Current WHO guidance, strategies and lessons learnt of pre- and post-validation surveillance of NTDs

Malaria surveillance for elimination and prevention of re-establishment

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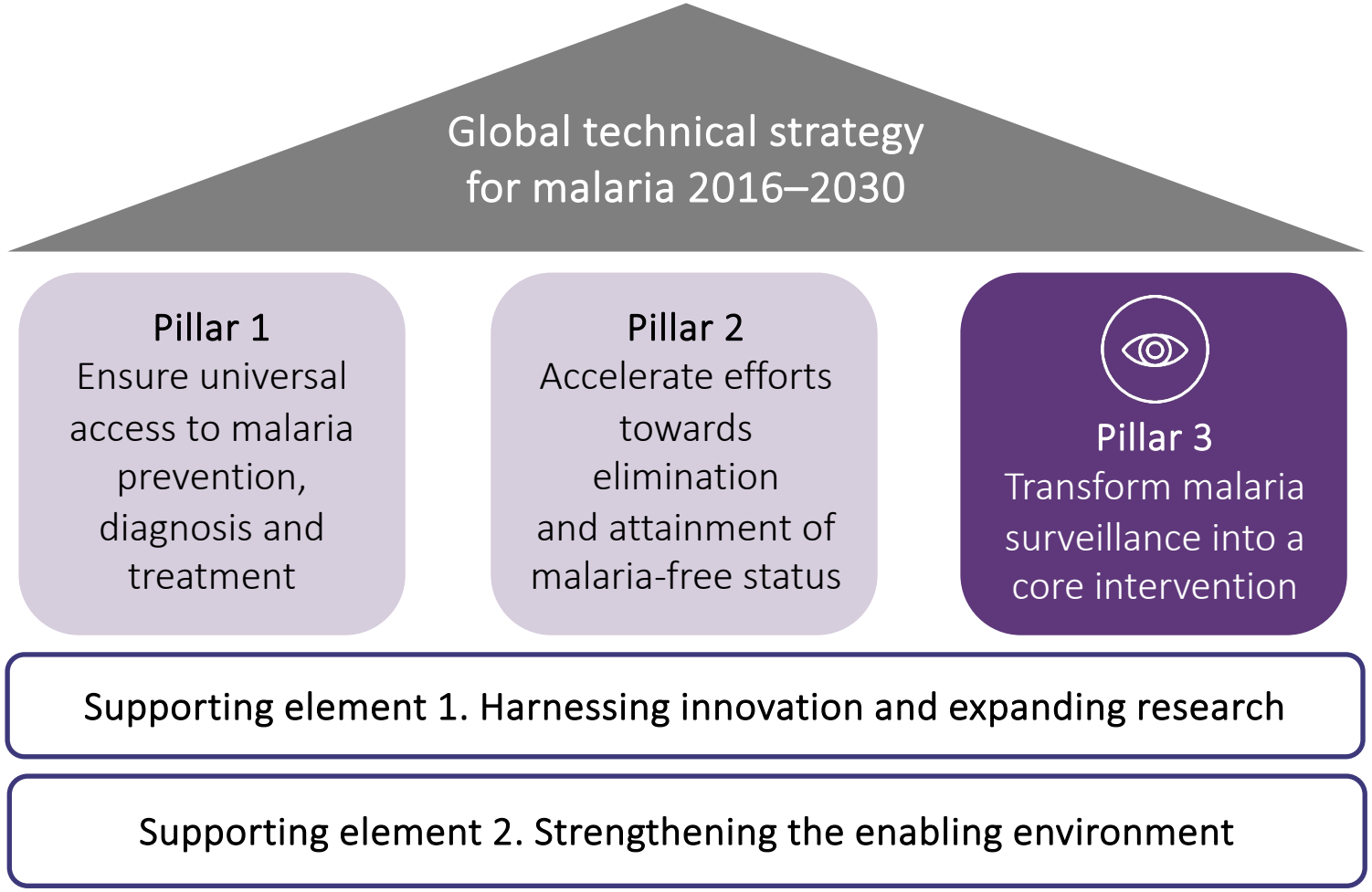
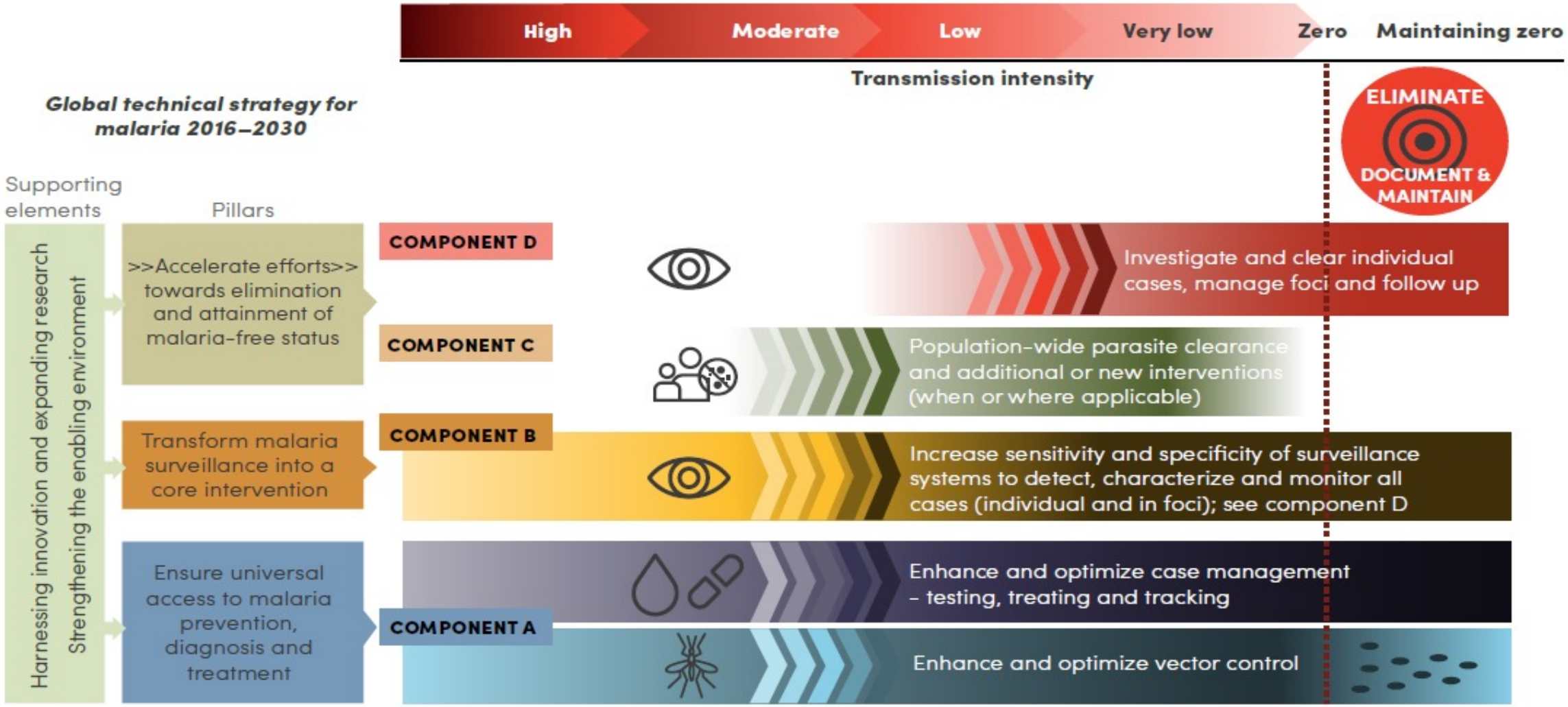
Surveillance as a Critical Pillar of the Global Technical Strategy



