

Handbook for Field Mosquito Control Activities

A Guide for
Prevention and Control of Dengue



National Dengue Control Unit
Ministry of Health



Handbook for Field Mosquito Control Activities

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This is an updated version of the previous document developed in 2019 and new sections are added on fogging including thermal and cold fogging, adult mosquito sampling, larvivorous fish, Bti bacteria, life skills etc.

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ABBREVIATIONS

AMOH	Additional Medical Officer of Health
Bti	<i>Bacillus thuringiensis israelensis</i>
COVID 19	Corona Virus Disease 2019
CCP	Consultant Community Physician
CIDA	Construction Industry Development Authority
DENV	Dengue Virus
DF	Dengue Fever
DHF	Dengue Haemorrhagic Fever
DGHS	Director General of Health Services
FBC	Full Blood Count
HEO	Health Entomological Officer
MOH	Medical Officer of Health
NS1	Non-Structural Protein 1
NSAID	Non-steroidal Anti-inflammatory Drugs
NDCU	National Dengue Control Unit
PHI	Public Health Inspector
PDHS	Provincial Director of Health Services
PPE	Personal Protective Equipment
RDHS	Regional Director of Health Services
RE	Regional Epidemiologist
ROP	Registrar of Pesticides
SPHI	Supervising Public Health Inspector
SHEO	Senior Health Entomological Officer
SMO	Spray Machine Operator
ULV	Ultra-Low Volume

Contents

Chapter 1	1
Introduction to Dengue illness.....	1
1.1 What are the clinical features of dengue illness?	2
1.2 How is dengue transmitted?	5
1.3 What needs to be done when dengue is suspected?.....	6
Chapter 2	8
Dengue transmitting mosquitoes	8
2.1 Developmental stages of <i>Aedes</i> mosquito.....	9
Chapter 3	12
Skills development for Field Mosquito Control Activities	12
3.1 Premise inspection for control/ advice on removal of mosquito breeding places	12
3.1.1 Preparation for field inspection.....	13
3.1.2 Obtaining permission to enter various premises and explaining the purpose	14
3.1.3 Identification of different types of premises to be inspected	15
3.1.4 Identification and detailed inspection of mosquito breeding sites at different types of premises.....	18
3.2 Records and returns to be maintained in different types of premises	27
3.3 Participating in various premise inspection programs.....	31
3.3.1. Measures to be taken during premise inspection	34
3.3.2 Completion and maintenance of records.....	36
Chapter 4	37
Assisting in dengue vector surveys	37
4.1 Preparations for conducting dengue vector surveys	37
4.2. Assisting in premise inspection for vector surveys	39

4.2.1 Elimination/ correction of mosquito breeding places found during the survey.....	39
4.3 Assisting in larval and adult mosquito surveys and preparation for laboratory testing.....	40
4.3.1 Larval survey.....	40
4.3.2 Adult mosquito survey	43
4.3.3 Collecting eggs from ovitrap.....	45
4.4 Assisting in entomology laboratory and maintenance of laboratory equipment	45
4.5 Assisting in implementation of integrated dengue vector control ..	46
Chapter 5	48
Environmental management methods in dengue control.....	48
5.1. Environmental modification	48
5.2. Environmental manipulation	50
5.2.1 Solid waste management.....	51
5.3 Alterations in living environment.....	54
Chapter 6	55
Chemical vector control methods.....	55
6.1. Chemical methods used to control larvae and pupae in water.....	55
6.2 Chemical methods used in adult <i>Aedes</i> control.....	57
6.3 Fogging machines.....	66
6.3.1 Parts of a fogging machine.....	66
6.3.2 Storage and maintenance of fogging machines.....	67
Chapter 7	69
Biological and bio-chemical vector control methods	69
7.1. Essential features of larvivorous fish.....	69
7.2 Rearing Guppy (<i>Poecilia reticulata</i>) as a larvivorous fish.....	70

7.3 Bti bacteria	78
Chapter 8	80
Occupational health and safety.....	80
Chapter 9	84
Empowerment and enforcement of the people for sustainable dengue control.....	84
Chapter 10	87
Effective communication and Health education.....	87
Chapter 11	91
Life skills.....	91
Chapter 12	94
Field Mosquito Control Assistants	94
12.1 Duties of Field Mosquito Control Assistants	94
12.2 Roles and rules that Field Mosquito Control Assistants should follow.....	95
 Annexures.....	 99- 114

FOREWORD

Dengue is the main vector-borne disease affecting social, economic and health aspects of the people in Sri Lanka.

Since last two decades, transmission of dengue is observed transcending boundaries with epidemics in 2- 3 years. The worst epidemic occurred in 2017 with 186,000 dengue patients island wide. A downward trend was observed with local outbreaks in 2020 amounting to 31,000 patients in the same year.

The Ministry of Health has implemented a number of strategies to control the spread of dengue by a range of interventions through intersectoral participation. It is essential to sustain dengue control activities continuously targeting localities which include residence, schools, construction sites, public places, religious places etc. to prevent the spread of the disease.

This revised edition incooperates additional information which include novel methods and techniques in vector control that can be referred to, by the Field Health Workers in dengue control as a basic guide.

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Director

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Chapter 1

Introduction to Dengue illness

Dengue is an illness caused by dengue virus. There are other diseases caused by viruses such as common cold, chickenpox, measles, influenza, hepatitis, mumps and COVID 19 etc. The entity of dengue including dengue haemorrhagic fever (DHF) and its possible serious complications has gained its significance as a major public health problem.

The virus causing dengue has four different serotypes. These are named as DENV-1, DENV-2, DENV-3 and DENV-4. Existence of these 4 serotypes makes it possible for the same individual to contract dengue fever more than once in lifetime.

Dengue causes a wide spectrum of disease. This ranges from asymptomatic disease to severe dengue as follows:

1. Asymptomatic disease
2. Mild flu like symptoms indistinguishable from other viral illnesses
3. Dengue fever (DF)
4. Dengue haemorrhagic fever (DHF)

An individual contracting dengue for the second time is more likely to develop severe complications of DHF. Therefore, seeking early medical advice for prompt diagnosis and close monitoring throughout the illness is very important.

The virus is transmitted from person to person by the bites of a mosquito named *Aedes*.

1.1 What are the clinical features of dengue illness?

A person who carries dengue virus is considered as “infected” with dengue virus. All infected individuals do not show symptoms of dengue. Only about 25% of them show clinical features while the remaining 75% do not show any symptoms.

Among the symptomatic individuals, about 80% show features of dengue fever as illustrated in figure 1.1. Only a small percentage develop DHF.

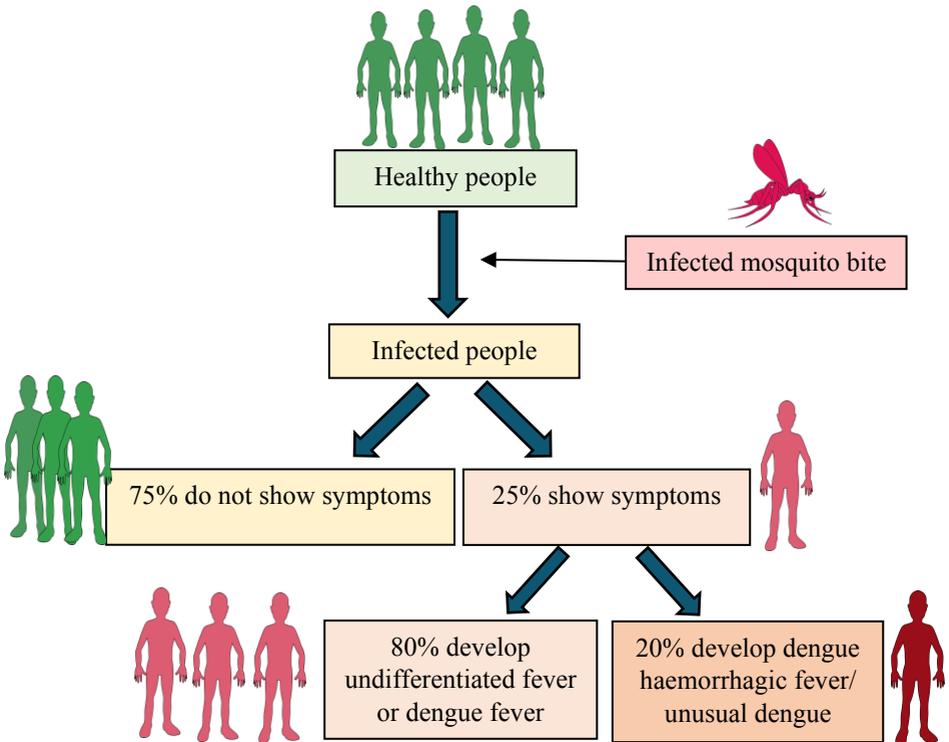


Figure 1.1 Distribution of asymptomatic and symptomatic dengue patients

It should be noted that in an area, number of persons who actually have the virus in the body could be more than the reported patients. Eg: within a

Grama Niladhari division, in a construction site etc. All infected individuals (with or without features of dengue) are infectious for about one week (i.e., they can transmit the virus to mosquitoes).

When an individual has following symptoms, dengue illness should be suspected:

- High fever (which may last 2-7 days)
- Headache and pain behind the eyes
- Muscle and joint pain
- Nausea and vomiting
- Red patches on the skin and bleeding manifestations

Dengue fever (DF)

Dengue fever is an acute febrile illness with severe headache, muscle/ joint pain and rashes.

Dengue hemorrhagic fever (DHF)

Dengue hemorrhagic fever is a more serious/ severe entity of dengue illness. Only a small percentage of the infected people develop DHF. Initially the symptoms of dengue fever and dengue hemorrhagic fever are similar and the two cannot be differentiated.

In DHF, plasma leaks to extravascular compartment (out of blood vessels into pleural and peritoneal cavities) which usually occurs after day three of illness as fever subsides. This accumulated fluid can be detected by ultra sound scan. Continued leakage of plasma in this manner can lead to shock and ultimately death of the patient if not detected and treated.

Therefore, such patients should be identified early and hospitalized for treatment. If leaking plasma is not replaced by oral or intravenous fluid, the patient can go into shock due to fluid loss. In shock, death can result due to failure of vital organs, such as liver, brain, kidney and/or heart.

