: mei@ucsf.edu.

How Is the HRP Guide Used?

Each module of the HRP Guide contains instructions on the methods to gather and analyze the necessary information that will inform a more resilient surveillance and response platform. Not all countries will need to implement all modules and [Figure 2](#) can be used to identify which modules of the HRP Guide are most pertinent to the program.

Users should follow the operations manual for each module and apply the results to inform targeted response interventions for HRPs. Implementation of the suggested modules is dependent on local circumstances. The HRP Guide methods are aligned with WHO guidance and are consistent with the approaches found in the Malaria Matchbox Tool by RBM and the Global Fund.

How Do I Navigate the HRP Guide?

Users should first consult the WHO Surveillance, Monitoring, and Evaluation Manual and related tools to assess the state of their surveillance systems.

Then users should select specific sites for initial implementation of the HRP Guide based on considerations in [Box 1](#).

Where capacity exists, the HRP Guide should be used in conjunction with the MEI's Entomological Surveillance Planning Tool (ESPT) to guide entomological sampling in areas with potential HRPs.

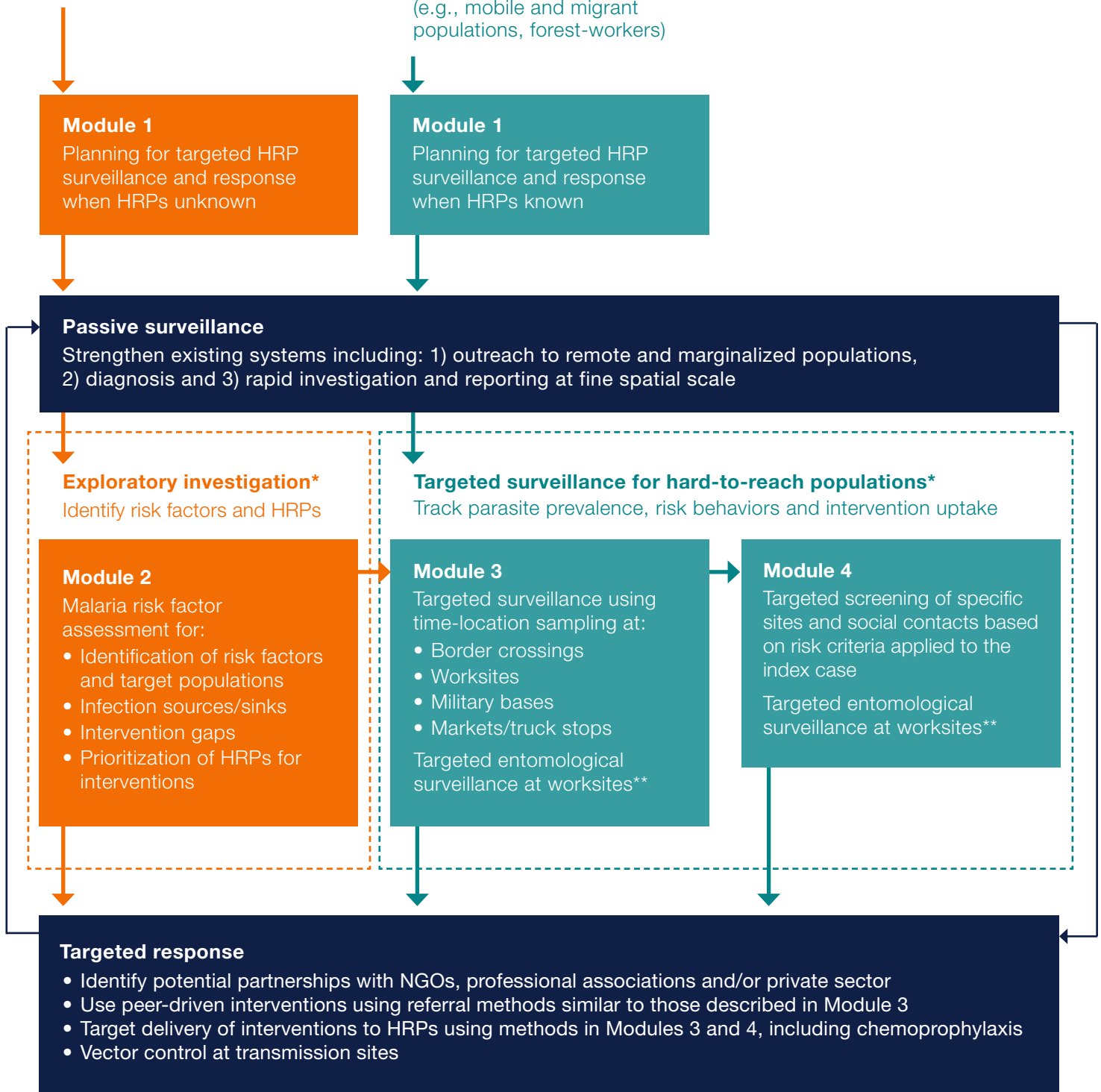
Box 1. Site/location considerations

When determining whether a site/location is well-suited for use of the HRP Guide, consider areas with some of the following characteristics:

- Locations of ongoing transmission where there are known HRPs with intervention gaps
- Areas where HRPs are unknown but populations are frequently exposed to malaria; extent of exposure may not be reflected in health system case records
- Areas where there are many private health providers or other health services not incorporated into national surveillance systems
- Areas of high mobility, including ports and border regions
- Areas with industries potentially associated with malaria risk (e.g. mining, forest plantations, etc.)
- Areas where there are known mobile, migrant, ethnic minorities, or other vulnerable populations (e.g., internally displaced populations, border crossers, etc.)
- Areas where the primary risk factors for malaria transmission include occupational exposure and other behaviors outside of households
- Areas where levels of malaria infection, risk behaviors, personal protective measures, access and utilization of prevention tools, and patterns of testing and treatment-seeking among HRPs is unknown

Figure 2. Do I have HRPs in my region/country?**Triggers/basis for assessment:****Unknown/suspected HRPs****Known HRPs**

(e.g., mobile and migrant populations, forest-workers)



*Procedures in each module of the exploratory investigation and in surveillance for hard-to-reach populations should be implemented according to the estimated risk and information gathered during the preparation phase. The process must be adapted in real time and take into account surveillance results as well as additional external information.

**Optional procedure

Key messages for the HRP Guide

To maximize impact and achieve elimination, malaria programs must adapt to changing transmission dynamics in elimination settings by identifying populations at highest risk of infection and appropriately tailoring and targeting surveillance and response strategies.

The HRP Guide aims to support decision-making about local HRPs through information-gathering, evidence generation and adapting reactive case detection guidelines.

Targeted surveillance approaches can be resource intensive, including labor and technical expertise for adapting designs and analysis, so collaboration with both research and implementation partners is key.

The HRP Guide identifies opportunities to integrate entomological data collection with epidemiological data to guide action.

The HRP Guide emphasizes that HRP surveillance should be iterative and adaptive since malaria transmission is dynamic; constant adjustments should be made to reevaluate which populations are at highest risk and tailor methods to deliver surveillance and response, to ensure maximum impact (See [Figure 1](#)).

The HRP Guide outlines a strategy to integrate data collection into routine surveillance at health facilities, to identify HRP characteristics and key actionable risk factors for malaria ([Module 2](#))

The HRP Guide provides methods to target malaria testing and data collection to locations (such as worksites) in order to generate representative estimates of malaria burden, transmission patterns, and intervention gaps in HRPs ([Module 3](#)).

The HRP Guide provides program-friendly approaches to adapt reactive case detection for HRPs, to improve case-detection rates and targeted surveillance ([Module 4](#)).