Surveillance along the malaria transmission continuum



Acceleration – as represented by arrow bars (>>>>>) here – relates to time-limited efforts made across all components in order to (1) achieve universal/optimal coverage in malaria prevention and case management (Component A**), and increase sensitivity and specificity of surveillance systems so they are able to detect, characterize and monitor all malaria cases and foci (**Component B**); and (2) bring malaria transmission to sufficiently low levels (with or without population-wide parasite clearance and other strategies, **Component C as an option**) where remaining cases can be investigated/cleared and foci can be managed and followed up (**Component D**).*

Role of Surveillance in Three Types of Settings

1

In high transmission settings:

- provide data for overall analysis of trends
- permit stratification and planning of resource allocation.

2

Where malaria is being eliminated:

- identify infections early to reduce onward transmission
- determine the most likely location of infection
- identify, investigate and eliminate foci of continuing transmission

3

Preventing re-establishment:

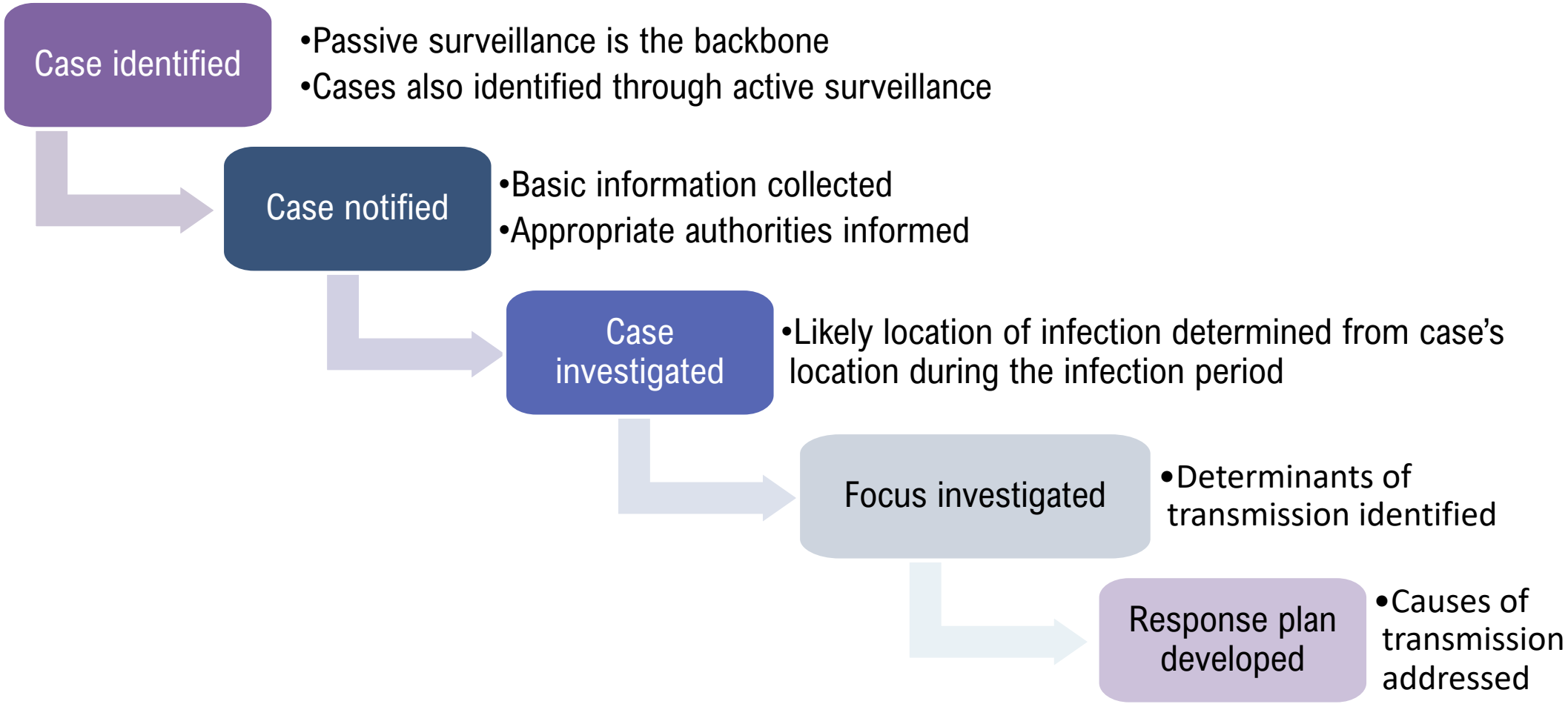
- identify imported cases early to prevent local cases
- identify outbreaks quickly to prevent re-establishment.

