Republic of Mauritius

OPERATIONAL PLAN FOR THE PREVENTION AND CONTROL OF CHIKUNGUNYA

FEBRUARY 2025

Ministry of Health and Wellness

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LIST OF ABBREVIATIONS

AHC	Area Health Centre
AHRIM	Association of Hoteliers and Restaurants in Mauritius
CDC	Centre for Disease Control and Prevention
CDCU	Communicable Disease Control Unit
CHC	Community Health Centre
CHL	Central Health Laboratory
CP	Community Physician
DHS	Director Health Services
EOC	Emergency Operations Command
FAREI	Food and Agricultural Research and Extension Institute
FETP	Field Epidemiology Training Programme
HSO	Health Surveillance Officers
MOHW	Ministry of Health and Wellness
MS	Medical Superintendent
NDU	National Development Unit
PCR	Polymerase Chain Reaction
PHFSI	Public Health and Food Safety Inspectorate
RCCE	Risk Communication and Community Engagement
RHD	Regional Health Director
RPHS	Regional Public Health Superintendent
RRT	Rapid Response Team
RT-PCR	Reverse Transcriptase - Polymerase Chain Reaction
VBCD	Vector Biology Control Division
WHO	World Health Organisation

Executive summary

This operational plan has been devised as part of the national effort to prevent and combat outbreaks of Chikungunya in the Island of Mauritius. It outlines a comprehensive strategy to reduce the incidence, transmission, and health impact of this mosquito-borne viral disease. Chikungunya, transmitted primarily *Aedes albopictus*, poses significant public health challenges.

Key Objectives

1. Ensure multisectoral collaboration among public health authorities, environmental agencies and community organisations.
2. Enhance surveillance system by ensuring timely detection of cases and potential outbreaks.
3. Promote community engagement through health education campaigns to encourage the adoption of protective behaviours, such as the use of repellents, wearing protective clothing, and eliminating standing water.
4. Improve clinical management of Chikungunya cases in order to reduce morbidity and prevent complications.
5. Reduce mosquito population.

Core Interventions

• Vector control measures
• Risk communication: Dissemination of timely and accurate information to empower communities and reduce misinformation.
• Outbreak response: Rapid deployment of emergency teams and supplies to contain outbreaks and mitigate their impact.

Expected Outcomes

• A significant reduction in Chikungunya transmission rates and outbreak frequency.
• Enhanced community resilience and capacity to manage vector-borne diseases.
• Strengthened health systems capable of responding effectively to future vector-borne disease threats.

By integrating preventive, surveillance and curative efforts, the plan aims to safeguard public health and reduce the socio-economic burden of Chikungunya.

1. Introduction

Chikungunya is a viral disease that is transmitted by day-biting mosquitoes. The principal vectors during outbreaks are the mosquitoes of the genus *Aedes*. In Mauritius, the local vector is *Aedes albopictus*.

The word comes from the African Makonde language and means "bent over in pain."

While the disease was first identified in the United Republic of Tanzania in 1952, the virus was first isolated in Thailand in 1958. Urban outbreaks of Chikungunya were first recorded in Asia in the 1970s, but since 2004, they have become more frequent and widespread. The first local, mosquito-transmitted Chikungunya cases in the Americas were reported in late 2013, after which large outbreaks occurred affecting most of the countries in the region. Chikungunya has now been reported in 118 countries in Asia, Africa, Europe and the Americas.

Chikungunya usually produces a transient illness often, clinically, confused with dengue. Symptoms include fever, headache, polyarthralgia, myalgia and rash. Although serious complications are uncommon, the arthralgia is incapacitating and may persist for months. It is a self-limiting disease found in tropical and sub-tropical regions around the world, predominantly in urban and semi-urban areas.

1.1 Causative agents

Chikungunya is caused by Chikungunya virus, a ribonucleic acid (RNA) virus which is member of Alphavirus genus of the family *Togaviridae*. There is one serotype of Chikungunya so far.

1.2 Vulnerability of Mauritius to Chikungunya

A preparedness plan for the prevention of control of Chikungunya is critical for Mauritius. The island being vulnerable to outbreaks for the following reasons:

1. *Aedes albopictus*, the sole mosquito species responsible for chikungunya and dengue transmission in Mauritius, is abundant and widespread across the island.

2. The population of *Aedes albopictus* is sustained throughout the year due to the mild tropical climate, the ecoplasticity of the vector and the ability of its eggs to remain viable for several months without water
3. Mauritius has suffered from an epidemic of Chikungunya in 2005 /2006.
4. Mauritius has extensive travel and trade links with countries which are endemic or prone to Chikungunya outbreaks.

1.3 Goal and Objectives of the Operational Plan

The main goal of the operational plan is to reduce morbidity and mortality from Chikungunya. Consequently, the focus during epidemic phase is containment and mitigation while during the quiescent inter-epidemic phase is early warning by surveillance and control. Hence the surveillance objectives will accordingly be different in each phase. The main goals are to:

1. Provide a step-step approach to the management of the epidemic by all stakeholders.
2. Provide a step-by-step approach to forecasting an epidemic.
3. Provide a step-by-step approach to the quelling of an epidemic at the onset.

1.4 The target users of the preparedness plan

This document is intended to all those involved in planning and in responding to the threat that represents Chikungunya and includes:

1. Policy and decision makers,
2. Hospital Administrators,
3. Regional Health Directors,
4. Regional Public Health Superintendents,
5. Community Physicians at CDCU Headquarters,
6. Public Health And Food Safety Inspectorate
7. Health Surveillance Officers
8. Vector Biology Control Division and
9. Other Stakeholders

2. Epidemiology of Chikungunya

Chikungunya virus occurs in tropical and subtropical regions. It often causes large outbreaks with high attack rates, affecting up to 75% of the population in areas where the virus is circulating. Outbreaks of Chikungunya have occurred in Africa, the Americas, Asia, Europe, and islands in the Indian and Pacific Oceans.

In 2005/2006, an epidemic of Chikungunya swept across the Indian Ocean islands of Comoros, Reunion, Mauritius and Seychelles. Subsequent outbreaks, in 2007, affected India and other Asian countries.

In late 2013, the first locally acquired cases of Chikungunya were reported in the Americas on islands in the Caribbean. By the end of 2017, >2.6 million suspected cases of Chikungunya had been reported in the Americas. Since then, the virus has continued to circulate and cause sporadic cases and periodic outbreaks in many areas of the world, including Africa, South America, and Asia.