Before the onset of shock, some dengue patients develop following "warning signs" commonly between 3rd and 7th days of fever;

Warning signs

- Severe abdominal pain
- Recurrent bouts of vomiting
- Drowsiness/ irritability/ lethargy/ dizziness and faintness
- Bleeding manifestations (seen as bleeding from gums and nose, dark brown coloured vomitus and black coloured stool, blood in urine, abnormal vaginal bleeding)
- Not passing urine for more than 6 hours or a reduction of urine output

**** If these warning signs are present, the patient should be advised to be hospitalized immediately since the patient can go into shock and inevitable death.**

1.2 How is dengue transmitted?

Dengue is transmitted from one person to another through the bite of an *Aedes* mosquito simply known as “dengue mosquito”. The female *Aedes* mosquito which feeds on human blood, is responsible for transmitting dengue. The male mosquito sucks plant sap and does not feed on human blood. For the maturation of mosquito eggs, the female mosquito requires human blood. The details of *Aedes* mosquito are described in chapter 2.

When an infected mosquito (which carries the virus) bites a healthy individual, the virus enters the human blood stream. Then the virus multiplies within the human body for 4 to 6 days and that person becomes infective (i.e., The person has the virus in the blood and can transmit the virus to another mosquito).

When a non-infected *Aedes* mosquito bites an infected individual, the virus enters the mosquito and multiplies within it. This infected mosquito spread the disease to humans.

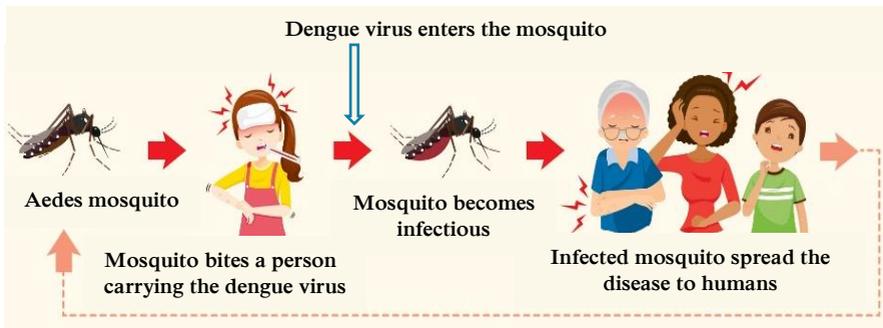


Figure 1.2 Transmission of dengue virus by *Aedes* mosquito

1.3 What needs to be done when dengue is suspected?

Early detection of dengue is life saving and helps limiting the spread of the disease as well. Without early medical care, the warning signs of dengue haemorrhagic fever will be overlooked and go unnoticed. Therefore, it is essential to refer the patient to a hospital or to a qualified doctor for initial treatment. The doctor will recommend a Full Blood Count (FBC) and NS1 (non-structural protein 1) antigen test according to the availability. It should also be emphasized that various local remedies/ herbal preparations or oils should not be used as a treatment method for dengue.

Proper medical advice and care of the patient is very important.

When DF is suspected, following steps are recommended.

- ✓ Rest adequately
- ✓ Avoid strenuous activities such as sports/ physical exertion
- ✓ If the patient is a child, avoid sending to school/ playing
- ✓ If fever is present, paracetamol can be given in the prescribed dose every 6 hours.
- ✓ If high fever continues, tepid sponging with lukewarm water
- ✓ Provide light meals
- ✓ Recommended amount of fluids should be given in equal time periods according to medical advice. Fluid intake can be considered adequate if normal urine output is maintained.
- ✓ Provide Jeevani, fruit juices, rice porridge, orange juice etc. in addition to water

What “not to do” when dengue is suspected.....

- ✘ Do not take pain killers (NSAIDs: Aspirin, Diclofenac Sodium, Mefenamic acid, Ibuprofen) to control fever.
- ✘ Do not take red/ brown coloured food or liquids (plain tea, coffee, dark coloured soft drinks, beetroot, purple-coloured grapes, etc.)
- ✘ Do not drink fluid more or less than the recommended amount.

An ambulatory care leaflet for the dengue patients who are managed at home, has been issued by National Dengue Control Unit and Ministry of Health (annexure i)

** Field inspection to identify and to eliminate mosquito breeding sites can prevent further spread of the disease and local outbreaks.

Chapter 2

Dengue transmitting mosquitoes

Mosquito-borne diseases have been a problem for Sri Lanka since ancient times due to the conducive environment for mosquito breeding.

Table 2.1 The main mosquito borne diseases found in Sri Lanka

Mosquito	Disease
<i>Culex</i>	Filariasis/ Japanese Encephalitis
<i>Anopheles</i>	Malaria
<i>Aedes</i>	Dengue / Chikungunya

The following two main mosquito species that transmit dengue are found in Sri Lanka.

1. *Aedes aegypti*

2. *Aedes albopictus*

Aedes aegypti is the most common species found in urban areas and *Aedes albopictus* is commonly found in rural areas.



Figure 2.1 *Aedes aegypti*



Figure 2.2 *Aedes albopictus*

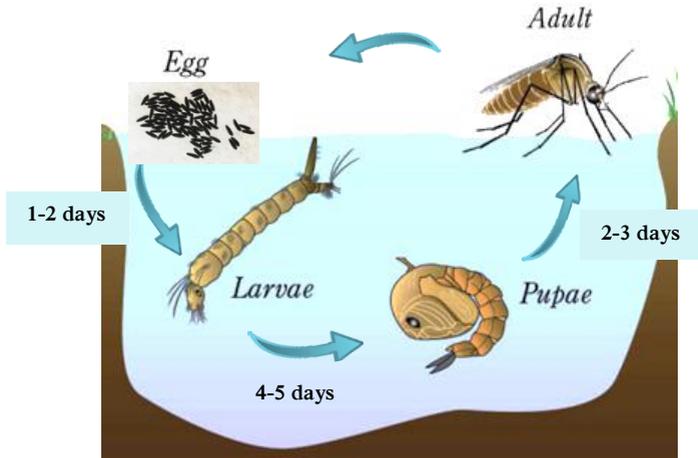


Figure 2.3 Life cycle of the *Aedes* mosquito (7-10 days)

The life cycle of the *Aedes* mosquito consists of 4 stages which has both aquatic and terrestrial components.

- | | | |
|-----------|---|-------------------|
| 1. Eggs | } | Aquatic stages |
| 2. Larvae | | |
| 3. Pupae | | |
| 4. Adult | - | Terrestrial stage |

The adult mosquito lays eggs in water. It usually takes 7 to 10 days to develop adult mosquitos from eggs through larval and pupal stages.

2.1 Developmental stages of *Aedes* mosquito

Eggs:

The *Aedes* female mosquito lays eggs just above the water level, on inner surface of wet containers, preferably with clear water. Usually about 100 eggs are laid at a time and they are hatched in 2-3 days. Even a small amount of water is sufficient for these mosquitoes to lay eggs.

The eggs appear as “black pin heads” to the naked eye.

Eggs that stick to the inner surface of the containers can survive under dry conditions for up to 12 months without being destroyed.



Figure 2.4 The eggs

When mosquito eggs come into contact with the water surface, they hatch and become larvae. This stage lasts 3-4 days; the longest stage in water.



Figure 2.5 Larval stage

The larvae show a characteristic "S" shaped wriggly movements and reach near the water surface to breath air above water level through the siphon which serves as a breathing tube.

After shedding the skin for about three times, larva becomes the pupa.

Pupae:

It is the stage after the larval phase until the adult mosquito emerges and this lasts 24-48 hours. This is an inert motionless stage.



Figure 2.6 The pupal stage in water



Figure 2.7 Transition from pupal stage to the adult mosquito

Adult mosquito:

Adult *Aedes* mosquitoes are small to medium sized (4-7mm), dark in colour with white markings/ bands on the body (Fig 2.1).

The adult life span ranges from 2-4 weeks depending on environmental conditions such as temperature and humidity.

Feeding of *Aedes* mosquito

The male mosquito sucks plant sap, but the female mosquito feeds on blood. Female *Aedes* mosquito generally bites more than one person for a full blood meal (Hence a multiple feeder).

The mosquito sucks blood most actively during the day time as below;

- 6.00 to 11.00 in the morning
- After 3.00 in the evening until sunset

They do not normally bite at night, but there is evidence that they can bite even at night in well-lit rooms. Generally, *Aedes aegypti* is an indoor biter while *Aedes albopictus* is an outdoor biter.



Figure 2.8 Female mosquito after a blood meal

Flight range

These mosquitoes can fly horizontally for a distance up to 100 to 200 meters, searching for human-inhabited areas and finding water containers to lay eggs. It can also fly vertically up to several floors in high-rise buildings.

Resting

Aedes aegypti primarily rests inside houses or buildings in dark and humid surroundings including curtains, mosquito nets and clothing, as well as on undersurface of furniture such as tables, chairs, desks and beds. *Aedes albopictus* generally rests outdoors in vegetation and in other hidden places.

Chapter 3

Skills development for Field Mosquito Control Activities

3.1 Premise inspection for control/ advice on removal of mosquito breeding places

Premise inspection for removal of breeding sites have been identified as one of the most feasible and highly effective strategy for dengue control.

Skills should be developed mainly in the following areas;

1. Premise inspection for control/ advice on the removal of mosquito breeding sites
2. Assisting in dengue vector surveys (entomological surveys)
3. Assisting in the implementation of integrated dengue vector control methods
4. Effective communication (described in Chapter 9)

Visits to different types of premises for inspection and removal/ control of mosquito breeding will be carried out based on the following situations:

1. Routine visits to dengue “risk areas”
2. Inspection of the surrounding premises of each “reported” patient
3. Visits to “high risk” Grama Niladhari Divisions based on entomological indicators
4. Premise inspection and removal of breeding sites in “epidemic areas” and “epidemic-prone areas” during special dengue control programs

3.1.1 Preparation for field inspection

Planning activities in localities:

Preparation for field inspection is very important. This will be planned by the Public Health Inspectors according to the instructions of the Medical Officer of Health for the forthcoming week. This can be done based on the situations mentioned above. By attending the planning meetings with the permission of MOH/ PHI, you will be updated on current dengue situation as well as about the areas of high mosquito density. Following this meeting, a schedule for the coming week will be prepared with assigned responsibilities.