Surveillance Systems - Elimination Settings

The malaria surveillance system in elimination settings must be capable of:

1. Early detection, diagnosis and treatment of all malaria infections 
2. Investigation of cases to determine the likely location of infection and case classification 
3. Investigation of foci to determine causes of transmission and develop a focus response plan 

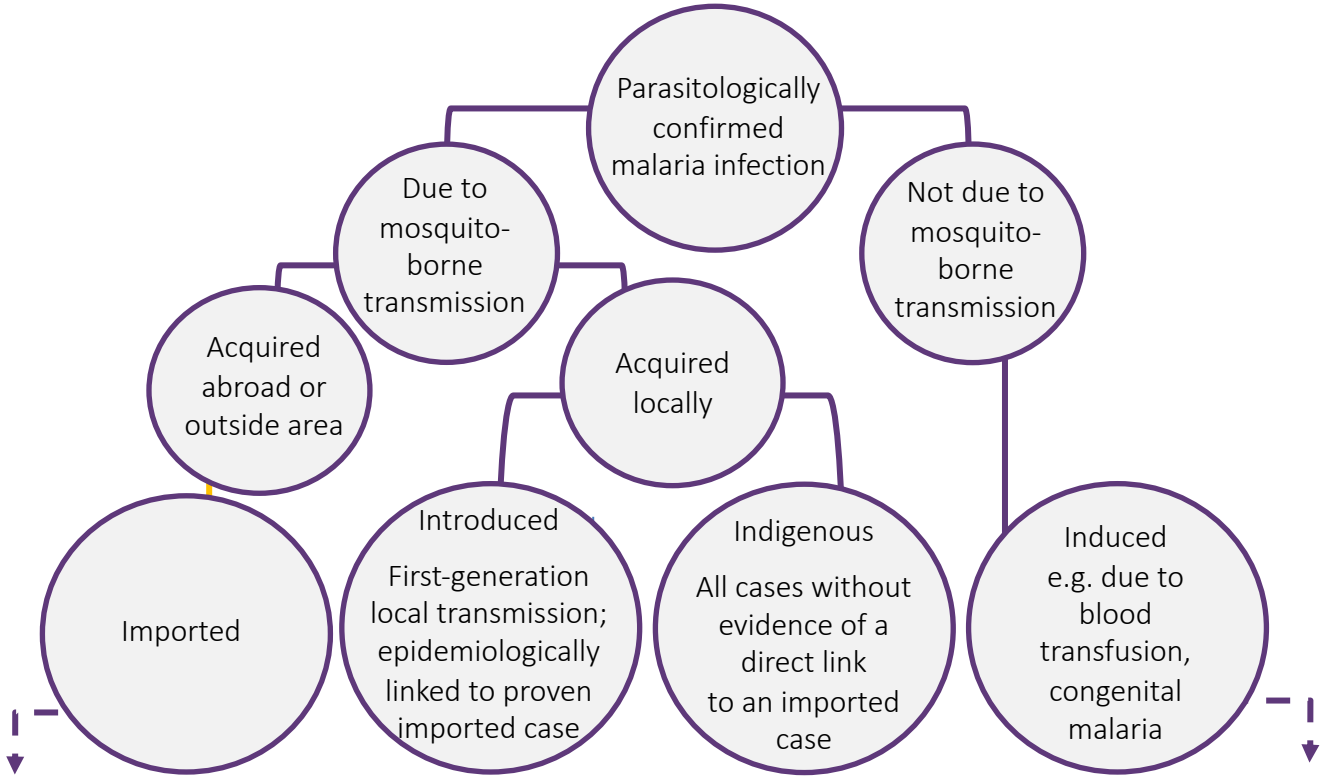
Overview of Surveillance Procedures in Elimination Settings



Case Investigation Objectives

- Case investigations are conducted to identify the likely location of infection of the case to inform response activities
- Case investigations collect more detailed data on cases than are captured in case registers
- Case investigations are helpful in identifying high risk populations
- Case investigations are used to determine the classification of cases as indigenous, introduced, imported, induced, relapsing or recrudescent