Risk to travellers is greatest in areas experiencing ongoing Chikungunya epidemics. Most epidemics occur during the tropical rainy season and abate during the dry season. Outbreaks in Africa have occurred after periods of drought, however, where open water containers near human habitats served as vector-breeding sites.

Both adults and children can become infected and be symptomatic with Chikungunya. After the outbreaks in the Americas during 2014–2017, >4,000 Chikungunya cases were reported among US travellers, and 13 locally acquired cases were reported in the continental United States. In addition, the US territories of American Samoa, US Virgin Islands, and Puerto Rico reported locally acquired cases during 2014–2015; Puerto Rico also has been reporting sporadic cases since 2016. During 2018–2020, 340 US traveller cases were reported, with noticeably fewer cases in 2020 due to decreases in international travel during the coronavirus disease 2019 (COVID-19) pandemic.

In 2024 and as of 30 of November, approximately 480 000 Chikungunya cases and over 200 deaths have been reported worldwide. A total of 23 countries reported Chikungunya cases from the Americas (15), Asia (6), Africa (1) and Europe (1). (ECDC, 2025)

On 10th of February 2025, Agence Régionale de Sante, La Reunion (ARS) and Sante Publique France reported that since 23 August 2024, 783 local cases of

Chikungunya were recorded in the island. Since January 2025, the authorities reported 671 local cases in Reunion Island.

The epidemiology of the disease may be divided into two marked phases as shown in Figure 1 below.

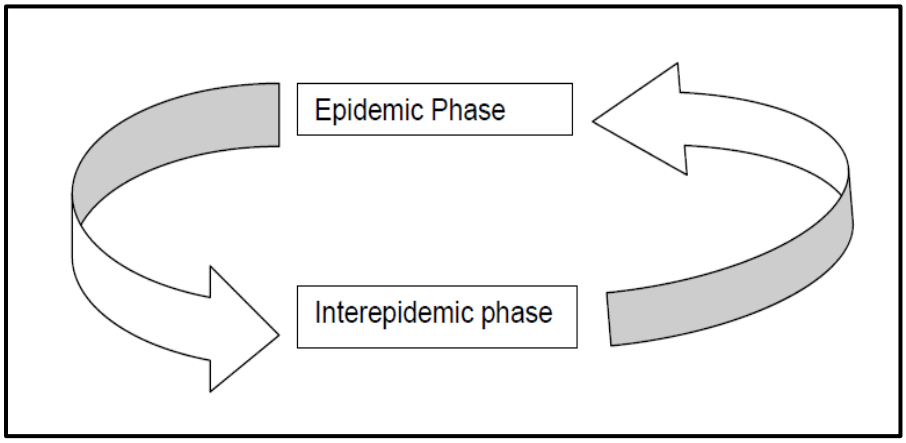

Figure 1: Cyclic nature of the Chikungunya epidemic

The virus causes overt outbreaks during the epidemic phase, following which the viruses go into a quiescent phase also referred to as the inter-epidemic phase. From there it erupts back into the epidemic phase depending on various environmental factors. The environmental factors triggering the viruses from one phase to another are poorly understood but includes temperature, rainfall, vector population and the number of immune subjects in the population commonly referred to as herd immunity.

3. Control Strategy of Chikungunya

The control strategy for Chikungunya depends on whether it is in the epidemic or the inter-epidemic phase. The activities for the inter-epidemic period primarily focus on the control of the larval population of the vector since there are no infected adult mosquitoes. During the epidemic phase the focus is on the control of both larval and adult mosquito populations since the adult mosquitoes are infective.

3.1 Triggers of outbreak investigation and control

Forecasting and recognizing an outbreak at the outset is important for reducing the full impacts of the outbreak. As shown in Figure 2, an early warning system (EWARS) must be used to detect triggers of an outbreak. The CDCU shall use the following trigger criteria for outbreak investigation and control:

1. Patient source data of the occurrence of more than one confirmed case of Chikungunya in a locality.
2. Density index of the *Aedes albopictus* mosquito from the Vector Biology and Control Division, including – the House Index (HI), the Breteau Index (BI), the Pupal Index (PI) and the Adult Incidence Index, in the affected localities locality. The various indices are calculated as per Annex 2 and should be < 5 during inter-epidemic situation and 0 during outbreaks.
3. Laboratory data showing increased laboratory request or positivity rate.

Figure 2 depicts the decision point for switching from inter-epidemic to epidemic periods. The set of activities are described below.