Preparing documents for field inspection:

It is essential to prepare a file with the following documents, leaflets and formats before the field inspection.

- Street maps
- Yellow notices and red notices
- Leaflets
- Posters (for schools/ construction sites etc.)
- Formats prepared for different premise types

Preparedness with equipment required for field inspection

Preparation of equipment required for field inspection is also very important for its successful completion.

These include;

- Torches
- Roof gutter mirrors

- Ladders
- Larvicides - e.g., temephos (liquid and granules) for on-site application
- Larvivorous fish (Gambusia fish- Nalahandaya, Guppy etc.)

It is mandatory that “on-site” application of products be carried out to kill larvae.

3.1.2 Obtaining permission to enter various premises and explaining the purpose

- Prior to entering a premise, it is important to obtain permission from the occupants or a responsible person in following institution categories.
 - Residents of households
 - The security officer of apartment complex
 - Health and Safety officer in charge of construction site
 - Chief monk or a priest in charge of any religious place
 - Principal/ vice principal/ teacher-in charge in school
 - A responsible person in Public/ private institution (E.g., Government office, garments, etc.)
- Always introduce yourself with a valid identity card.
- Explain your reason for being there.
- It is important to convince the occupants that intention of your visit is to help and not to find fault with them.
- Work with respect and dignity with premise occupants/ school principals/ clergy and other occupants.
- Premise inspection should be done without disturbing activities of the particular institution.

- It is important to obtain cooperation and active participation of the occupants/ premise owners when inspecting the premises.
- Wearing personal protective equipment would ensure safety while inspecting construction sites.
- Cultivate self-discipline all the times.

3.1.3 Identification of different types of premises to be inspected

Types of premises can be categorized as follows to carry out inspection in systematic way:

Dengue risk localities

- Houses
- Schools and higher education institutes
- Construction sites
- Factories
- Government and private institutes
- Religious and public places

Households:

There are different types of houses in a Grama Niladhari division. In urban areas, there are single/ multi-storied houses and apartment complexes which are located very close to each other. Therefore, more premises can be inspected in a given period of time. In rural areas, houses (mostly single storied) may be scattered in a large area. Therefore, the number of houses inspected in a given period of time may be fewer.

Schools and higher education institutions:

According to the findings of entomological surveys and mosquito control programs, school premises are at higher risk of dengue mosquito breeding. Further, in recent years, about 30% of the total dengue patients are school children. Therefore, premise inspection and removal of mosquito breeding places need to be regularly carried out to eliminate breeding in school premises.

Special mosquito control programs are conducted in schools, generally prior to the commencement of a new term and when the schools are selected as examination centres.

Similarly, universities/ higher education institutions where many people congregate and accommodated, are at higher risk of mosquito breeding and disease transmission.

Construction sites:

Number of construction sites are increasing rapidly with the vast development and urbanization. This is one of the main reasons for the spread of dengue infection in urban and semi-urban areas.

The dengue mosquitoes commonly breed in containers (barrels, buckets, tanks, etc.) which are used to store rain water as well as water for construction work. Furthermore, according to the evidence, potential and positive breeding sites are common in these localities. Being that many of the workers here are from other areas of the country, the disease can spread to distant areas they came from, when they go back during infective period.

Factories:

Dengue mosquito breeding places can be abundant inside and outside factory premises, due to improper waste management and the water collecting materials, packings and containers. Since a large number of employees are working in factories, there is a higher risk of spreading the disease.

Government and Private Institutions:

Waste material collecting in depots, ports and also the institutions where ‘seized items’ pending legal clearance are stored (court, police, etc.), are constantly implicated as breeding grounds.

Since these are often ‘city-centered’, if visitors and employees of these places get infected, there is a risk of spreading dengue to other areas.

Religious and public places:

Temples, churches, mosques and kovils are places often visited by people which have high likelihood for waste collection due to various activities. Therefore, the risk of spreading dengue is high if the premise inspection and elimination of breeding places are not done regularly.

Further, mosquitoes can breed in public places due to improper waste management, mainly in recreational areas, public places such as bus stands, parks and weekly markets and as well as in beach areas.

The common breeding places of the sites mentioned above are summarized in the section 3.1.4

3.1.4 Identification and detailed inspection of mosquito breeding sites at different types of premises

Table 3.1 Household mosquito breeding sites

Discarded containers/ solid waste	<ul style="list-style-type: none"> • Tyres/ plastics/ glass/ polythene/ tins • Regiform/ wooden boxes/ shopping bags/ porcelain pieces including crockery/ curd pots/ bottles • Coconut shells/ king coconut husks • Discarded fruit peels/ shells (wood apple, avocado) • Discarded food packs
Places of rain water collection	<ul style="list-style-type: none"> • Clogged roof gutters/ cement drains/ concrete roof/ gully pits • Rain covers/ polythene • Buckets/ Flower pots
Wells and water collecting tanks/ containers	<ul style="list-style-type: none"> • Cement and plastic tanks • Barrels/ buckets • Wells • Upper part of tube well pipe
Ornaments and garden decorating materials	<ul style="list-style-type: none"> • Bird baths • Ponds/ fish tanks without larvivorous fish • Water collecting statues and mounted ornaments • Trays under flower pots/ flower vases
Water collecting/ retained receptacles inside/ outside the house	<ul style="list-style-type: none"> • Water collecting trays in refrigerators/ air conditioners • Water filter trays • Toilet accessories (unused/ unmaintained) • Pet feeding trays • Ant traps
Water collecting plants or parts of trees	<ul style="list-style-type: none"> • Ornamental flower plants that retain water in leaf axils • Tree holes • Bamboo stumps • Water collecting tree trunks

Table 3.2 Mosquito breeding places in construction sites

Machinery and accessories that can collect water outside the premises	<ul style="list-style-type: none"> • Cement mixing machines • Backhoes used for excavation • Wheel Barrows • Forms and moulds used for concrete • Mortar pans/ Iron barrels / buckets
Places and fixtures where water can collect inside and outside the premises	<ul style="list-style-type: none"> • Ground floor and other floors • Balconies and flower pots • Concrete roof • Blocked roof gutters • Temporary roofs and canopies made of polythene or canvas • Iron or PVC pipes and other accessories which can collect water
Uncovered water collecting tanks/ containers	<ul style="list-style-type: none"> • Cement and plastic tanks • Barrels/ Buckets • Water sump
Drains and pits where rain water and water from construction sites can get retained	<ul style="list-style-type: none"> • Lift well • Gully pits • Drainage systems • Incomplete septic tanks • Other trenches and pits made of cement
Discarded and disposable items	<ul style="list-style-type: none"> • Tyres, plastics, glass, polythene • Paint tins/ buckets • Bottles • Regiform/ Styrofoam and wooden boxes • Polythene bags • Disposable packaging and wrapping material • Debris, iron pieces

Table 3.3 Special premises and their common breeding places

Schools	Discarded tables, chairs and other scraps/ construction sites in schools/ abandoned toilets/ cement floors/ abandoned swimming pools
Factories	Improperly stored equipment/ covering wraps/ discarded vehicle parts/ abandoned vehicles and other receptacles
Institutions	Seized items pending legal clearance that are not stored properly
Religious places	Lamps/ pandols/ decorations and statues/ ponds
Public places	decorating structures/ objects, fixtures and ornaments mounted on fences and walls/ Unused fishing boats
Natural environment and special sites	Small pits in the rocks/ rock pools/ pineapple plantations/ water retained coconut shells in rubber plantations Upper part of the tube well pipe and water stored clay pots

Mosquito breeding sites found in various premises



Flower pots



Pots with hard soil



Trays under flower pots



Gully pits



Blocked roof gutters



Blocked cement lined drain

Discarded and disposable items



Discarded polyethene and plastic



Discarded metal items



Discarded coconut shells and king coconut husks



Discarded tyres

Unused items and other places where water can often collect



Unused commodes/ cisterns and squatting pans



Bird baths



Air conditioner tray



Refrigerator tray

Water collecting tanks, buckets, pots, shallow concrete wells and tube wells



Water collecting barrels



Rain water harvesting tanks



Upper part of tube well pipe



Water tanks

Natural breeding places where mosquitoes breed



Cut bamboo stumps



Tree holes



Banana leaves



Natural pits on rocks



Axils of Pineapple and Bromeliads

Abandoned/ unused ponds and ponds without larvivorous fish



Potential mosquito breeding places in construction sites



Concrete slabs



Water retaining buckets



Polythene covers



Drains/ gutters



Roofing sheets



Rain water retaining machinery



Lift well



Debris

Quality and coverage of premise inspection can be enhanced by conducting inspections outdoors and indoors at various levels as above.

Premise inspection for mosquito breeding outside the buildings

- Premise inspection should be started from ground level.
- Pay attention to all mosquito breeding places that may exist outdoors. When the inspection is carried out in this manner, undetected mosquito breeding places will be minimised. Understand that some mosquito breeding may not be obvious; such as in pipes of tube wells.
- When entering the premise, move in right hand or left-hand direction and cover the whole area.
- In water retained edges of buckets and containers which are overturned, mosquito larvae can be present. Observe all the folds of covering sheets since rainwater can get collected there.
- Kids' toys can retain rainwater which may not be visible from outside. Therefore, shake up the toys in order to drain away the water.
- Separate records for wells are recommended with the following information
 - Check the presence of larvivorous fish (that feed on larvae) in the wells where they were already introduced.
 - Record the presence of larvivorous fish each time of premise inspection.
 - Observe the condition of the nets applied to cover the wells. Check for the presence of insecticide sachets applied to abandoned wells (procedure will be explained in section 6.1)

* Check the water retaining top part of the tube wells carefully as it is another hidden breeding place for mosquitoes.



Figure 3.2 Tube well

Inspection of mosquito breeding inside the buildings of the premises

- Pay special attention to mosquito breeding places inside buildings.
- Carefully inspect the trays of refrigerators and air conditioners, flower vases, receptacles to collect water from leaking taps (under the sink), water storage buckets/ barrels for domestic use, etc.
- Make sure you check balconies, concrete slabs and roof gutters, overhead tanks, etc.
- Provide health education (refer to chapter 10)

Educate the households on specific mosquito control activities whenever possible. Get the residents regularly look for and destroy mosquito breeding sites by empowering them to adopt good practices. Adopting healthy behaviour will take some time. Therefore, constant education and monitoring of their practices should be carried out.