Classification of Malaria Cases



Relapsing	Recrudescent
History of *P. vivax* or *P. ovale* infection within past three years; no epidemiologically linked cases in vicinity	Recurrence of asexual parasitaemia of the same genotype(s) that caused the original illness, due to incomplete clearance of asexual parasites after antimalarial treatment

Distinguishing Imported from Local Cases

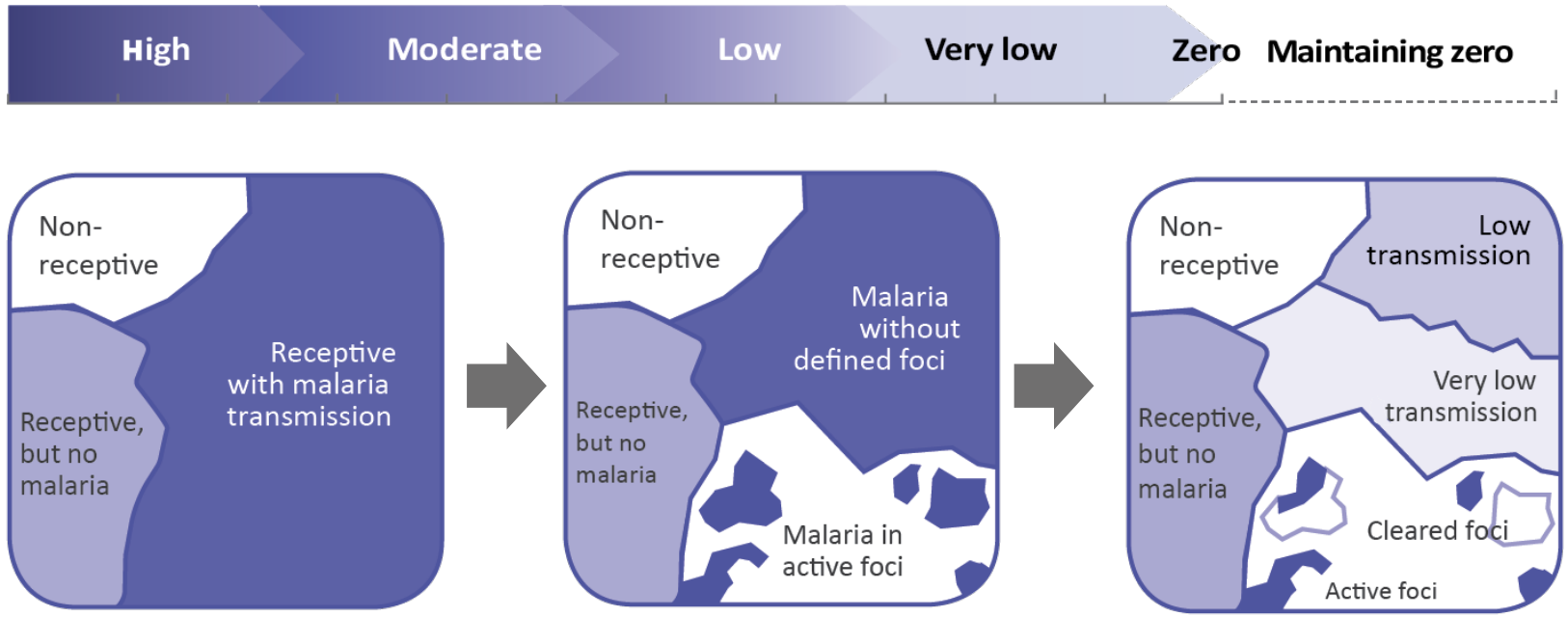
Very likely imported

Very likely local

Classification is not always straightforward!