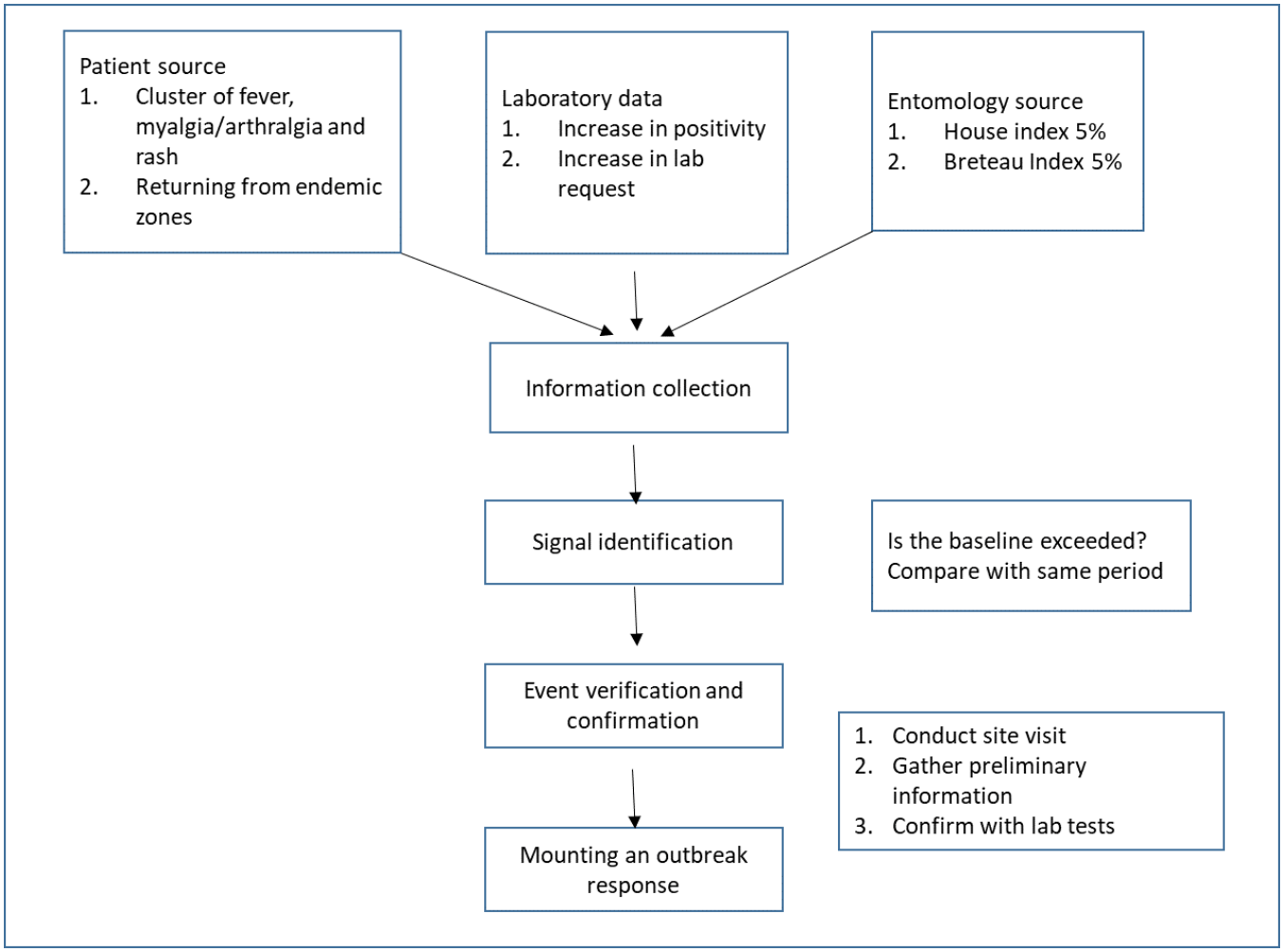

Figure 2: Early warning system for detecting Chikungunya outbreaks

3.2 Operational Procedure for Managing Outbreaks

The main goals during an outbreak are to manage the patients promptly and efficiently so as to reduce morbidity and mortality. In addition, the outbreak must also be overcome to protect the community at large. A set of tasks outlined in the ensuing sections are aimed at achieving these goals.

3.3 Objectives during outbreaks

The objectives during outbreaks are:

1. Planning and coordination
2. Outbreak investigation
3. Management of cases
4. Situation monitoring
5. Mosquito control
6. Risk Communication and Community Engagement

7. Infection Prevention and Control

3.4 Algorithm for mounting a response to an outbreak

This is shown in figure 3 below

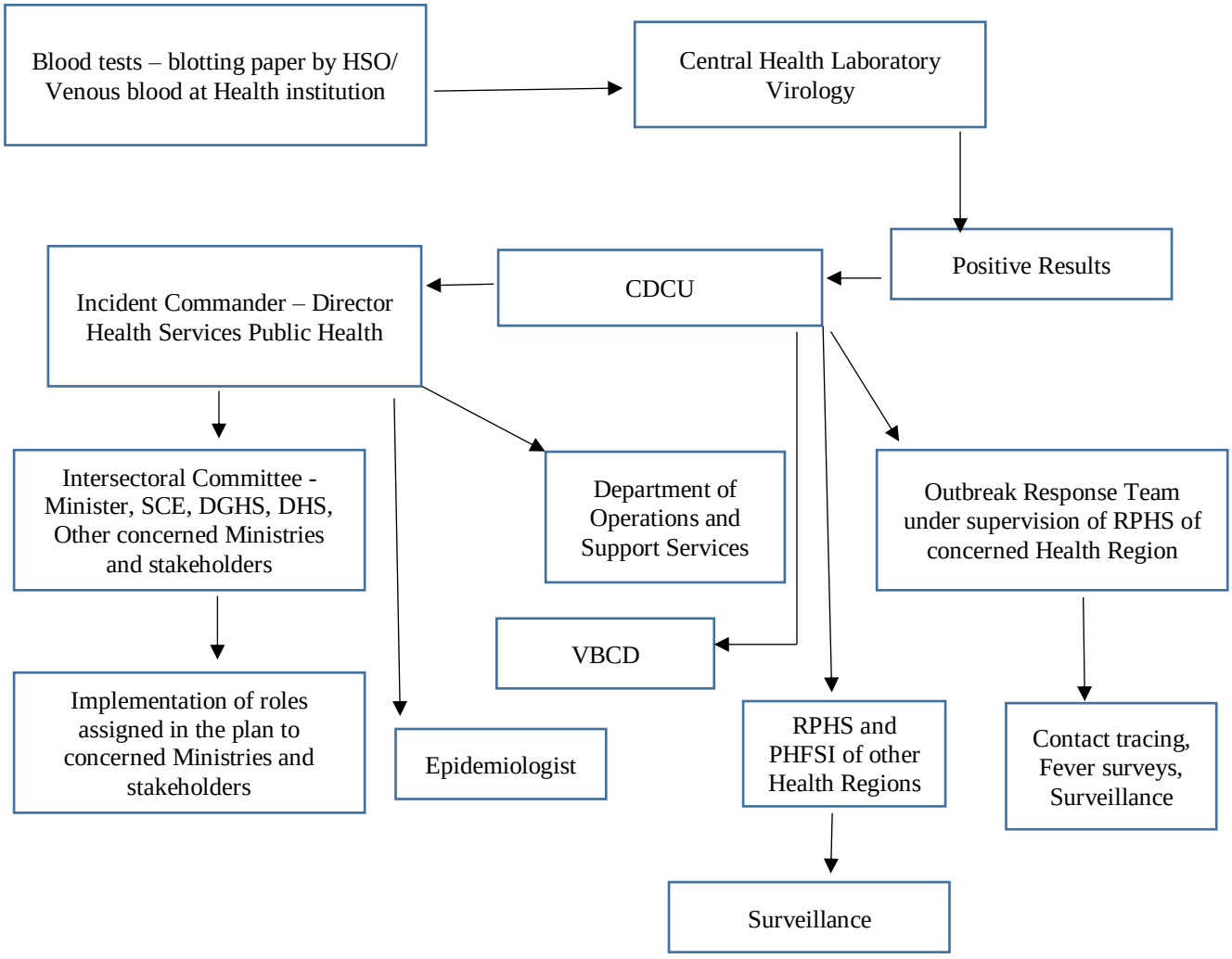

Figure 3: Algorithm for mounting an Outbreak Response

3.5 Overall Planning and coordination for logistic of an outbreak

Since several stakeholders are involved in the outbreak phase, it is important to define the roles and functions of each stakeholder, through planning and coordination, to ensure smooth supervision and minimize duplication, redundancy or contradictory activities.

