Overview of best-practice vector surveillance and control

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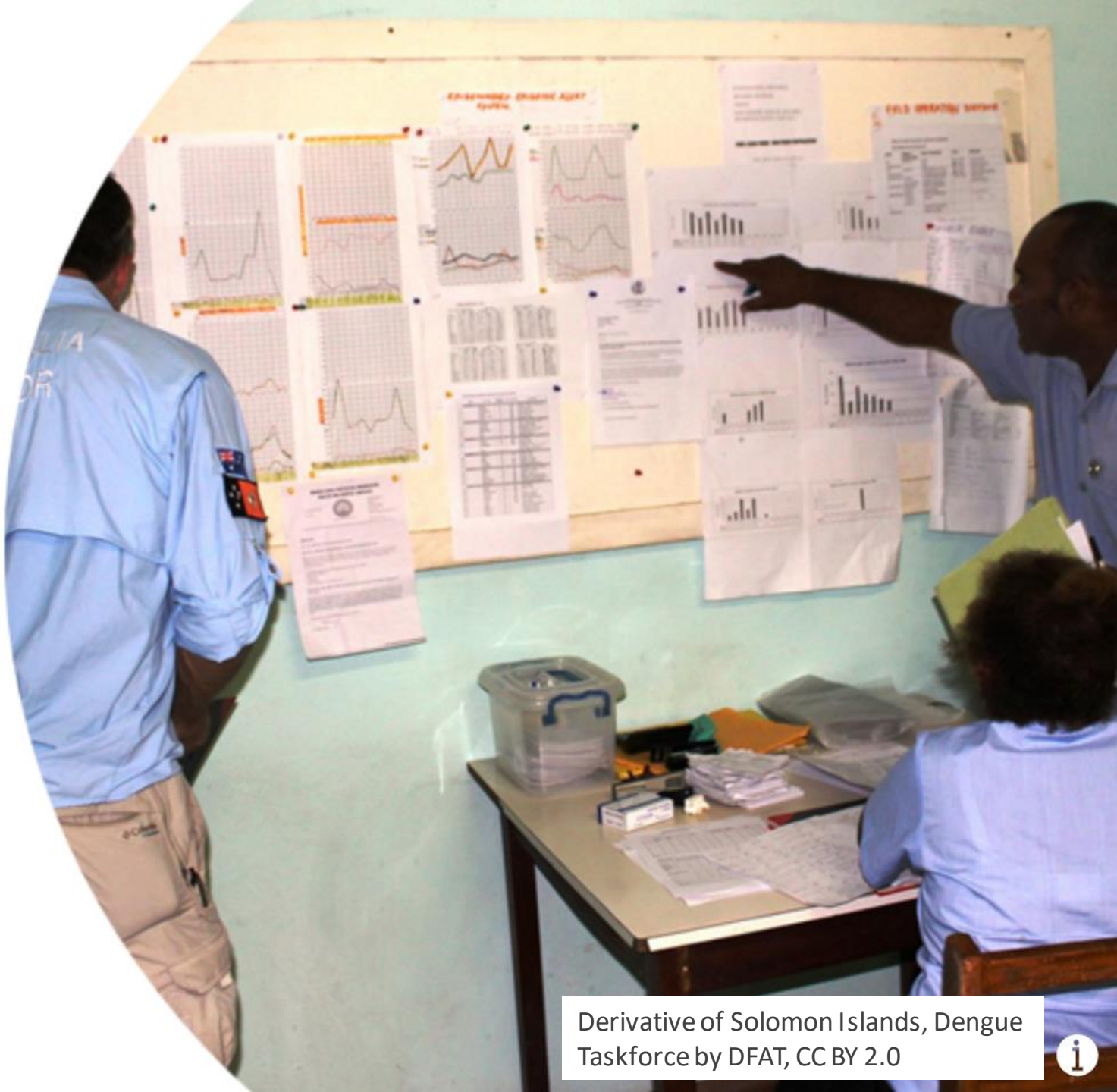
1 **Vector surveillance**

2 **Vector control**

Vector surveillance

Vector surveillance is the standardised collection, analysis and interpretation of entomological data.

Vector surveillance helps managers develop targeted control strategies.