- When inspecting various premises, always check and inquire about the reports/ returns to be maintained by the officers in charge/ responsible person of the institutions as explained in section 3.1.5.

* Remember that the quality of premise inspection is more important than the number of premises inspected per day.

3.2 Records and returns to be maintained in different types of premises

There are separate records and returns prepared for each premise. Some records should be filled by the occupants while others should be filled by the inspection teams.

In order to facilitate regular inspection, specific checklists and records have been distributed to the occupants (annexed). For inspection of various premises, an understanding of these records to be maintained by the occupants of those premises/ institutions is essential.

There are separate formats prepared for different premises which are expected to be filled by inspection teams. These are;

1. House inspection format (annexure ii; 102-103 pg)
2. Construction site inspection format (annexure iii-104-105 pg)
3. School inspection format (annexure iv-106-107 pg)
4. Institution inspection format (annexure v-108-109 pg)

Each format is described below.

Houses or residence (annexure ii)

During premise inspection, identify the potential breeding places and larvae positive sites. Try to correct/ eliminate the identified breeding places as much as possible and issue red notices for premises with uncorrected breeding sites. Record all above information in the relevant format.

And also, check whether regular premise inspections are done by the occupants and proper actions are taken as explained in table 3.4

Table 3.4 Common breeding sites and actions to be taken

Outside the households		
Non-degradable items	<ul style="list-style-type: none"> • Tyres • Unused fish tanks • Pots/ porcelain pieces including crockery • Tins/ bottles • Plastics/ polythene • Parts of toys 	<ul style="list-style-type: none"> • Store properly under a shelter to prevent water retention • Destroy or bury • Sell for recycling
Degradable items	<ul style="list-style-type: none"> • Coconut shells/ king coconut husks 	<ul style="list-style-type: none"> • Split king coconuts and place them turned over
Rain water collecting items	<ul style="list-style-type: none"> • Clogged roof gutters/ cement drains • Barrels/ water tanks • Slabs • Bird baths • Vehicle spare parts 	<ul style="list-style-type: none"> • Remove clogged leaves/ dirt • Modify/ build to prevent water from getting collected • Cover with a net to prevent mosquitoes from entering • Remove retained water and wash thoroughly after scrubbing • Slope the slab/ fill with cement mixture or sand • Introduce larvivorous fish • Store under a shelter
Natural sites	<ul style="list-style-type: none"> • Tree holes • Bamboo stumps • Plants that collect water between leaves (E.g., Bromeliads) 	<ul style="list-style-type: none"> • Fill with sand/ cement mixture • Avoid growing such plants

• Inside households		
Ornaments and water collecting places inside households	<ul style="list-style-type: none"> • Vases • Flower pots and ant traps • Refrigerator and air conditioner trays • Water collecting containers in toilets and kitchens • Unused toilets/ commodes 	<ul style="list-style-type: none"> • Change water frequently • Scrub and wash • Keep covered • Close commodes with lids • Repair broken commodes/ cisterns • Sand bags to cover unused toilet outlets

Construction sites

There are three formats prepared for construction sites.

- i. Checklist for mosquito control in construction sites (annexure iii)

This form should be filled by the inspection team.

In addition to this below two formats should be maintained at the construction site.

- ii. Premise inspection form for construction sites (annexure vi)

This form has to be filled by employees weekly (Safety officer and dengue control team members at the site). This form should be displayed in the construction premises for inspection by the health team.

Check whether the forms are updated by the employees accurately. If the process is incorrect and incomplete, educate on appropriate procedure.

- iii. Monthly report of premise inspection - construction sites (annexure vii)

This return has to be sent to MOH/ CIDA/ Local Government Institutions by the authorized officer in construction site.

Schools (annexure iv)

When inspecting schools, PHI will ascertain whether there is a dengue committee in the school with a teacher in charge, and whether they inspect school premises once a week.

Learn and be familiar with the preventive activities implemented at schools. Furthermore, be familiar with the “Dengue Free Child” App.

Dengue Free Child App

This mobile application is a surveillance tool to get notifications about school children having fever.

When a school child has fever, the class teacher or a parent is supposed to upload the details through “Dengue Free Child” App. The app enables users to proactively report dengue or suspected dengue fever so that actions can be taken regarding a premise/ area where the infection is prevalent.

This app also alerts parents to keep an eye on dengue-like symptoms in their children.

The “Dengue Free Child” app has been created with separate user access for government officials and school authorities, in addition to the general public sharing and accessing information about dengue patients.



**Figure: 3.3
Dengue Free
Child App**

Institutions (annexure v)

It is important to find out whether there is a dengue prevention committee and if they inspect the institution once a week. During the inspection, inquire whether the monthly report of the premise inspection from those institutions is being sent to the relevant MOH office (annexure viii).

3.3 Participating in various premise inspection programs

Premise inspection will be carried out at various situations as mentioned in section 3.1. Areas to be covered and the number of premises to be inspected will vary with each situation. However, the aim should be a detailed and a qualitative premise inspection.

The different situations that necessitate premise inspection for elimination of mosquito breeding are as follows:

1. Daily premise inspection in dengue risk areas

Premise inspection in dengue high-risk areas should be carried out regularly. This is performed targeting the areas that have been identified as “high risk” areas from recent evidence (i.e., with increased number of patients, having high mosquito breeding etc.).

The number of premises that can be inspected per day may vary depending on the area. Therefore, approximately one health team should inspect at least 25 to 30 premises per day in rural area, while 30 to 50 per day in an urban area due to the proximity of premises. It is important to be in the field for at least 5 hours enabling detailed premise inspection.

2. Premise inspection of the surrounding area of each reported patient

When the PHI investigates the notified case, the premise inspection is carried out under his supervision. This helps ascertaining whether dengue is transmitted from the same location or from a different area. The travel history obtained by PHI would help tracing the place of contract which could be the patient's home, work place, school or another place where the patient has travelled recently.

In order to enhance the source reduction activities, all premises within 200 meters from the centre should be inspected including situations of clustering. This should be done very qualitatively.

3. Premise inspection based on entomological indicators

If entomological surveys indicate high mosquito density in a particular location or predict on increase in the future, inspection of that location should be performed as early as possible and the relevant Grama Niladhari division should be covered including all types of premises i.e homes, institutions and construction sites, etc.

To educate the community regarding elimination of mosquito breeding places is one of the key responsibilities. For the breeding sites that cannot be disposed of, insecticides/ larvicides should be applied in order to prevent outbreaks in high risk areas. This should often be carried out under the guidance of technical officers.

4. Premise inspection during outbreaks

When many patients are reported in your MOH area beyond the normal occurrence, it is considered as an outbreak. In such a situation, you have to work with a large team which consists of members from different institutions other than health sector. As Field Health Workers you must work with responsibility and team spirit in such cases. Premise inspection should be carried out more extensively to cover the relevant Grama Niladhari division or a larger area, until the outbreak is over.

5. Premise inspection during special dengue control programs

There are two types of special mosquito control programs organized by the National Dengue Control Unit to augment routine source reduction activities.

i. **Special Mosquito Control Programs**

Short programs conducted in “high risk” MOH areas (for 2- 3 days), generally once a month

ii. **National Mosquito Control Weeks**

Conducted in “high risk” MOH areas (for 3-7 days) prior to the possible outbreaks associated with South West and North East monsoonal rains; generally in April and October respectively.

In addition to the routine mosquito control activities, above special programs are implemented by the MOH offices coordinated by district level and NDCU



Employees of the Armed Forces, Police, Local Government also participate in these programs, which are conducted on a large scale with the participation of government and non-government organizations.

Field Health Workers should take the initiative to inspect the premises according to the street maps provided, as you are familiar with the area. During special programs, separate dates may be fixed for inspection of construction sites and schools.

3.3.1. Measures to be taken during premise inspection

While inspecting various premises, find potential breeding sites and breeding sites with mosquito larvae. Provide health education as well. Therefore, it is important to have a clear understanding of the measures to be taken during premise inspection.

- When you detect any mosquito breeding sites/ larvae positive sites during the inspection, guide the occupants to correct such places immediately by themselves and assist when necessary.
- Explain correction techniques to prevent recurrent breeding. Provide health education to premise owners/ care takers and heads of institutions regarding these methods.

- For the sites where water get collected daily or retained in large amounts which cannot be drained (e.g. boats, tanks and slabs in construction sites), refer to the PHI for advice on application of insecticides.

When to issue a red notice ?

The aim of mobilizing inspection teams is to clear all the mosquito breeding places. In situations where all the potential mosquito breeding sites and larvae positive sites of the premise cannot be corrected immediately, issue a red notice to the premise owner/ occupant.

E.g.- high abundance of breeding places, no responsible person, when the responsible is person elderly/ disabled.

When to issue a yellow notice?

If the premise is closed, you can leave a yellow notice for the attention of the owners.

Issue of such a notice makes the resident accountable to clean the premises within 3 days and inform the MOH office that all the breeding places were removed and maintained.

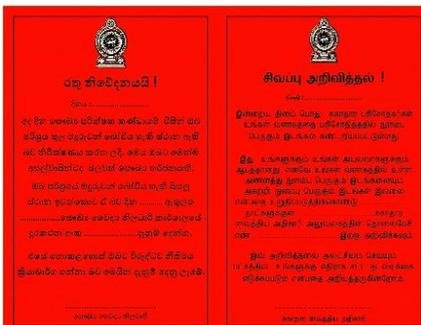


Figure 3.4 Red notice



Figure 3.5 Yellow notice

Follow up and ascertain that the MOH has been informed by the owner of the premise after correcting the breeding places. Inform the MOH or PHI regarding the premises and institutions which have not corrected the breeding and larval sites despite red notices.

3.3.2 Completion and maintenance of records

The inspection teams are expected to duly complete and handover the records and returns mentioned in section 3.2 during relevant premise inspection. Documenting daily duties and maintenance of records are incumbent upon the Field Health Workers since these reflect the performance of duties.