3.5.1 Stakeholders from the health sector

From the health sector the following persons have clearly defined roles and responsibilities:

1. DHS Public Health
2. Administrative Cadre of MOHW
3. The RPHS of CDCU
4. The Regional Health Director
5. The Regional Public Health Superintendent at Regional level
6. The Rapid Response Team led by the Medical Superintendent
7. The Epidemiologist
8. The Head of the Vector Biology and Control Division and
9. Director Public Health and Food Safety

3.5.1.1 Role of the DHS and Administrative cadre of MOHW

The role of the DHS Public Health and the Administrative cadre of the MOHW is to oversee the overall planning and coordination of the management of the outbreak.

3.5.1.2 Role of the CDCU

The role of the Communicable Disease Control Unit (CDCU) is as follows: -

1. Coordinate and oversee all activities pertaining to outbreaks:
    a) Collect, compile data and submit reports.
    b) Coordinate implementation of activities at regional levels through the Regional Public Health Superintendents.
    c) Arrange for submission of daily technical reports, for each region, to the DGHS and DHS of Public Health.
2. Direct all operations for
    a) Outbreak investigations to be undertaken by the regional rapid response team.
    b) Outbreak controls.
3. Monitor the following activities:
    a) Larviciding and fogging operations effected in the regions.

b) The implementation of strategies for vector control and vector surveillance.
c) Analyse the trend of the disease with respect to person, place and time.
d) Conduct additional epidemiological studies if necessary.

4. Produce and disseminate information for action
   a) Guide the fogging and larviciding operation by directing them where the "hot zones" of the disease are.
   b) Produce and disseminate updated case definitions and case management protocols to all RPHS
   c) Supervise the training of clinicians in case definition and management
   d) Publish weekly bulletin of the disease trend and operation conducted
   e) Maintain a list of Chikungunya-endemic countries and supply it to the PHFSI

3.5.1.3 Role of the Regional Health Director

The Regional Health Director is responsible for:

1. The overall management and coordination of Chikungunya response within the designated region. This includes, but is not limited to, ensuring the appropriate allocation and preparedness of healthcare facilities for case management.
2. Oversee the procurement, availability and timely distribution of essential countermeasures, including medications, personal protective equipment (PPE), bed nets, transport facilities and other critical supplies required for patient care and vector control.
3. Ensuring that healthcare personnel are adequately trained in Chikungunya case management, infection prevention and control (IPC) measures, and that public health interventions, such as surveillance, community engagement, and vector control activities are effectively implemented in collaboration with relevant stakeholders.

3.5.1.4 Role of the Regional Public Health Superintendent

At regional level, the Regional Public Health Superintendent (RPHS) is responsible for:

1. Overseeing and coordinating the public health response to Chikungunya cases with the Public Health and Food Safety Inspectorate and other concerned stakeholders. This

includes ensuring systematic surveillance through the monitoring of case trends, conducting outbreak investigations, identification of clusters or outbreaks and timely reporting of suspected and confirmed cases.

2. Overseeing IDSR and laboratory-confirmed case tracking to guide appropriate public health interventions.
3. Gathering and consolidating data from Medical Superintendents regarding the status, clinical progression and outcomes of hospitalized Chikungunya patients.
4. Ensure that case findings, laboratory results and epidemiological data are communicated accurately and in a timely manner to all relevant stakeholders.

3.5.1.5 Role of the Medical Superintendent

The Medical Superintendent is responsible for:

1. The establishment, operation and effective deployment of the Rapid Response Team (RRT) within the health region. This includes ensuring that the RRT is adequately equipped with essential medications, medical equipment and relevant rapid diagnostic tests required.
2. Ensuring that the RRT is provided with adequate and appropriate personal protective equipment (PPE) in line with infection prevention and control (IPC) protocols.
3. Monitoring the clinical progress and outcomes of hospitalised patients and communicating the relevant data to the Regional Public Health Superintendent (RPHS), facilitating data-driven decision-making for patient management and public health response.

3.5.1.6 The role of the head of the Rapid Response Team (RRT)

The RRT is responsible for carrying out field investigations to confirm the presence of an outbreak. The head of the RRT at central level is designated by the DHS Public Health and the head of the RRT at regional level is designated by the RHD.

The role of the head of the rapid response team is as follows:

1. To carry out field investigation of the outbreaks according to set procedures
2. To report daily to the central command unit at the CDCU
3. To analyse the prevalence of the disease in different risk groups and geographic areas

3.5.1.6 The role of the Epidemiologist

The Epidemiologist is responsible to the Director Health Services of Public Health through the Regional Public Health Superintendent and has the following roles:

1. To plan, design and implement epidemiological studies with a view to investigating human disease and risk factors.
2. To participate in research activities and special investigations (including disease outbreak investigations).
3. To determine and utilise appropriate statistical methods/analysis to evaluate and interpret data.
4. To perform duties as assigned in the event of a Public Health emergency and other response programmes.
5. To produce periodical reports on the epidemiological trends of communicable diseases and their risk factors.

3.5.1.7 The role of the Vector Biology and Control Division

The role of the Vector Biology and Control Division is as follows:

1. To map the density of the mosquito vector by the various indices detailed at **Annex 2**
2. To send daily reports of mosquito data to the Operations centre at the CDCU and to the relevant regional Health Office.
3. To assess the efficacy of insecticides used by the Public Health and Food Safety Inspectorate during outbreaks
4. To assess the efficacy of vector control interventions during outbreaks
5. To assess resistance to insecticides in *Aedes albopictus* as per the Insecticide Resistance Management Action Plan
6. To participate in multi-sectoral and technical meetings
7. To investigate novel vector surveillance and control methods
8. To provide vector-related information for drafting sensitization messages and for the prioritization of sensitization interventions
9. To participate in sensitization campaigns

3.5.1.8 The role of the Public Health and Food Safety Inspectorate Cadre

1. Health status of close contacts is enquired by Health Surveillance Officers (HSOs) of the concerned Health Office and blood samples on blotting paper are taken from all immediate contacts. Said blotting papers should be urgently sent to the Molecular Biology Laboratory at Candos.