Vector surveillance

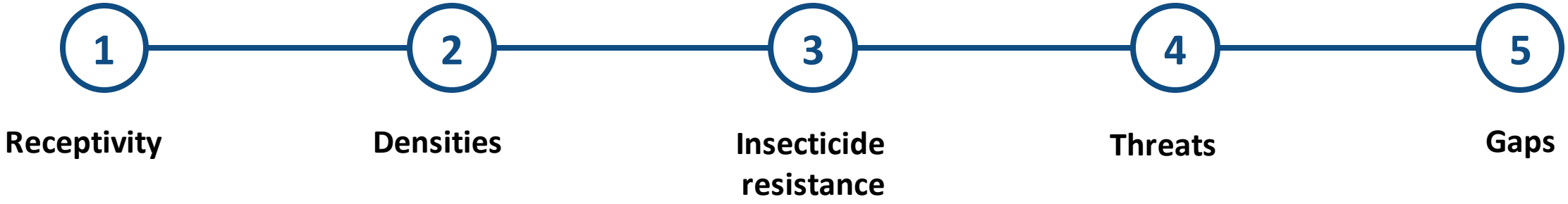
- A core intervention to understand mosquito characteristics
- Ensures control programs remain effective and responsive
- Enables vector control to be adapted to local conditions
- Helps to understand the receptivity of the environment to transmit a mosquito-borne disease
- Is not used for predicting outbreaks

Vector surveillance is part of preparedness and response

Vector surveillance data needs to be:

- standardised
- high-quality
- used for decision making

The WHO have identified 5 main objectives of vector surveillance



Designing a vector surveillance program

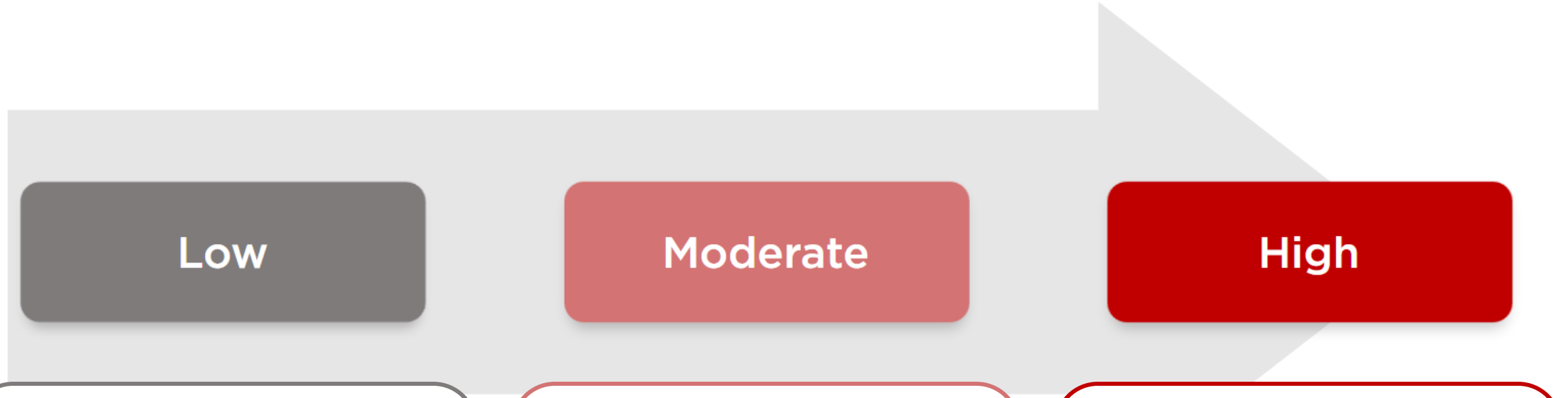
Requires understanding of:

- Risk of arbovirus outbreaks
- Arbovirus transmission scenario
- Vector control activities

Aedes aegypti mosquito by James Gathany / CDC (2006)

The risk of arbovirus transmission

Risk stratification can be at subnational levels: such as provinces, islands, health zones, cities, suburbs within cities, and villages.



The risk of outbreaks is low when there are no *Aedes* vectors, no circulating arbovirus, and few incoming travellers.

The risk of outbreaks is moderate when *Aedes* vectors are present, but there is no circulating arbovirus, and few incoming travellers.

The risk of outbreaks is high when *Aedes* vectors are present, arbovirus are circulating or sporadic, and there are **regular** incoming travellers.