Chapter 4

Assisting in dengue vector surveys

Dengue vector surveys include larval surveys as well as adult mosquito surveys. The supportive staff has to be familiar with the equipment for various surveys, methodology of conducting field surveys and necessary assistance in the Entomology laboratory.

4.1 Preparations for conducting dengue vector surveys

Preparation of necessary equipment for larval and adult surveys will be guided by the HEO.

A. Equipment required for larval surveys



Dipper



Ladle



Pipette



Vials with Labels



Strainer



Field bag



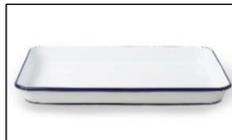
Pen and field book



Torch



Mirror



Tray



Ladder

B. Equipment required for adult mosquito survey



Paper cups with net



Aspirator



Cotton wool



Container to transport paper cups



Towel



Torch

C. Equipment required for ovitrap related surveys

Ovitrap or oviposition traps are dark (black) containers with water. Female mosquitoes find it ideal spot to lay their eggs and hence used to collect mosquito eggs for laboratory purposes.

Adhesive strip for eggs



Ovitrap

Adhesive pedal for eggs



Zip bag for egg transport



Solution to attract mosquitos



Bag to transport ovitrap



Field Record book



Sponge



Torch



Marker pen

4.2. Assisting in premise inspection for vector surveys

- Assisting in vector survey should be carried out under the guidance of Entomologist/ HEO.
- Gather/ assemble the above equipment into the carrier to conduct surveys.
- Permission for the inspection should be obtained with the knowledge of the HEO. It is important to interact with the community in the field in a friendly and respectful manner.
- During the larval survey, assist the HEOs to identify the hidden breeding sites of mosquitoes.
- Show them all the water collections you detect.
- A complete community survey may require inspection of about 100 premises.
- In adult mosquito survey, mosquito resting places should be carefully inspected, such as walls, under surfaces of roofs, wooden furniture, curtains, wall hangings, mosquito nets etc.
- In ovitrap related surveys, ovitrap should be placed under the guidance of HEOs.

4.2.1 Elimination/ correction of mosquito breeding places found during the survey

It is the responsibility of the survey team to guide the owners/ occupants to eliminate/ rectify all mosquito breeding places identified during entomological surveys. After conducting the survey, if breeding sites which are not correctable or removable are encountered, they should be referred to MOH/ PHI of the area for further action and follow up.

4.3 Assisting in larval and adult mosquito surveys and preparation for laboratory testing

Larvae, adult mosquitos and mosquito eggs should be collected without any damage or harm. Collection methods of larvae and adults are described in the sections below. While you work in the field, you will gain experience in the methods and techniques.

4.3.1 Larval survey

Larvae collection should be done in following methods depending on the places where the larvae exist.

i. Collecting larvae using a pipette

This method is used to collect larvae from small water collections such as small receptacles, tree holes, roof gutters, leaf axils, buckets, etc.



Figure 4.1 Collecting larvae using a pipette

- Pour all the water collected from the pipette into the ladle
- If larvae are present after inspection, put them in to the bottle using the pipette and label the bottle.

ii. Collecting larvae using a dipper

This method is used to take samples from water collections where water level is high such as water tanks, barrels, cement drains/ and shallow wells.



Figure 4.2 Collecting larvae using a dipper

- Immerse the dipper to fill $\frac{3}{4}$ of it with water.
- If larvae or pupae are found, take samples using a pipette.
- If larvae are not present, repeated collections should be done at four corners of a square container. If the container is round, conduct the same procedure along edges.
- If there are larvae or pupae, take samples using a pipette.
- Label the bottles.

iii. Collecting larvae using a net

This method is used for large water bodies such as wells, large containers, pools, etc. and the following steps should be followed.

- Slowly immerse the net into the water until half of the net is above the water level: This should be done at an angle of 45 degrees to the water surface.
- Move the net along the edge and centre part of the water source in a sweeping pattern.

- Take out the net and overturn it to wash the contents on to the tray you are carrying.
- If there are larvae, place them inside the bottle by using a pipette and label it.
- Repeat the process in 2-3 minutes once the disturbed water settled.

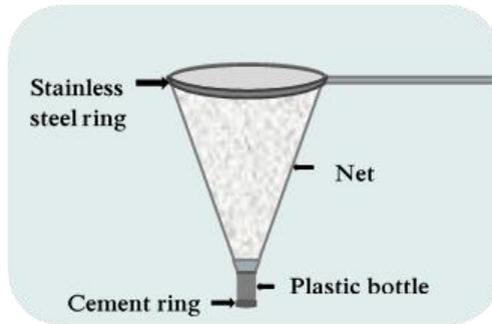


Figure 4.3 Larvae collecting net

After the larval survey;

- The samples should be carefully prepared for examination in the entomology laboratory. The larval samples should be mounted on glass slides and properly sealed with coverslips.

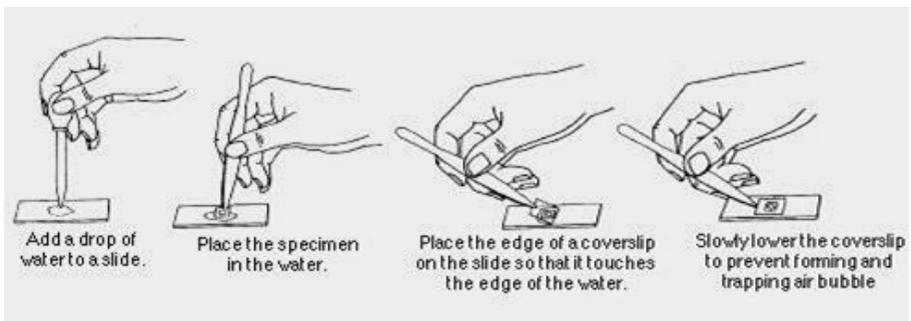


Figure 4.4 Preparing larval sample for examination

4.3.2 Adult mosquito survey

Collecting adult mosquitoes

- Adult *Aedes* mosquitoes are collected from their resting places and flying locations using an aspirator.
- Do the collection without harming the adult mosquitoes.
- Transfer the collected mosquitoes to paper cups.
- Place the mosquito cups in the cup holder.
- Cover with a damp towel and transport.

The following different types of aspirators can be used to collect mosquitos.



Machine aspirator



Backpack aspirator

4.5 Types of aspirators

Procedure

- Survey should be started by 7.30 a.m.
- Select at least **40 premises** in each locality.
- Complete 10 households/ premises per day.
- Cover 40 premises for a complete survey as follows;
 - by a team of 1 HEO and 2 SMO/ SKS within 4 days
 - by a team of 3 HEO and 6 SMO/ SKS within 1-2 days
- Get the consent from a responsible occupant to enter the premise to carry out the collection.
- Spend 20 - 30 minutes to complete the collection in one premise.

Note: Time spent depends on the extent of the premise.

- In indoors, use a torch to examine indoor mosquito resting surfaces such as curtains, cloths, wall hangings, undersides of furniture, wall hangers, bed nets, walls, roofs, ceilings, etc.
- In outdoors, examine for the adult mosquitoes in dark, humid places such as thick vegetation and other possible places where mosquitoes could be resting.
- Collect resting mosquitoes using a suitable aspirator or disturb them and collect using a hand net.
- At the field, identify the species and observe the abdominal conditions of the mosquitoes using a hand lens.
- Transfer the collected mosquitoes in to labelled paper cups (mouth of the paper cups should be covered with nets).
- Then carefully keep these cups in a plastic basin and cover them with wet towels until transferred to the laboratory for further investigations.



Collection of mosquitoes by aspirator



Transferring collected mosquitoes to paper cups

Figure 4.6 Collecting and transferring mosquitos to paper cups

After the adult mosquito survey:

Place paper cups with mosquitoes in a suitable humid environment. This should be a place free of ants. These mosquitos have to be fed with sugar

solutions. Learn the procedure of preparation and feeding. Assist to provide sugar solution for collected mosquitoes.

4.3.3 Collecting eggs from ovitrap

Slowly remove the adhesive strip with eggs from the ovitrap. Carefully insert the strips into the zipped bag for transport th the laboratory.

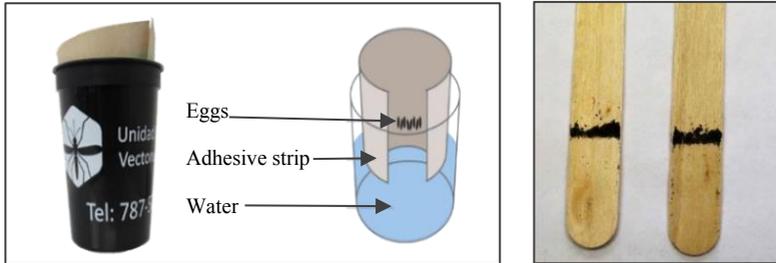


Figure 4.7 Collecting eggs from ovitrap

After the ovitrap survey:

Under the guidance of entomologist/ HEO, the adhesive strips with the collected eggs should be placed in a suitable place for drying. This place should be free of ants. The eggs in the strips are counted separately.

4.4 Assisting in entomology laboratory and maintenance of laboratory equipment

After the field surveys the equipment should be cleaned and transferred to the entomology lab for storage.

Following activities are essential for the maintenance of the laboratory in orderly manner under the guidance of entomologists and HEOs:

- Feeding larvae and mosquitoes

- Transferring larvae and mosquitoes intact to the relevant containers cautiously
- Appropriate storage of ovitraps and other equipment used for larval surveys, after cleaning thoroughly
- Systematic storage of fragile laboratory equipment after washing and wiping
- Cleaning the laboratory

As you gain experience in entomology work, develop your knowledge and skills to differentiate-

- Adult mosquitoes of *Anopheles*, *Culex* and *Aedes*
- Male and female adult mosquitoes of *Aedes*
- Larvae and pupae of *Aedes*

4.5 Assisting in implementation of integrated dengue vector control

As you have learnt by now, control of dengue vector in an area may require more than one method and several implementing partners.

e.g. In a school there may be several breeding places, necessitating several corrective actions.