2. Indoor Residual Spraying (IRS) –
   - IRS (Dosage: 200ml alpha-cypermethrin / 10L Water); and
   - MIST BLOWING ACTIVITIES (Dosage: 250ml Aqua K Othrine / 10L Water); is carried out at the residence of the patient and at the site of work of the patient, by the CDCU Team as soon as possible or the Health Office in question.

3. Fogging activities (40 ml Aqua K Othrine + 600 ml Nebol + 3360 ml Water) for 4L Fogging apparatus) is carried out on the first (1st) day following a positive case, by the concerned Health Office targeting all premises, including Health and Educational Institutions, gardens, wastelands/ barelands, public places in a radius of 300 metres from residence of patient and any other place where patient stayed overnight as well as site of work and around place of hospitalisation of patient. Fogging operations to be repeated on DAY 3, DAY 7 and (DAY 10 in local cases of Chikungunya).

4. Residents are sensitised prior to the fogging operation by the concerned Health Office.

5. Peri-domestic activities is carried out by the concerned Health Office within a radius of 300 metres around
   (a) Residence of patient and
   (b) Site of work of patient
   on the next day following fogging operations.

i. Larviciding activities is carried out by Insecticide Sprayer Operators (ISOs) of concerned health office, using Temephos at a dosage of 17 ml / 10L Water or Bacillus thuringiensis israelensis (B.T.I) - 20 g B.T.I /10L Water.

ii. House to house inspections are carried out by PHFSIs of the concerned Health Office to detect and eliminate nuisance and clearing of wastelands through service of Notices / issue of Statement of Nuisances, wherever applicable.

iii. Fever surveys to be done by Health Surveillance Officers (HSOs) of the concerned Health Office twice weekly for 4 consecutive weeks.

6. Health Education talks to be delivered in schools, Community Centres, etc., by PHFSIs of the concerned office, jointly with officers of the VBCD, including distribution of flyers, during outbreaks of Chikungunya.

3.5.2 The non-health sector stakeholders

From the non-health sector, the following departments and Ministries are involved:

1. The Ministry of Environment, Solid Waste Management and Climate Change
2. Ministry of Local Government,
3. Ministry of Agro Industry, Food Security, Blue Economy and Fisheries
4. Ministry of Education and Human Resource
5. Ministry of Tourism,
6. Ministry of Gender Equality and Family Welfare
7. Mauritius Police Force
8. Representatives of the private sector such as Mauritius Chamber of Commerce and Industry, The Chamber of Agriculture, AHRIM, FAREI and other stakeholders.
9. Other members will be co-opted as and when required.

The participation of the non-health sectors will be ensured through the setting up of a multisectoral taskforce.

3.5.2.1 The role of the Ministry of Environment, Solid Waste Management and Climate Change

- Step up clean up campaigns by providing waste litter bins in high-risk areas
- Help in the cleaning up of bare lands and riverbanks where wastes accumulate.
- Provide additional workforce whenever necessary

3.5.2.2 The role of the Ministry of Local Government

- Opening of temporary dump sites for receiving green waste and old tyres
- Issuing of exemption from waste carrier's license for carrying waste
- Regular inspection and monitoring of bare lands/wasteland
- Wasteland management by legal actions against offenders.
- General cleaning campaigns in collaboration with "forces vives"
- To provide support in larviciding and fogging activities to the Ministry of Health & Wellness.

3.5.2.3. The role of the Ministry of Agro Industry, Food Security, Blue Economy and Fisheries

- Ensure elimination of breeding sites from irrigation areas.
- Sensitize planters on proper water storage for irrigation
- Supplement workforce for vector control activities.

3.5.2.4. The role of Ministry of Tourism

- Support the national awareness campaign
- Support the vector control activities
- Sensitize hotels for the need to identify cases within their premises and ensure that positive Chikungunya patients remain isolated in their rooms.

3.5.2.5 Role of Ministry of Education and Human Resources

- Support the awareness campaign
- Ensure a clean environment within their premises.

3.5.2.6. The role of the Business Sectors

- Support the cleaning campaign
- Support the awareness campaign
- Empower workers for a clean working environment

3.5.3 Role of RCCE

1. Coordination and internal communication by organizing coordination meetings, conducting advocacy campaigns, initiating the development and review of strategies and action plans, conducting training of stakeholders at all levels and mobilizing resources to facilitate implementation of activities.
2. Public communication by identifying and training trusted spokespeople and capacity-building of various stakeholders by using social media, messengers, ambassadors, influencers and champions.
3. Community engagement with communities in health zones and local government to achieve advocacy or briefings for specific groups such as educational talks, outreach communication, use of private radio stations, use of community platforms and networks and engagement of community influencers.
4. Infodemic management to monitor and manage rumors and misinformation circulating in the media, social networks and in the community by training officers in each health region.

3.6 Setting up of a Multi Sectoral Committee for coordination of health and non-health sectors

A multi sectoral committee has been set up under the chairmanship of the Minister of Health & Wellness comprising of Senior Officials of other Ministries namely: the Ministry of Environment and NDU; Ministry of Local Government, Rodrigues and outer Islands; Ministry of Agro- Industry, Food production and Security; Ministry of Education, Culture and Human Resources; Ministry of Tourism, Leisure and External Communications; Ministry of Women Rights**,** Mauritius Police Force and representatives of Private Sector such as Mauritius Chamber of Commerce and Industry, the Chamber of Agriculture, L'AHRIM, FAREI and other stakeholders.

The role of the multisectoral committee is as follows:

1. Identify and monitor control measures to be implemented by each sector
2. Meet regularly during an outbreak to review progress and advise the government on the control measures to be taken.

3.7 Public relations/Advocacy/Administrative Mobilisation

This component should target healthy behaviour on the business sectors and administrative programme management's agenda via mass media such as news coverage, talk shows, soap operas, celebrity spoke persons etc. Active participation of the following Ministries should be included in the campaign against Chikungunya:-

1. Ministry of Local Government,
2. All the Local Authorities,
3. Ministry of Education and Human Resource,
4. Ministry of Environment, Solid Waste Management and Climate Change
5. Ministry of Youth and Sports,
6. Ministry of Tourism,
7. Ministry of Agro Industry, Food Security, Blue Economy and Fisheries,
8. Mauritius Police Force
9. L'AHRIM,
10. The Mauritius Chamber of Commerce and Industry
11. The Chamber of Agriculture and
12. Other stakeholders

3.8. Sustained Appropriate Advertising and Promotion

The approach here should be massive, repetitive, intense and persistent advertising via radio, television, newspapers and other available media to engage the people in recommended behaviour change and the health cost of not changing the behaviour. An effective media program should be developed and implemented to create awareness of Chikungunya, proper disposal of refuse and waste and source reduction measures.