Operational priorities for vector surveillance

Designated Points of Entry (air and sea ports)	Risk of arbovirus outbreak (no cases)[1]		Transmission scenario (at least 1 case)
	Low (no vectors present)	Moderate to High (vectors present)	Isolated to widespread cases
Routine entomological surveillance			
			Focus investigations
Spot checks			

What is the purpose of routine vector surveillance?

- To be prepared
- To identify key larval habitats
- To determine vector occurrence
- To track the density of the mosquito vector population
- To define the insecticide resistance profile of the primary vectors
- To monitor the biting and resting behaviours of the vectors

Priority indicators for *Aedes* surveillance

	Risk of arbovirus outbreak		
	Low	**Moderate**	**High**
	No *Aedes* present No arbovirus cases	*Aedes* vectors are present No arbovirus cases	*Aedes* vectors are present Before outbreak occurs
Adult occurrence	Once or twice a year	Quarterly/seasonally	Monthly/quarterly
Adult density			
Resting location			Annually
Resistance frequency		Annually	
Key larval habitats			
Aquatic habitat availability			

Routine surveillance occurs at **sentinel sites**

Selecting sentinel sites

Outlining the workplan

Example of routine surveillance from a high risk area

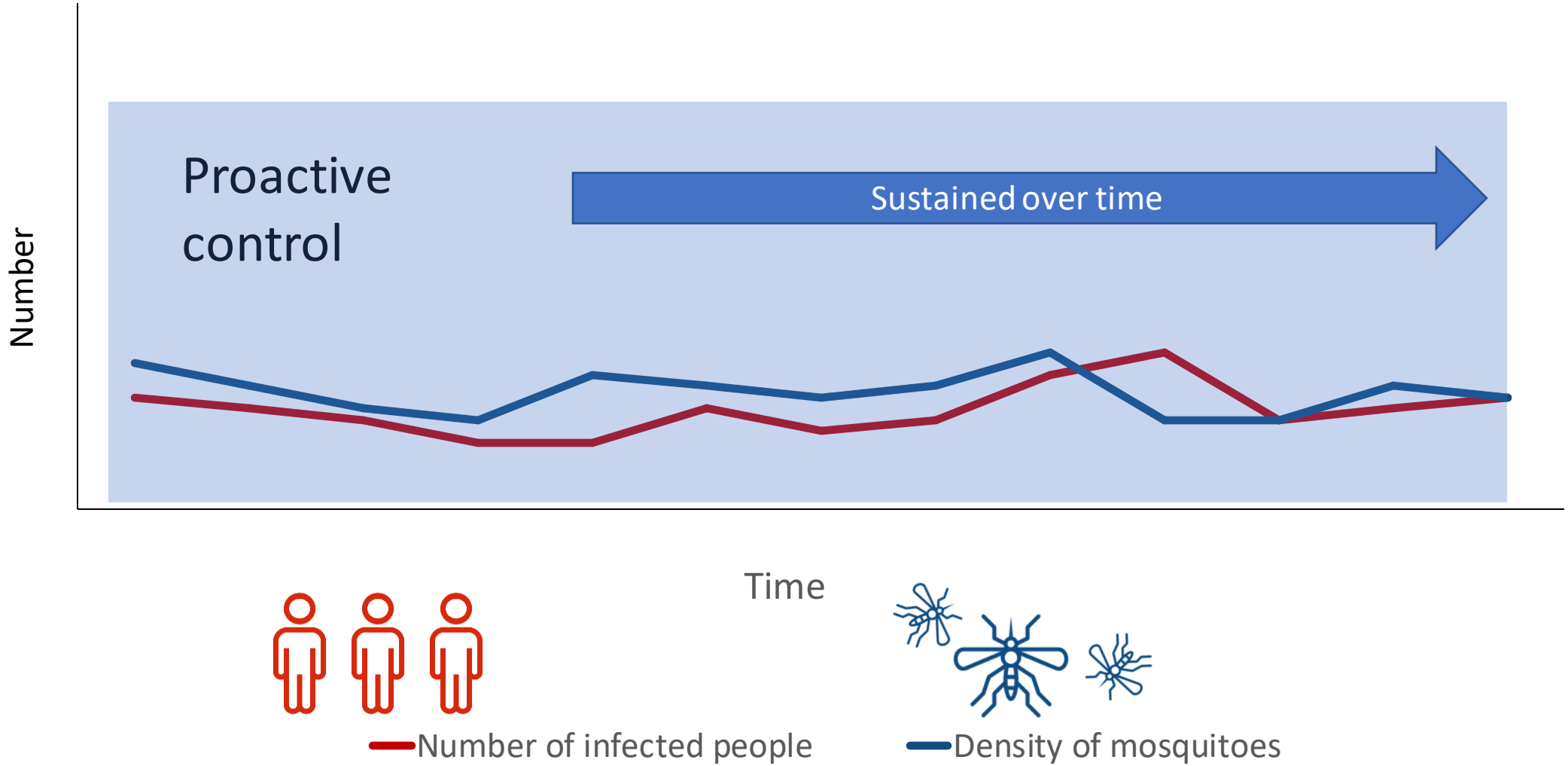
Factor	Details
Priority indicators	Adult occurrence and insecticide resistance
Routine surveillance method	Quarterly monitoring
Frequency	Adult occurrence – Two weeks of trapping in each quarter Insecticide resistance – Once per year
Surveillance sites	4 high risk surveillance sites
Sampling stations	10 fixed sampling stations within each surveillance site
Mosquito collections	BG sentinel traps (Adult occurrence) Ovitraps (to collect specimens to be reared for insecticide resistance bioassays)
Intended use of information	Choice of vector control tool based on the mosquito vectors present Choice of insecticide based on the insecticide resistance profile of the vectors