- slab - removal of water
- roof gutters - cleaning to prevent water stagnation
- water tanks - covering with a lid or introducing larvivorous fish
- Unremovable water collections, e.g., large cement tanks/ slab- add larvicide e.g., Temephos liquid or granules

Therefore, to prevent breeding of dengue mosquito, activities have to be implemented through a range of combined processes simultaneously with integration of different vector control methods; i.e., removal, covering, introducing larvivorous fish, etc.c, as in above example. The field health workers can contribute to this process at various levels.

To maximize the resources of different stakeholders we have to utilize all appropriate, safe, available and effective methods rationally to reduce mosquito breeding: this is the basis of globally recommended IVM principle which is defined as “a rational decision-making process for the optimal use of resources for vector control”.

In the next chapters the various vector control methods below and actions in relation to each is described.

- Chapter 5 - Management of environment
- Chapter 6 - Chemical control methods (Larval and adult)
- Chapter 7 - Biological control methods
- Chapter 9 - Dengue control through intersectoral collaboration, Community empowerment and engagement

Chapter 5

Environmental management methods in dengue control

The most effective means of vector control is environmental management which is the process of “changing the environment using temporary or permanent methods” to prevent or reduce mosquito breeding and man-vector contact to prevent transmission of the disease.

This change in “environmental management” can be achieved by modification or manipulation of environmental factors which aims at preventing *Aedes* vector population and man-vector contact. This can be done by destruction, alteration, disposal and recycling water collecting/retaining items.

Basically, three types of environmental management are identified as below,

- Environmental modification
- Environmental manipulation
- Alterations in the living environment

These three are described briefly below;

5.1. Environmental modification

Environmental modification is changing the environment (mosquito breeding sites/ potential breeding sites) to eliminate/ prevent mosquito breeding using long-lasting methods i.e., permanent physical transformation of vector habitat.

e.g.,

- Prevention of mosquito breeding in cement tanks, barrels and other containers in localities with irregular water supply by providing continuous pipe-borne water supply
- Covering the water storage cement tanks, domestic wells and overhead tanks/ cisterns permanently to prevent entry of mosquitos.
- Construction of buildings without roof gutters and removal of unserviceable roof gutters
- Removal of unwanted cement tanks
- Use of mosquito proof plastic overhead tanks instead of open tanks



Applying covers for wells and water tanks



Construction of houses without roof gutters



Use of closed plastic tanks instead of open water tanks



Providing continuous pipe water supply

Figure 5.1 Environmental modification methods

5.2. Environmental manipulation

Environmental manipulation is changing the environment (both potential and positive breeding places) by temporary methods to prevent or reduce mosquito breeding.

These include,

- Regular cleaning with scrubbing of water storage tanks, flower pots, flower vases, ant-traps, refrigerator trays, etc.
- Application of larvivorous fish, Bti and Temephos to the non-potable water storage containers and changing water regularly
- Proper draining of cement lined drains, water collections on cement floors and concrete slabs and periodic cleaning of roof gutters
- Proper management of solid waste by reducing, reusing and recycling of discarded items.
- Proper storage of used tyres, household and garden utensils under a shade to avoid water collection.
- End capping or filling the cavities of iron/ galvanized poles by cement or soil
- Cutting bamboo at the nodes or filling bamboo stumps and tree holes with sand or cement

The effects of environmental manipulation are short term; thus, such activities need repeated application i.e. temporary changes to vector habitats to convert conditions unfavourable for vector breeding.

5.2.1 Solid waste management

Proper solid waste management is an important strategy to prevent mosquito breeding in the environment where waste is collected regularly. Dengue mosquito breeding sites can be successfully minimized by following the basic principles of solid waste management.

3R Concept:

This concept is a basic principle used for solid waste management. This is also called the hierarchy of waste management. The 3R's of waste management means exercising measures that help reduce, reuse and recycle wastes and is a continuous cycle.

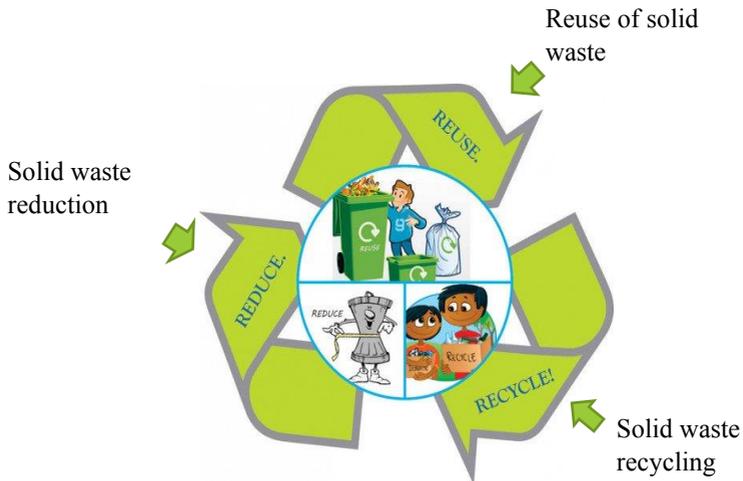


Figure 5.2 Basic elements of 3R concept

Reduce

Reduction of the amount of solid waste generated. e.g;

- Avoiding use of disposable items, i.e., plates, spoons, cups, napkins etc.
- Printing on both sides of papers to reduce paper waste generation

- Avoiding or minimizing purchase of goods packaged in plastic and non-degradable materials
- Using alternative methods to replace non-degradable materials for packing goods
- Using a common package instead of packing goods individually e.g., several items in one pack

Reuse

Reusing resources used for one purpose, for another or for the same purpose again is meant by re-use. This is to reduce the amount of solid waste generated.

e.g.

- Using a lunch box instead of a polythene wrapper/ sheet to carry food
- Using the same bag for shopping every time
- Using glass bottles, tins, cans, cardboard boxes for other purposes



Figure 5.3 Reusable resources

Recycle

Recycling means to change or transform waste and unusable items into raw materials that can be used to create new objects. Since it is not practical to carry out the recycling process at the household level for non-degradable (e.g. plastic, paper, glass, metal etc.) It is done in specialized factories set up for that purpose.

Therefore, when removing solid waste from the premises, they should be properly categorized and disposed of. There is a standard colour code for categorizing solid waste. You need to develop the skills to educate the public about this colour code for disposal of solid waste.



Figure 5.4 Categorization of solid waste

Standard colour code used for waste categorization:

Degradable waste

Non-degradable waste



Figure 5.5 Standard colour code used for waste categorization

5.3 Alterations in living environment

This strategy is used to prevent human-vector (dengue mosquito) contact. Physical barriers and personal protective measures can reduce or prevent the bites of mosquito, thereby limiting the spread of the disease from person to person. E.g:-

- Screening doors and windows of houses/ buildings/ institutions using mosquito proof mesh/ using insecticide treated curtains/ nets
- Protective clothing to cover the body



Figure 5.6 Application of mosquito proof mesh and nets

- Use of repellents - Application of natural repellents such as citronella oil, lemon grass oil, neem oil. However, repellents have a short term effect ($\frac{1}{2}$ - 10 hours).



Figure 5.7 Types of mosquito repellents

The approved list of repellents by Registrar of Pesticides is attached. (annexure ix; page 112)

Chapter 6

Chemical vector control methods

Chemical methods of vector control include,

1. Larval control chemical methods
2. Adult mosquito control chemical methods

The routine source reduction measures described above can be combined with larvicide application to water containers which cannot be eliminated, covered, emptied or otherwise managed.

6.1. Chemical methods used to control larvae and pupae in water

When other larval control measures are not practical/ feasible, Temephos can be used for larval control during dengue epidemics, when vector breeds in water collections. e.g., in abandoned/ unused boats, concrete slabs, in yards with machinery parts, construction sites etc.

Temephos 1% sand granules (Abate 1% SG)

This is a slow releasing formulation of larvicide that is recommended for *Aedes* mosquito control in domestic non drinking water storage containers such as water storage tanks, barrels and other containers.

Frequency of applying Temephos 1% SG is 3-4 times per year. This may vary depending on mosquito density and rainfall pattern in the area. If the water in the tanks is changed frequently, the frequency will change. This insecticide is not recommended for use in potable (drinking) water. Note that this is only to be applied by health sector for larval control, i.e., Restricted category.

Table 6.1 Dosage, application methods and frequency of application of Temephos 1% SG

Product	Formulation	Application methods	Dosage (mg/l)	Frequency of application
Temephos	1% SG (GR)	In cotton cloth pouches (put the required amount of granules in the pouch/sachet and keep it suspended in water) 	1g in 10 liters of water	03 month intervals

Table 6.2 Quantities of Temephos 1% SG required to treat water containers of different sizes

Capacity of the container (Liter)	Required Temephos 1% SG amount (gram)	Required Tea-spoons (1 tsp= 5 g)
Less than 25	Less than 5	Small amount
50	5	1
100	10	2
200	20	4
250	25	5
500	50	10
1000	100	20

Other larvicides approved by ROP for the open market are listed below.

- Pyriproxyfen (Sumilarv 0.5 G granules)
- Novaluron (Rimon®10 EC Liquid)
- Polydimethylsiloxane (Aquatain AMF Liquid)
- S-Methoprene (Vioprin)
- Natular

6.2 Chemical methods used in adult *Aedes* control

Adult mosquitoes can be controlled by applying insecticides in following ways.

1. Space spraying - spraying the insecticide into the air in the form of a vapour or aerosol
2. Residual spraying - spraying the insecticide on surfaces e.g., walls where adult mosquito is resting

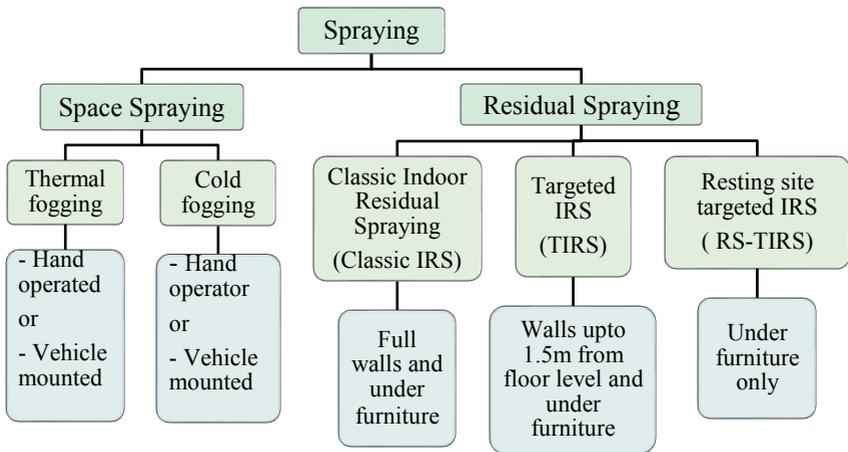


Figure 6.1 Types of spraying

Space spraying

Space spraying involves the release of insecticides in small droplets (up to 50 μm in thermal fogging and up to 15 μm in cold fogging), where the mosquito is knocked down and eventually die. This method is used as an instant vector control method to rapidly reduce the density of *Aedes* mosquitoes during dengue epidemics and outbreaks.