3.9 Activation of the Emergency Operation Centre

During an outbreak, operation centres should be set up at the central and regional levels.

3.9.1 EOC at central level

At the central level, the EOC will be headed by the Incident Manager (until the operationalisation of PHEOC) and will be assisted by:

1. Regional Public Health Superintendent CDCU (HQ) / CDCU (Vector Borne Diseases)
2. 3 Community Physicians (preferably with FETP)
3. 1 Epidemiologist
4. Director Public Health and Food Safety
5. Director CHL
6. IPC National Focal Point
7. Chief HIEC unit
8. PHFS Inspector from CDCU (Vector Borne Diseases)
9. 1 Senior PHFSI
10. 2 PHFSI
11. 1 entomologist of the Vector Biology and Control Division
12. Staff of medical records department
13. Staff of medical statistics
14. 3 administrative/supportive staff.
15. Manager Procurement Unit
16. Any other staff as and when required will be co-opted

The functions of the Operations Centre at central level will be as follows (but not limited to):

1. Maintain a database of outbreak investigation on a daily basis
    - Task to be performed by medical record and administrative staff
2. Analyze the trend of the epidemic by locality
    - Task to be performed by medical statistics unit, with the support of the Epidemiologist and Entomologist.
3. Disseminate the result daily to all interested parties.

4. Ensure procurement, supply and appropriate distribution of required counter measures.

3.9.2 EOC at regional level

At regional level, the EOC will be headed by the RPHS and supported by the Medical Superintendent, Community Physician, Regional Health Services Administrator, Principal PHFSI of the concerned region. Any other stakeholder required will be co-opted.

4. Outbreak investigation

4.1 Establishing the outbreaks

An outbreak is confirmed by showing that the number of positive cases is above the expected baseline number. In the case of Chikungunya, since the baseline is currently zero in Mauritius, at least one **local** case will indicate the presence of an outbreak. This will be done by the following steps:

1. Clinically confirming the suspected diagnosis by the application of the standard case definition
2. Laboratory confirmation of the index and linked cases
3. Outbreak Investigation Team from the CDCU consisting of:
    - RPHS
    - CPs with FETP
    - Epidemiologist
    - Public Health Food & Safety Inspectors
    - Senior Health Surveillance Officer/Health Surveillance Officer.
    - VBCD
    - Data manager
    - Driver
    - Any other member will be co-opted

4. Once an outbreak is confirmed, Rapid Response Teams should be set up in each regional hospital. The rapid response team at regional level will consist of:

a) One Community Physician
b) One healthcare worker trained in FETP
c) Principal Health Food & Safety Inspectorate
d) One Senior Health Surveillance Officer
e) One Entomologist of the Vector Biology and Control Division (if needed)
f) One laboratory representative (if needed)
g) One data manager/administrative support staff (if needed)
h) Any other member will be co-opted as and when required

It is incumbent of the CDCU, in collaboration with the DHS Public Health, to notify about a potential outbreak by informing:

1. The Minister of Health and Wellness
2. The SCE
3. The DGHS
4. The DPS of Public Health
5. Communication advisors
6. Members of the regional outbreak Rapid Response Team

4.2 Management of cases

Proper patient management is critical for reduction of case fatality and limiting the spread of the infected mosquito in the community at large. The strategy for management shall be:

1. Prevention of spread of the disease through mosquito bites and
2. Clinical management - symptomatic

4.2.1 Public health measures

1. Mosquito nets, electrical mosquito repellents, mosquito coils, mosquito repellent creams and mosquito repellent lotions to be made available in all hospitals and a weekly status of the above is to be sent to the RHD to be forwarded to the concerned DHS and copied to CDCU Vector Borne Diseases.
2. Community to be sensitized in the need to refrain from travelling to high-risk zones and to visit Chikungunya affected patients.
3. All admitted patients should be under a mosquito net, windows to the room should be closed and mosquito repellents/coils should be used in the hospital room.

4.2.2. Clinical Management of Suspected cases

1. Case definition of the Chikungunya should be circulated to all Medical Practitioners (see Annex 1).
2. Guidelines on Clinical Management as prepared by Consultants Physicians of suspected or confirmed cases of Chikungunya must be distributed to all Medical Practitioners.

A strategy of triage must be followed to reduce the surge capacity on the hospitals and reduce morbidity and mortality of the patient.

4.3 Situation Monitoring

The CDCU will be responsible for situation monitoring by both active case detection and passive surveillance from sentinel sites.

The Medical Superintendent will be responsible for the curative aspects. Data pertaining to Chikungunya admissions and outcomes such as complications and deaths, amongst others, will be collected by the MS Office and forwarded to the RPHS Office.

It is imperative that all stakeholders, including the RHD, RPHS, MS, officers from the PHFSI cadre and officers from the VBCD, ensure that data relevant to their respective fields reach CDCU in a **timely manner** and through the proper channels.

4.3.1 Active case detection

Whenever an index case is detected, active case search will be undertaken for all contacts of the case. The following procedure will be used:

1. Interview the index case to enumerate a list of immediate contact
2. Draw a map of the location of all contacts
3. Trace the contacts using the above list
4. Interview the contacts to get epidemiological data
5. Collect acute blood sample
6. Observe the contacts for 12 days (maximum incubation period)

4.3.2 Passive Case detection

Passive surveillance for case detection must be conducted by using sentinel sites comprised of:

1. Government hospital and clinics
2. Private clinics (to send official notification and status of patient to RPHS Office on a daily basis)
3. Private Medical practitioners (to send official notification and status of patient to RPHS Office on a daily basis)

The procedure for passive surveillance shall be as follows:

1. The sentinel sites should be chosen to represent all the health regions
2. Focal points for all sentinel sites should be identified for each health region
3. The focal point should be supplied with documentation and complete instruction on case definition and case investigation form including laboratory collection
4. Weekly communication should be maintained with the focal points

4.4 Laboratory Surveillance

The Virology Unit of the Central Health Laboratory will be responsible for virological surveillance. The main roles of the virology unit will be as follows:

1. To confirm all suspected cases by PCR
2. Submit daily report to CDCU in a standard format
3. Participate in planning meeting for control of outbreak control

4.5 Vector Surveillance

The responsibilities of vector studies, surveillance and provision of guidelines for strategical control of mosquito vectors are vested to the **Vector Biology and Control Division.**

The roles of this unit in outbreak control are:

1. To conduct mosquito surveys within 24 hours of notification of the Chikungunya case (DC) within a 300 m radius of the DC's residence, workplace, school and/or other places the latter may have recently visited to determine larval, pupal and adult density of *Ae. albopictus* in the region.