Vector control

Vector control activities are interventions that **limit the ability** of the mosquito population to transmit pathogens (by reducing biting rates on humans and/or vector competence)

Photo by John Rae Productions

Vector control activities may be **proactive** or **reactive**



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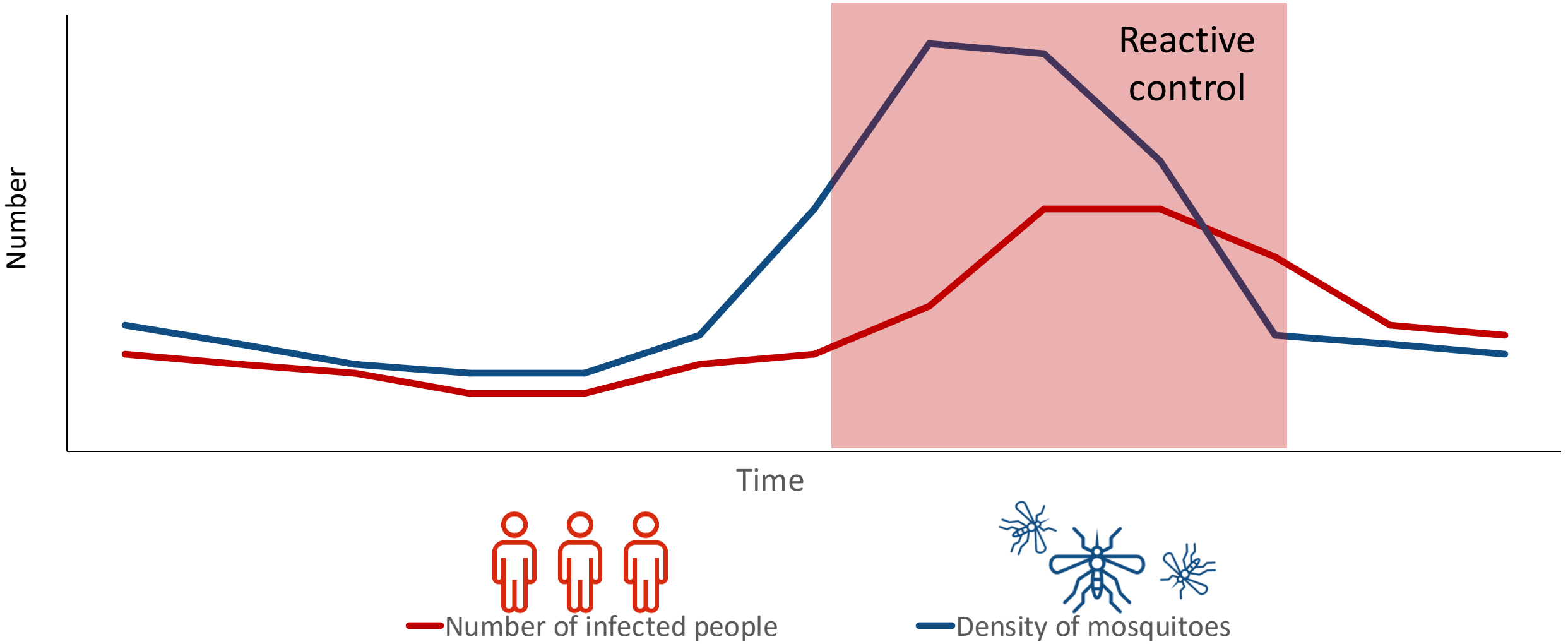