Space spraying is done in 2 ways, i.e., cold fogging and thermal fogging.

1. Cold fogging (Ultra Low Volume fogging)

The insecticide is mixed with water instead of diesel or kerosine oil and released into space by a smaller nozzle (< 1 mm) at high pressure which produces smoke mechanically in the form of mist.

Cold fogging is done by hand operated and vehicle mounted fogging machines.

2. Thermal Fogging

Insecticides are mixed with diesel/ kerosene and pumped at high pressure (nozzle size 1-1.2 mm) and temperature generating a hot gas. The chemical substance is released as droplets into space producing a very visible fog.

Thermal fogging is carried out by hand carried (portable) and vehicle mounted thermal fogging machines.

Fogging should only be carried out during dengue outbreaks or when patients are reported. In addition, when high larval density is reported in an area, fogging can be used to kill the already emerged adult mosquitos, thereby to reduce the risk of future outbreaks. It should be noted that fogging has to be performed concurrently with larval control (e.g., source reduction), environmental management (e.g., covering wells, cleaning roof gutters/ slabs, etc.), since fogging does not kill larval and pupal stages.

Types of fogging machines

Fogging Machines used for thermal and cold fogging are described below.

ULV (Ultra Low Volume) machine

This machine is used for indoor cold fogging. It uses a high volume of air to create a fog without heat. Fog is comparatively less visible and procedure is less noisy.



Figure 6.3 ULV fogging machine

Thermal fogging machines

There are two types of thermal fogging machines.



Hand held thermal fogging machine



Vehicle mounted fogging machine

Figure 6.4 Types of thermal fogging machines

Mist blower fogging machine

This equipment is used to spray chemicals for “hard to reach” places with mosquito breeding sites. e.g., pineapple yards, concrete slabs



Figure 6.5 Mist blower fogging machine

- Produce a minimum amount of smoke
- The chemical is released in very small droplets
- Covers a large area up to 15m distance

Residual Insecticide Spraying

Residual insecticides are long lasting insecticides which are sprayed targeting the common mosquito resting places in the premises. This is done by hand compression sprayers. When the mosquito comes into contact with it, lethal dose of insecticides is absorbed by it, resulting in death of mosquito.

After a blood meal, dengue mosquitoes mostly rest in dark places inside the premises as explained in chapter 2.

Therefore, dengue mosquitoes can be killed by spraying insecticides to the curtains as well as the under surface of wooden furniture.

This method has a limited value due to the poor acceptance by households. In recent years, there is evidence that spraying residual insecticides to the wall up to 5 feet height from the floor level is an effective adult mosquito control method.

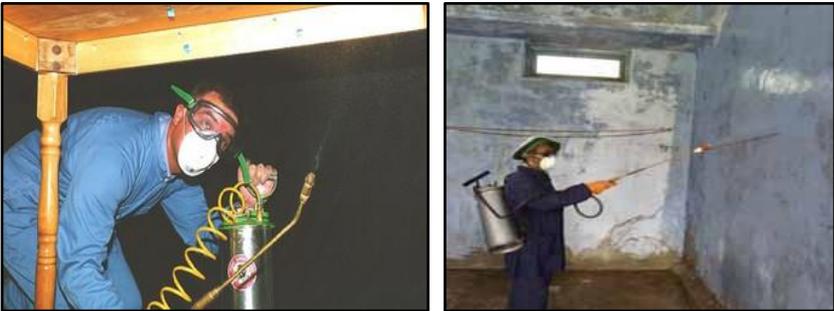


Figure 6.6 Residual insecticide spraying on walls and under surfaces of wooden furniture

Favourable environmental conditions for fogging

Table 6.4 Favourable environmental conditions for fogging

	More favourable conditions	Average conditions	Unfavourable conditions
Time	morning (6.30a.m – 8.30a.m) & evening (4.00p.m – 6.00p.m)	morning (8.30am – 10.30am)	mid-morning or noon
Wind	static, between 3-13 km/h	0-3km/hr	more than 13km/h
Rain Fall	no rain	drizzle	heavy rains
Temperature	cold/ mild	mild	warm

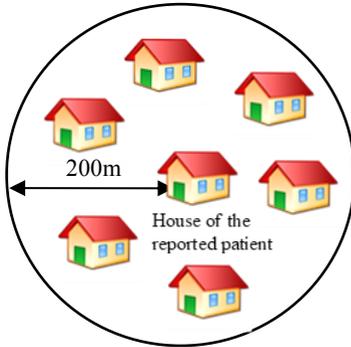
The ratio at which insecticides should be mixed for fogging with different chemicals and different machines

The ratio at which the insecticides and the oil base should be mixed in the solution tank, for different types of fogging techniques are described in the following table.

Table 6.5 Recommended insecticide mixing ratio

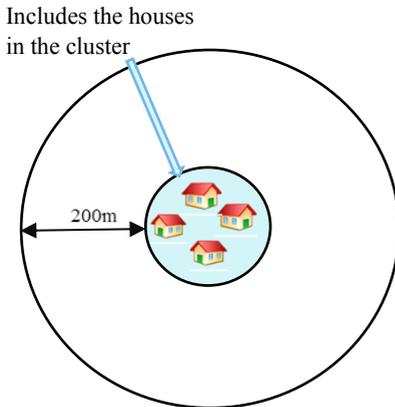
Type of insecticide	Ratio to mix		The amount of pesticide mixture required for a hand fogging machine with a capacity of 5 liters		The amount of pesticide mixture required for a vehicle mounted fogging machine with a capacity of 50 liters
	Insecticide portion	Kerosene or Diesel portion	Amount of insecticide	Amount of fuel	
Technical malathion	1	19	250 ml	4750 ml	2.5 liters
Pesguard	1	159	30 ml	4970 ml	300 ml
Gokilaht	1	99	50 ml	4950 ml	500 ml

Area to be covered by space spraying for a reported single dengue patient and a cluster of cases



For a single patient, fogging should be carried out to cover each and every domestic and peridomestic areas within 200m radius from the patient's house/ source of infection as shown here.

Figure 6.7 Area to be covered by space spraying for a reported single dengue patient



When there is a cluster of dengue cases in an area (2 or more cases occurring within 200m distance from each other, within 2 weeks), fogging should cover both the area of the cluster and the area within a radius of 200m outside the cluster area.

Figure 6.8 Area to be covered by space spraying for a cluster of a few cases

Advising households before fogging

When fogging is planned, prior announcement by Public Address System should be carried out with following key messages.

Key messages to the residents of the area prior to fogging

- Turn off all gas cookers, ovens and other heaters and allow some time to cool down before spraying
- Turn off all electricity at the main switch
- Keep the doors and windows open
- Keep food, water containers, fish tanks, etc. well covered
- All the residents and pets should be away from the area.
- Keep the doors and windows closed for 1/2 hour after fogging allowing smoke/ mist to spread in the house.
- Open the doors and windows of the house/ building to ventilate before returning.
- Spray operator should work backward and away from the fog to minimize exposure.

Conduction of fogging:

Basic steps to follow when using hand fogging machines:

- Mark the area to be fogged on the area map, according to the instructions of the PHI.
- Let the fog enter the house for 10-15 seconds through an open front door or window.
- At all times the operator must determine the direction of wind and aim the fog in that direction.
- Fog should be spread inside the house to kill indoor mosquitoes.

Steps to follow when fogging

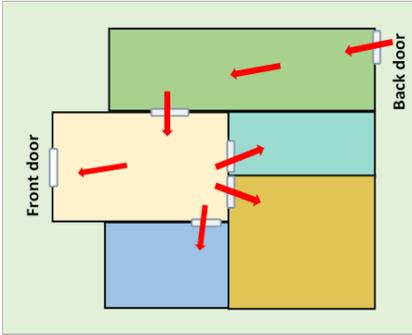


Figure 6.9 How to fog when the operator enters through the back door and exits through the front door

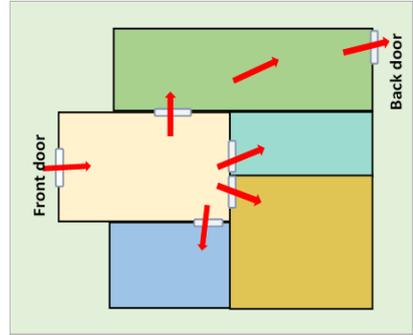


Figure 6.10 How to fog when the operator enters through the front door and exits through the back door

Fogging by vehicle mounted fogging machine

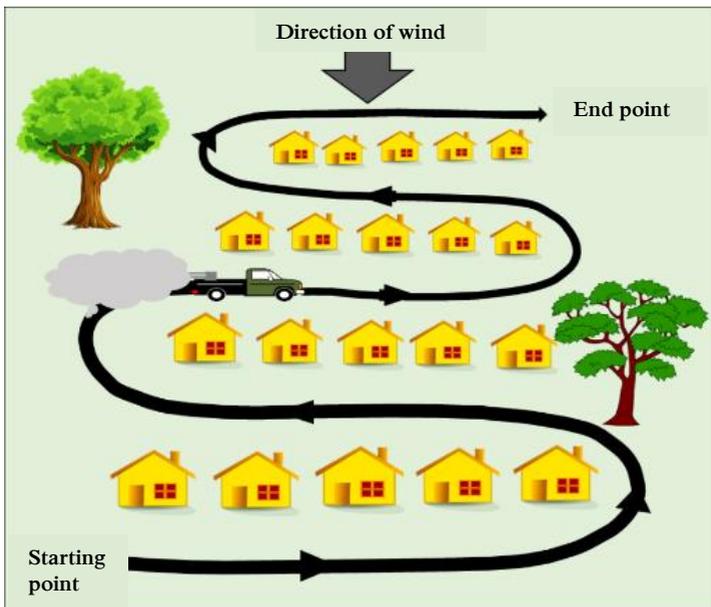


Figure 6.11 Recommended movement of a vehicle mounted fogging machine

Vehicle mounted fogging machines are used to cover a large area when there are scattered cases in a particular area/ along the same or adjacent streets.