2. To repeat mosquito surveys (monitoring surveys) after vector control interventions in the vicinity of Chikungunya cases to evaluate their impact on the *Ae. albopictus* population.

3. Calculate the following density indices (see Annex 2) for *Ae. albopictus*
    a. House index (HI)
    b. Container index (CI)

c. Breteau index (BI)

d. Pupal index (PI)

e. Adult density

4. To map the vector density in Chikungunya hotspots
5. Perform PCR for Chikungunya on adult *Ae. albopictus* mosquitoes
6. To submit a daily report on vector population density to the operation centre CDCU and the relevant regional Health Office
7. To provide predictive maps of *Ae. albopictus* in the Chikungunya hotspots using the ALBOMAURICE modelling software
8. To evaluate the efficacy of insecticide products used by the Public Health and Food Safety Inspectorate during outbreaks as per WHO guidelines

4.7 Mosquito control

Mosquito control forms an integral part in the prevention and control of Chikungunya. It consists of the following activities:

1. Adult control by space spray
2. Larval source reduction
3. Prompt reporting of mosquito control activities
4. Social mobilisation and communication

4.7.1 Adult control by space spray

1. Indoor Residual Spraying (IRS) –
    - IRS (Dosage: 200ml alpha-cypermethrin / 10L Water); and
    - MIST BLOWING ACTIVITIES (Dosage: 250ml Aqua K Othrine / 10L Water); is carried out at the residence of patient and at the site of work of patient, by the CDCU Team as soon as possible or the Health Office in question.

2. Fogging activities (40 ml Aqua K Othrine + 600 ml Nebol + 3360 ml Water) for 4L Fogging apparatus) is carried out on the first (1st) day following a positive case, by the concerned Health Office targeting all premises, including Health and Educational Institutions, gardens, wastelands/ barelands, public places in a radius of 300 metres from residence of patient and any other place where patient stayed overnight as well as site of work and around

place of hospitalisation of patient. Fogging operations to be repeated on DAY 3, DAY 7 and (DAY 10 in local cases of Chikungunya).

4.7.2 Larval source reduction

1. Larviciding activities is carried out by Insecticide Sprayer Operators (ISOs) of concerned health office, using Temephos at a dosage of 17 ml / 10L Water or Bacillus thuringiensis israelensis (B.T.I) - 20 g B.T.I /10L Water.
2. House to house inspections is carried out by PHFSIs of the concerned Health Office to detect and eliminate nuisance and clearing of wastelands through service of Notices / issue of Statement of Nuisances, wherever applicable.

4.7.3 Reporting of mosquito control activities

During the epidemic period, the following daily reports must be submitted to the MOHW:

1. Advance programme of work for larviciding for the week
2. Advance programme of work for fogging for one day
3. Daily report on larviciding
4. Daily report on fogging
5. Daily Entomological report
6. Daily application report

4.7.4 Social mobilisation and Communication

Social mobilisation or community participation is a key component for sustainable prevention and control of mosquito-borne diseases. Community participation includes mobilisation of civil society groups and inter-sectoral groups in health education, personal protection and law enforcement. The target is to deliver the messages of environmental management for:

1. Container management to reduce the sources of mosquito breeding habitats
2. Elimination or alteration of breeding sites including rubbish disposal, tyres, etc.
3. Proper management of water storage device
4. Environmental protection through larviciding and use of repellents etc.

The WHO COMBI model for social mobilisation and communication must be used to deliver the above messages.

5. Surveillance Tasks for Inter-Epidemic Period

The inter-epidemic or quiescent period is defined as "the time between outbreaks of a disease." It is that time which allows to build up on resources in order to prepare for the next outbreak.

5.1 Objectives during inter-epidemic period

The objectives during the inter-epidemic period are:

1. Capacity building and preparedness
2. Planning and coordination
3. Situation monitoring
4. Simulation exercises
5. Mosquito surveillance and studies
6. Mosquito control
7. Social mobilisation and communication

5.1.1 Capacity building and preparedness

The inter-epidemic phase provides an opportunity to build the capacity in preparedness and readiness for responding to outbreaks of mosquito-borne diseases, after a gap analysis is conducted.

5.1.2. Planning and coordination for logistic for inter-epidemic period

The inter-epidemic period is an excellent opportunity to foster and consolidate coordination. Since several stakeholders are involved in the control of vector-borne diseases, it is important to define the role and function of each stakeholder through planning and coordination to ensure smooth surveillance and minimize duplication, redundancy or contradictory activities.

5.1.3. Situation monitoring

It consists of the following:

1. Maintaining a robust surveillance system to monitor trends in Chikungunya cases and associated mosquito vectors.

2. Analysing epidemiological data to identify high-risk areas and periods.
3. Monitoring climatic and environmental factors that may contribute to mosquito breeding and virus transmission.

5.1.4. Simulation exercises

The importance of simulation exercises is:

1. To evaluate and enhance the preparedness of health systems and stakeholders by conducting mock drills and simulation exercises.
2. To test the efficiency of response plans, interagency coordination and logistical arrangements.
3. To identify gaps in preparedness and address them proactively.
4. To build confidence among health workers and communities.

5.1.5. Mosquito surveillance and studies

These consist of the following activities:

1. Conducting entomological surveillance to monitor the density and species of mosquito vectors (e.g., *Aedes aegypti* and *Aedes albopictus*).
2. Studying mosquito behavior, breeding patterns, and insecticide resistance.
3. Identifying hotspots of mosquito breeding and prioritize them for control measures.

5.1.6. Mosquito control

Mosquito control is carried out by:

1. Implementing integrated vector management (IVM), including source reduction (eliminating mosquito breeding sites), larviciding, and adult mosquito control.
2. Promoting environmental sanitation and community involvement in vector control.
3. Ensuring the use of effective and safe insecticides while addressing resistance concerns.