Operational priorities for vector control

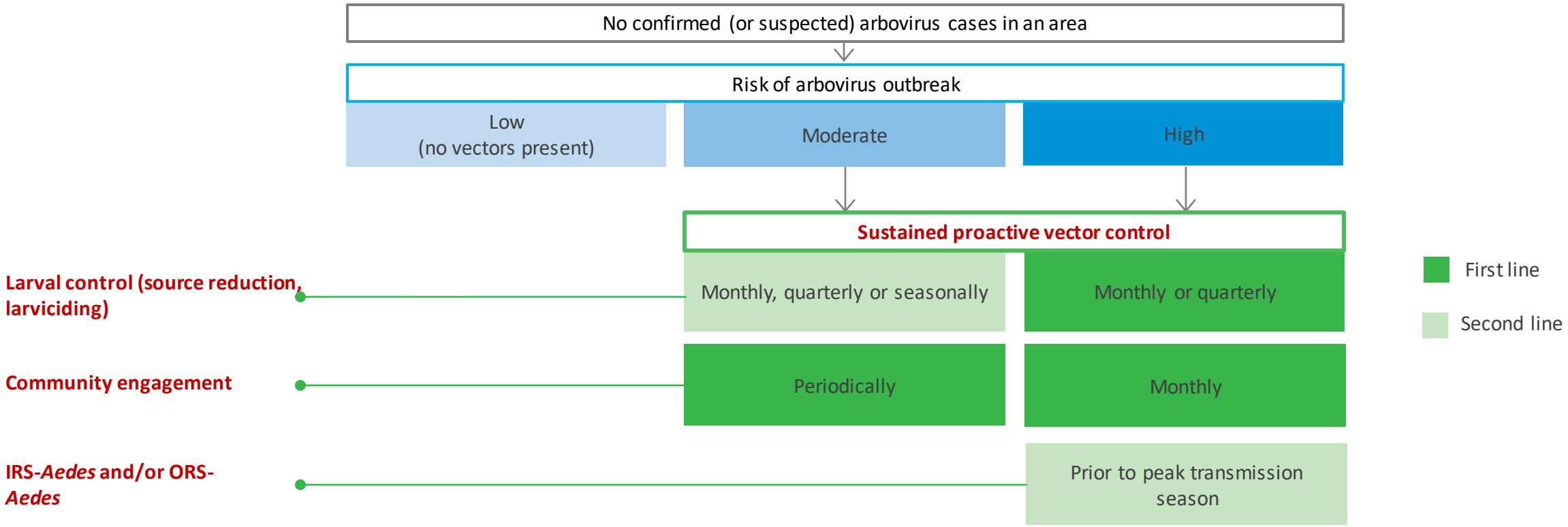
Designated Points of Entry (air and sea ports)	Risk of arbovirus outbreak (no cases)[1]		Transmission scenario (at least 1 case)
	Low (no vectors present)	Moderate to High (vectors present)	Isolated to widespread cases
	Sustained proactive	Sustained proactive	
	Reactive (when exotic vectors are detected)		Reactive (focal, broad scale, sustained)