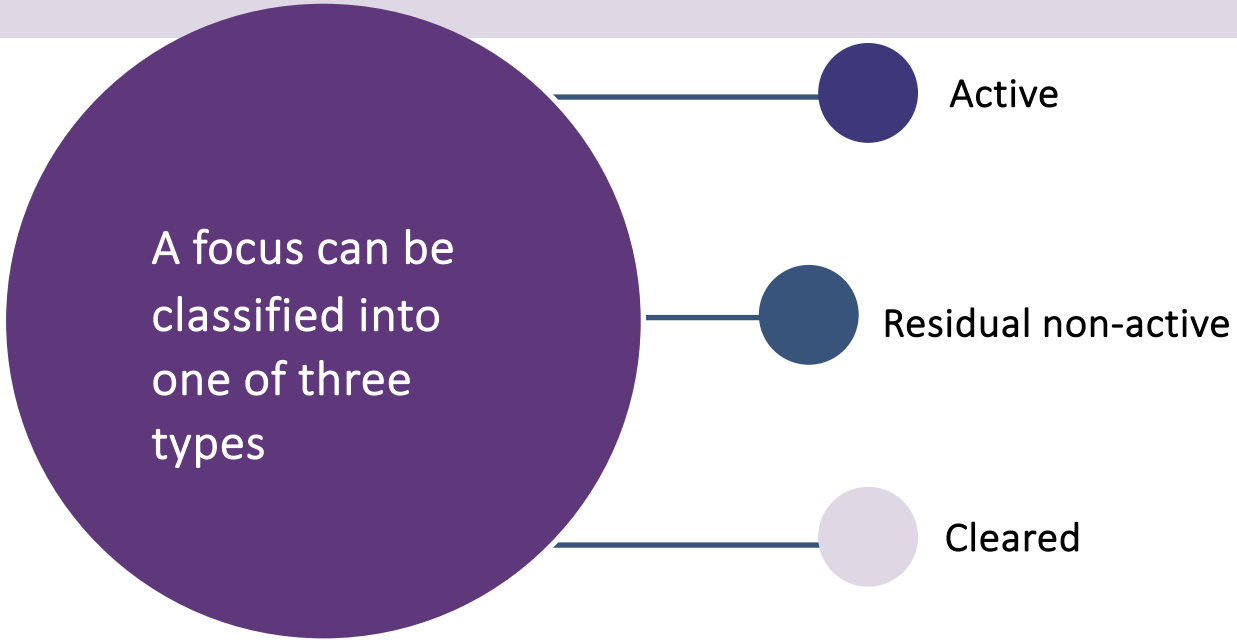
- Resident of the eliminating country who spent at least one night in a malaria-endemic area less than nine days ago
- Resident of a known malaria-endemic area who has been in the eliminating country for less than nine days
- Resident of a known malaria-endemic area who has been in the eliminating country for more than nine days but less than 14 days
- Resident of a non-malaria endemic area who has been in the eliminating country a few weeks
- Resident of a known malaria-endemic area who has been in the eliminating country a few weeks
- Resident of the eliminating country who has no history of travel
- Resident of the eliminating country who spent at least one night in a malaria-endemic area between nine and 14 days ago

Increasing Heterogenity of Transmission



Focus Definition

A focus is a defined and circumscribed area situated in a current or former malarious area that contains the epidemiological and ecological factors necessary for malaria transmission



Focus Classification

Types of malaria foci with operational criteria

TYPE OF FOCUS	DEFINITION	OPERATIONAL CRITERIA
Active	A focus with ongoing indigenous transmission	Indigenous case(s) have been detected within the current calendar year
Residual non-active	Transmission interrupted recently (1-3 years ago)	The last indigenous case(s) was detected in the previous calendar year or up to three years earlier
Cleared	A focus with no indigenous transmission for more than three years	There has been no indigenous case for more than three years, and only imported or/and relapsing or/and recrudescent or/and induced cases may occur during the current calendar year