5.1.7. Social mobilisation and communication

The role of the community cannot be overlooked in a disease like Chikungunya. Enlisting the help of the community can be done in the following ways:

1. Raise community awareness about Chikungunya, its symptoms, and prevention methods.
2. Educate the public on eliminating mosquito breeding sites (e.g., stagnant water in containers).
3. Use mass media, social media, and local networks to promote behavioral change.
4. Engage community leaders and organisations to sustain public participation in prevention activities.

5.2. Role of the CDCU (Awaiting PHEOC)

During the inter-epidemic period, CDCU (awaiting the operational and planning leads of PHEOC) will:

1. Review the best practices and challenges of the previous outbreak.
2. Review all protocols and SOPs for outbreak control and prevention and ensures availability of necessary logistics.
3. Undertake outbreak training modules and conduct regular simulation exercises.

5.3 Situation Monitoring

The CDCU is responsible for situation monitoring that consists of both active case detection and passive surveillance from sentinel sites.

5.3.1 Active case detection at point of entry

Health Inspectorate Division at points of entry (Port and Airport) to put under surveillance all passengers arriving from Chikungunya endemic countries

1. A list of such passengers to be submitted to all health offices and CDCU
2. Home visits of incoming passengers will be done by HSO according to existing protocol.

3. Blood samples to be collected from suspected cases and they will be requested to attend nearest health institution and RPHS of region are informed accordingly
4. Regionalized training for HSO, Insecticide Sprayer Operators, Field Supervisors, General Workers
5. Surveillance to be strengthened at both the airport and the harbour
6. A list of such passengers is to be submitted to the Ministry of Health and Wellness and to the CDCU Vector Borne Diseases for monitoring surveillance
7. Contact tracing will be done by PHFSIs with the support of RPHS office.

5.3.2 Passive Case detection in the community

The sentinel sites for case detection will be comprised of:

1. Government Hospital and clinics
2. Private clinics
3. Private practitioners

5.3.3 Laboratory Surveillance

The Virology Unit of the Central Health Laboratory will be responsible for virological surveillance. The main roles of the virology unit will be as follows:

1. To confirm all suspected cases by PCR
2. Submit daily report to CDCU in a standard format
3. Participate in planning meeting for control of outbreak control

Annex 1

Case Definition of Chikungunya

Criteria for case definition:

- Clinical criteria: Acute onset of fever >38.5°C and severe arthralgia/arthritis not explained by other medical conditions.
- Epidemiological criteria: Residing or having visited epidemic areas having reported transmission within 15 days prior to the onset of symptoms.
- Laboratory criteria:
    - Virus isolation.
    - Presence of viral RNA by RT-PCR
    - Presence of virus-specific IgM antibodies in single serum sample collected in acute or convalescent stage.
    - Four-fold increase in IgG values in samples collected at least three weeks apart

Suspect case:

Any person with acute onset of fever >38.5°C and severe arthralgia/arthritis not explained by other medical conditions.

Probable case:

A patient meeting both the clinical and epidemiological criteria.

Confirmed case:

A suspected case with laboratory confirmation.

Reference:

https://www.who.int/emergencies/outbreak-toolkit/disease-outbreak-toolboxes/chikungunya-outbreak-toolbox

Annex 2

Mosquito indices and thresholds

The following mosquito indices are calculated by the Vector Biology and Control Division to assess the incidence of *Ae. albopictus*:

A. Adult incidence indicator

The man hour density (MHD; WHO, 1975) is calculated to determine the density of adult mosquitoes collected during human landing catches

$$MHD = \frac{Number\ of\ adult\ mosquitoes\ caught\ from\ the\ same\ species \times 60}{Number\ of\ collectors \times duration\ of\ collection\ in\ minutes}$$

However, the use of Bg Sentinel trap baited with carbon dioxide is a non-subjective and more sensitive method to collect and assess the incidence of adult *Ae. albopictus* during dengue-related surveys. Adult density is expressed as:

No. of female Ae. albopictus /Bg trap/24 h

B. Larval incidence indicator

Four indices which are commonly used to monitor the incidence of the immature population of *Ae. albopictus* are the Breteau Index, the House Index, the Container Index and the Pupal Index. Formulae to calculate those indices are found below:

$$Breteau\ Index = \frac{Number\ of\ containers\ positive\ for\ larvae\ and\ pupae\ of\ Ae.albopictus}{Number\ of\ houses\ inspected} \times 100$$

$$House\ Index = \frac{Number\ of\ houses\ positive\ for\ larvae\ and\ pupae\ of\ Ae.albopictus}{Number\ of\ houses\ inspected} \times 100$$

$$Container\ Index = \frac{Number\ of\ containers\ positive\ for\ larvae\ and\ pupae\ of\ Ae.\ albopictus}{Number\ of\ containers\ inspected} \times 100$$

$$Pupal\ Index = \frac{Number\ of\ Ae.\ albopictus\ pupae}{Number\ of\ Houses\ inspected} \times 100$$

The House Index has been most widely used for monitoring infestation levels, but it does not take into account the number of positive containers nor the productivity of those containers. Similarly, the Container Index only provides information on the proportion of water-holding containers that are positive. The Breteau index on the other hand establishes a relationship between positive containers and houses, and is considered to be the most informative. It does not however provide information regarding container productivity. The rate of contribution of newly emerged adults to the adult mosquito population from different container types can vary widely. The Pupal Index provides an estimate of the relative adult production by taking into consideration the pupal counts.

Mosquito indices threshold globally

According to the Pan American Health Organization and the World Health Organization (PAHO, 1994; Rozendaal, 1997), an area is at a high risk of arbovirus transmission when:

House Index > 5

Breteau Index > 5

Container Index > 3

Mosquito indices threshold locally

During inter-epidemic situation in Mauritius, vector control activities should be deployed in localities where either:

House Index > 5

Breteau Index > 5

Container Index > 3

Pupal Index > 5

Adult density > 5

During epidemic situation, vector control and community sensitization activities should be deployed in localities where any of the indices is more than zero:

House Index > 0

Breteau Index > 0

Container Index >0

Pupal Index* > 0

Adult density > 0

*If Pupal Index is high, this indicates the possibility of a rapid replenishment of the *Ae. albopictus* population in the locality within 1 to 2 days despite fogging activities being deployed in the locality since mosquito pupae are not killed by insecticides. In serious cases, the interval between subsequent fogging operations may be shortened to ensure that adults are rapidly killed upon emergence.

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The Ministry of Health and Wellness appreciates the valued cooperation and contribution of the following stakeholders as mentioned below:

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