Currently available vector control tools

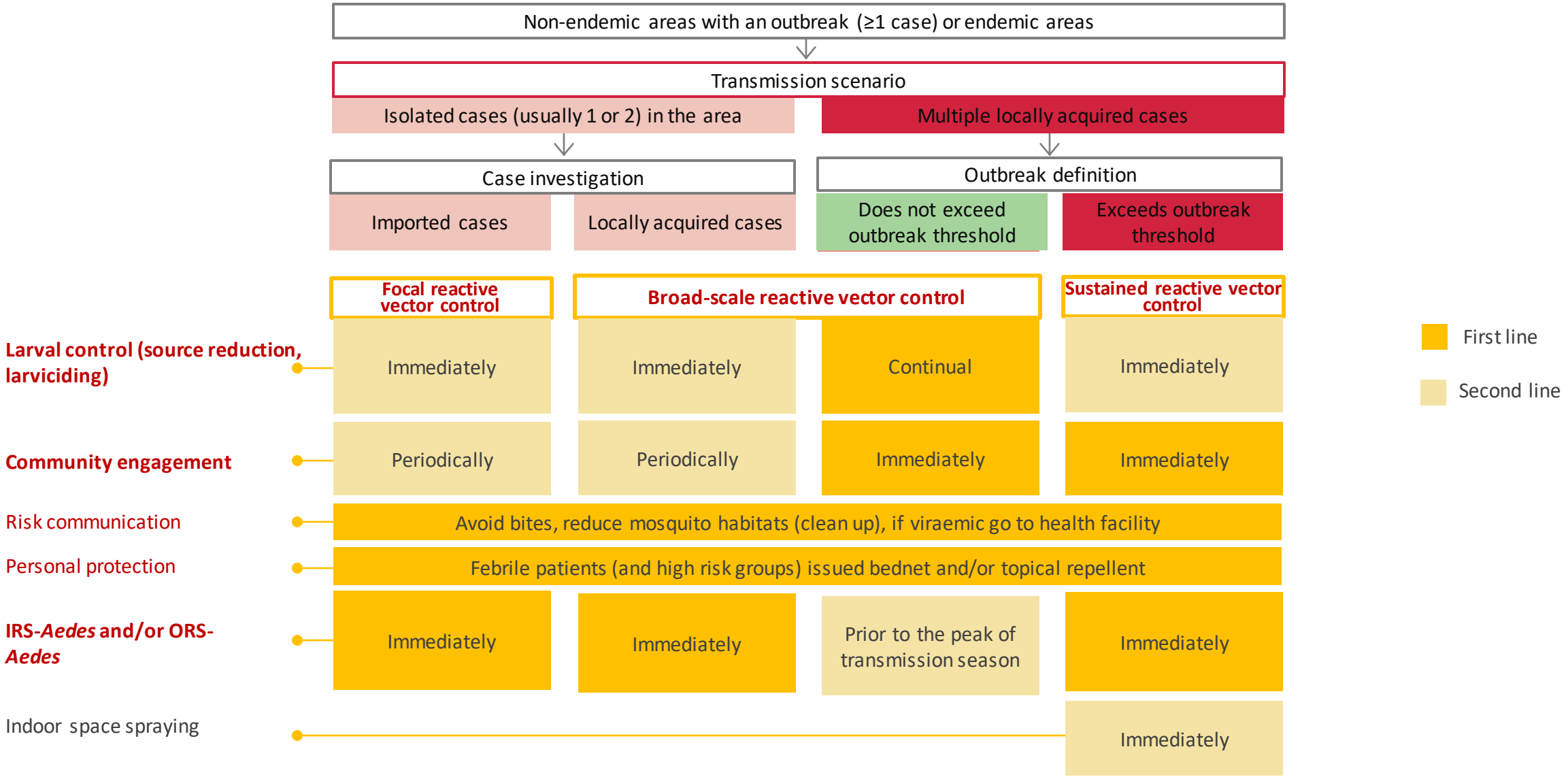
Outdoor Residual Spraying (Harbourage spraying)

The application of residual insecticides to vegetation where mosquitoes rest.

Operational priorities for vector control according to transmission risk



Operational priorities for vector control when at least one case of arboviral disease has been detected



PacMOSSI

Pacific Mosquito Surveillance Strengthening for Impact

James Cook University Australia

World Health Organization Western Pacific Region

Pacific Community Communauté du Pacifique

Beyond Essential Systems

PNGIMR Papua New Guinea Institute of Medical Research

QIMR Berghofer Medical Research Institute

APMEN asia pacific malaria elimination network

the power of humanity

Australian Red Cross

Queensland Government Queensland Health

Burnet Institute Medical Research. Practical Action.

Australian Defence Force Malaria and Infectious Disease Institute

Australian Government

Indo-Pacific Centre for Health Security

The University Of Queensland Australia

UNSW Australia

The University of Newcastle Australia

AFD Agence Française de Développement