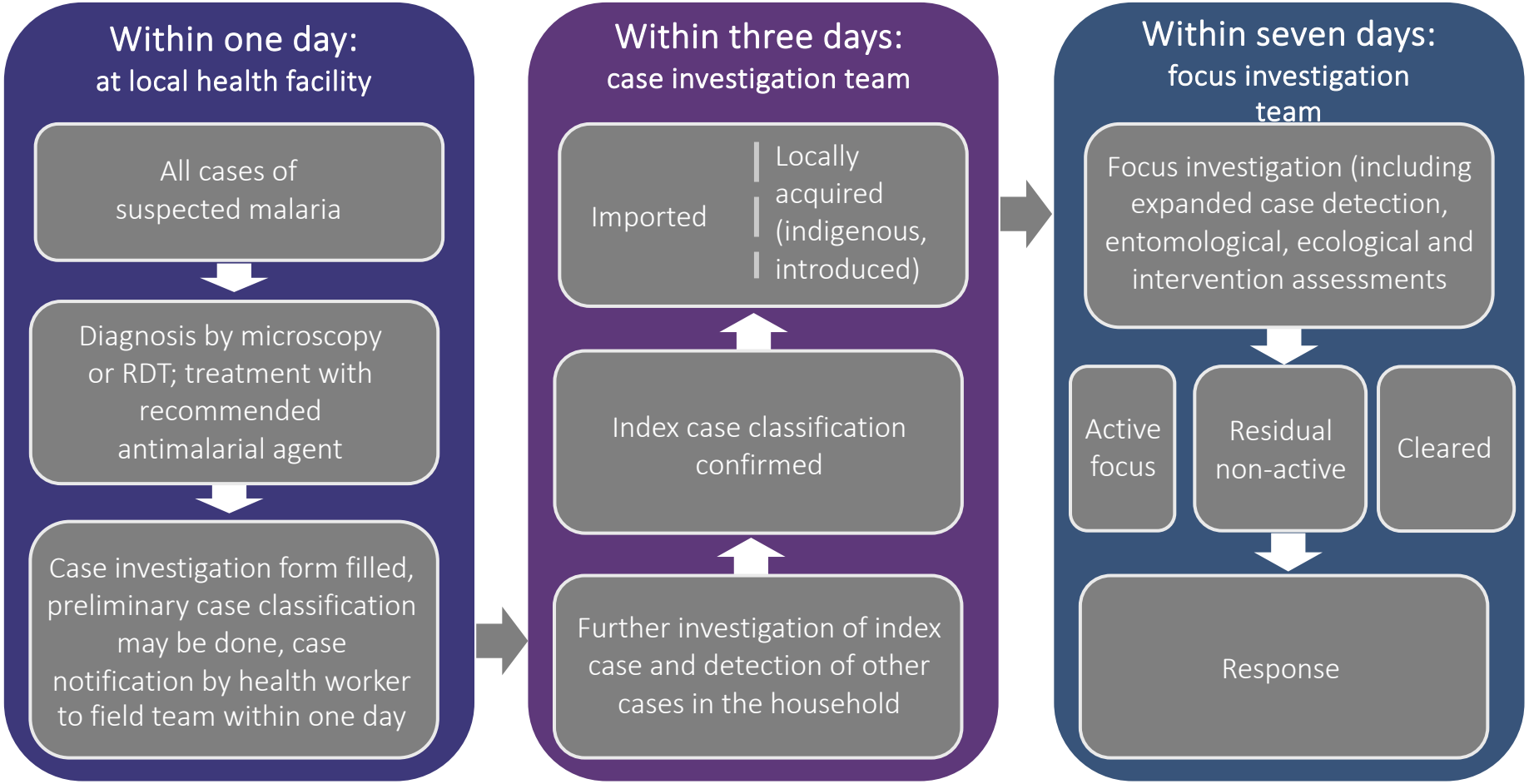
When to Conduct a Focus Investigation?

Examples of when focus investigations are needed:

- **New local case(s) in an area that hasn't had cases in some time**
  - cleared foci and residual non-active foci with new cases
  - active foci where at least four weeks have passed with no indigenous cases
- **Persistent or resurgent transmission**
  - Active foci where transmission is either not declining or is increasing despite apparent adequate interventions
- **Novel parasite species**
  - A species not recently transmitted in the area is identified

In some cases, focus investigations may assist in the classification of cases, when the classification is not clear and additional epidemiological and entomological data are needed to aid the classification.

Case Notification, Case and Focus Investigation Systems

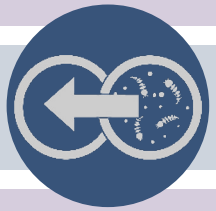


Hypothesis of Determinants of Transmission

Could include but are not limited to:

Changes in coverage or quality of vector control, surveillance and case management

Changes in rate of malaria parasite importation (i.e., changes in migration, refugees)



Changes in weather (i.e., increased rainfall and temperature)

Increases in extent of breeding sites (i.e., land-use change such as deforestation or new agricultural fields)

Insecticide or antimalarial drug resistance

Increased human susceptibility (i.e., famine, conflict)

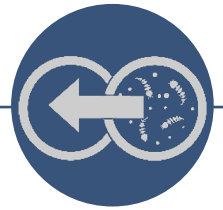
Methods to Investigate Potential Determinants of Transmission

Changes in coverage or quality of vector control, surveillance and case management

Include as appropriate:

- review standard operating procedures to ensure compliance with WHO recommendations
- review records to determine coverage and quality of implementation of activities or standard operating procedures
- verify level of effective coverage through household or health facility visits
- investigate quality of activities through direct observation or interviews.

Methods to Investigate Potential Determinants of Transmission



Changes in rate of malaria parasite importation
(i.e., changes in migration, refugees)

Include as appropriate:

- key informant interviews to identify important industries that may be regularly attracting migrants from malaria endemic areas
- information on refugees or internally displaced persons who may have recently arrived from malaria-endemic areas
- household interviews to identify newly arrived residents who may have come from malaria-endemic areas.

Methods to Investigate Potential Determinants of Transmission

Changes in weather
(i.e., increased rainfall and temperature)

Include as appropriate:

- comparison of rainfall and temperature with recent weeks and previous years to identify anomalies
- key informants to identify unusual weather patterns in terms of distribution of rainfall.

Methods to Investigate Potential Determinants of Transmission

Increases in extent of breeding sites (i.e., land-use change such as deforestation or new agricultural fields)

Include as appropriate:

- key informant interviews to identify increases in construction, agriculture, pisciculture irrigation, dams or other industries leading to increases in the extent of water bodies
- comparison of remotely sensed images to identify changes in land use/land cover.

Methods to Investigate Potential Determinants of Transmission

Insecticide or antimalarial drug resistance

Include as appropriate:

- review entomological surveillance data to determine whether resistance is present
- review surveillance data to identify proportion of cases without an adequate clinical response

Methods to Investigate Potential Determinants of Transmission

Increased human susceptibility (i.e., famine, conflict)

Include as appropriate:

- dip stick studies on populations facing multidimensional poverty and therefore and increase susceptibility
- study populations of large scale migration as a result of conflict and who thereby have increased susceptibility.

From Focus Investigation to Response Plan

The results of the focus investigation are analysed to understand the likely drivers of transmission, which are then used to formulate a response plan.

Focus Map


Breeding Site 3
Capela St. Isabel Al Oan
Px 5 Adriana Moniz
34 yrs Introduced
Px 2 Olivio A.
Ferreira 16 yrs
Imported
Px 4 Evaristo dos
Nascimento 36 yrs
Introduced
Px 8 Victoria Lurok
46yrs Female
Px 1 Junita F. Nunes
20yrs Imported
Traditional Cultural House
Capela St. Maria
Maromak Nia Inan...
Breeding Site 2
Px 7 Natarius Manuk
24Yrs Male Imported
Px 3 Estevao Cardoso
58 yrs Introduced
Px 9 Natalino Jose
19 yrs Male Imported
Px 6 Alfonsius
Berek 56 yrs Male
EBF Catolica
Sao Jose Wetaba
Temporarily closed
Capela Wetaba
Breeding Site 1
TIMOR-LESTE
INDONESIA
INDONESIA
TIMOR-LESTE
TIMOR-LESTE
INDONESIA

Response Plan

Hypothesis: New malaria cases due to onward transmission from migrant workers. Onward transmission occurred because there was delay in care-seeking, missed diagnoses and poor quality and coverage of vector control.

Element	Activity	Responsible	Timeline
Case detection	• Increase hours of health post • Sensitize workers • Weekly active case detection among plantation workers	District health authority	• Immediately • Immediately • Weekly active case detection through transmission season
Diagnosis	• Deploy expert microscopist • Conduct retraining of microscopists • Initiate quality assurance system	National laboratory	• Immediately • Within one month • Within two months
Vector control (indoor residual spraying)	• Re-train spray agents • Re-spray houses in focus • Develop standard operating procedures • Develop supervision plan • Implement annual insecticide resistance monitoring	Vector control unit	• Immediately • Within one week • Within one week • Within one week • Within two months

Thank you