When space spraying is carried out using vehicle mounted fogging machines, the route of the vehicle should be planned before fogging in order to make sure the entire target area is covered. Recommended movement of a vehicle mounted fogging machine through the target area is shown in figure 6.11

Basic steps to be followed in vehicle mounted fogging are described below:

- With the guidance of the MOH and PHI, study the map of the target area as a team and determine the route for the vehicle.
- Make sure you do not block the road for other vehicles or people.
- When the road is narrow and the houses are close to the roadside, vehicle should move against the wind direction with the spray head pointing backwards.
- When the road is wide, move the vehicle in zigzag manner across the wind direction ensuring coverage of the target area.
- The speed of the vehicle should be 6-8 km/ hr (3.5-4.5miles/ hr).
- Keep the tip of the fogging machine at an inclination of 45 degrees horizontally to allow the droplets to travel as far as possible.
- There may be some places in the target area where the vehicle cannot be reached: Such areas should be fogged by hand fogging machine.
- Some streets may have a dead-end without connecting to another. In such streets, fogging should be conducted starting from the dead-end towards main road (not from the other way round).
- The fogging machine should be switched off before stopping the vehicle.

The frequency of space spraying

For an indigenous case, minimum two fogging rounds should be carried out.

- First round of fogging - as early as possible on receiving notification of the case (at least within 48 hours of the notification)
- Second round of fogging - within 5-7 days after the first round.

In case of an exogenous case (disease contracted from an outside area) in receptive areas, one round of fogging may be sufficient.

6.3 Fogging machines

6.3.1 Parts of a fogging machine

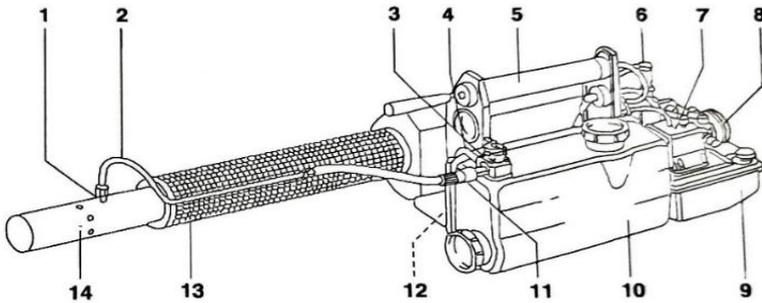


Figure 6.2 Parts of a hand-held fogging machine

- | | |
|---------------------------|--------------------------------|
| 1. Fog solution socket | 8. Non-return valve |
| 2. Chemical solution line | 9. Fuel tank |
| 3. Chemical solution tap | 10. Spraying tank |
| 4. Pressure hose | 11. Dosage nozzle |
| 5. Starter pump | 12. Battery holder |
| 6. Spark plug | 13. Cooling pipe and resonator |
| 7. Carburettor | 14. Fog mixing tube |

6.3.2 Storage and maintenance of fogging machines

As proper care of the fogging machine is important for their durability, adhere to the following instructions while handling the fogging machines.

General instructions

Before storing fogging machines

- Leave the fogging machine for cooling.
- Remove the batteries.
- Remove the remaining liquid solutions. Close the lid of the liquid tank loosely after emptying.
- Check the inside: If the valve blade is damaged, remove and replace.
- Clean the mixing tank and mixing pipe.
- Check the nozzle of the mixing tank.
- Inspect and clean the fuel tank.
- Store in a safe and dry place.

Cleaning of fogging machines

- The adhered carbon particles should be removed from the fogging machine at least every 2 days of use or after four filling cycles.
- Once a week, clean the carbon particles, remove the liquid from the tank, and rinse with clean water. Fill half of the tank with clean water, close the lid, start the machine and fog until the water runs out, so that all the pipes are cleaned.
- Wipe the valve plate and spacer plate with a clean cloth soaked in a liquid such as kerosene.
- When installing the air valve, make sure that the diaphragm is in the correct position.

- Remove any remaining carbon particles from the liquid plate, fogging hose, and resonator tube.
- Remove the spark plug. Dip into liquid fuel and clean by brushing: Inspect the spark plug and adjust the distance between the electrodes to 1.5 - 2.0 mm.
- Clean and remove clogged carbon particles in the swirl vane.
- Clean the mixing chamber and the resonator tube by removing remaining carbon particles with a cleansing agent. Make sure that the nozzle is not damaged during rubbing.

Maintenance of fogging machines

A fogging machine should be fully serviced after 20 hours of use or 50 refills of the machine or kept unused for a long time.

Following activities need to be carried out for this purpose.

- Removal of dirt from the outer surface of the fogging machine should be done first.
- Wash the empty liquid tank as mentioned above and also clean the liquid pipe.
- Diaphragm of the fogging machine, all washers and gaskets should be replaced with a new one and the machine should be upgraded.
- If the machine caps, gaskets, etc. are worn out, replace them.

Chapter 7

Biological and bio-chemical vector control methods

Biological and bio-chemical vector control methods are environment friendly mosquito control methods. They include larvivorous fish and Bti bacteria. Bti is used in non-potable water storage tanks, ponds, wells and water collecting places in construction sites and other industrial premises which is described in section 3.1.4.

Larvivorous fish such as Guppy, Tilapia, and Nalahandaya are used as common biological vector control agents. Larvivorous fish rearing takes place in tanks located in some MOH offices and Field Health Workers need to develop skills on larvivorous fish rearing, field distribution and follow up, which are described in this section.

7.1. Essential features of larvivorous fish

- Small, hardy and capable of moving about easily in shallow waters among thick weeds
- Drought resistant and capable of thriving in both deep and shallow waters
- Ability to withstand rough handling and transportation for long distances
- Being prolific breeders
- Breed freely and successfully in confined waters
- Having a short life span
- Surface/column feeders (feeding in both surface and mid-water) and carnivorous in habitat

- Predilection for mosquito larvae even in the presence of food materials.
- Compatible with the existing fish life in that environment.

7.2 Rearing Guppy (*Poecilia reticulata*) as a larvivorous fish

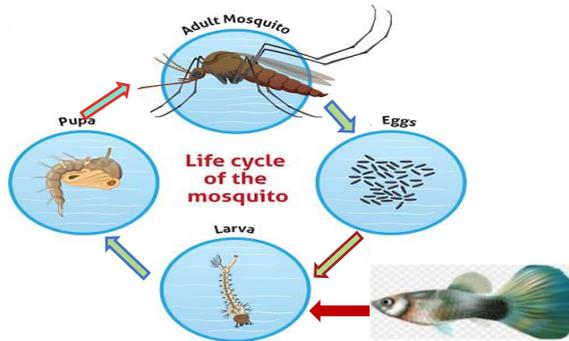


Figure 7.1 Mosquito control using larvivorous fish

Special features of Guppy fish

- It is a species of fish that is resistant to extreme environmental conditions and survives in most water bodies.
- It tolerates high degree of pollution of water with organic matter.
- Lives in temperature range from 24°C - 34°C.
- It can survive in water with pH ranging from 6.5 to 9.
- It takes about 90 days to mature after hatching of eggs.
- Average life span is 18-24 months.
- Adult fish breed throughout the year at 4-week intervals.
- Females release 50 to 200 offspring, every 4 weeks.
- A single fish eats about 80 to 100 mosquito larvae per day.

- Easy to handle and have the ability to withstand transportation for long distances.
- No special carriers are required for transportation.
- It can be found in the habitat even after many years of establishment.

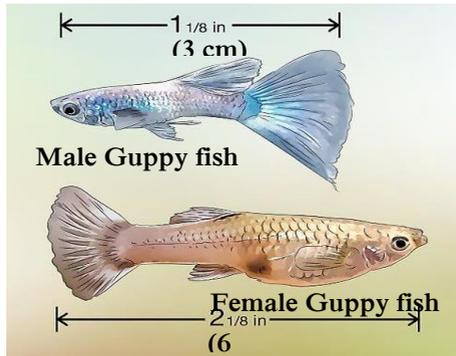


Figure 7.2 Male and female Guppy fish

Possible sites where Guppy fish can be introduced

- Water storage tanks and barrels
- Cement tanks and drains with stagnant water
- Fresh water wells, ornamental ponds, lift wells etc. in construction sites

Fish hatchery

In order to have a continuous supply of fish, it is necessary to establish a hatchery where the fish may survive and multiply in the local settings.

Optimum requirements for construction of tanks for fish hatchery is described below. According to the situation in the district, adjustment to the size of tanks may be made with technical guidance.

Larvivorous fish rearing can be established in a natural water body or a special hatchery.

Key factors when rearing Guppy in a natural water body

The following features are defined for situation with optimum resources. In the districts and MOH level, these conditions may be adopted and modified depending on the facilities available and necessity for weekly turnovers.

- Should be a permanent water body
- The depth of water should be 1.5 m
- Water should be confined and without big natural outlet/ outflow
- Minimum size of the water body should be at least 5 X 4 m
- Should be free from other carnivorous fish/ animals
- Water should not be contaminated by chemicals or other harmful substances.
- Easily accessible for daily inspection and for collection of fish
- Regular cleaning of the surrounding area and removal of debris need to be carried out

Key features when rearing Guppy in a special hatchery

- There should be a constant supply of water free of chlorine and insecticides.
- Aquatic plants such as vallisneria and hydrilla should be grown in the tank.



Vallisneria



Hydrilla

Figure 7.3 Aquatic plants that can be grown in Guppy fish rearing hatchery

- The hatchery should not be subjected to strong water currents and should be protected from floods.
- The tank should be made of brick and plastered with cement and the walls should be about 0.5 m thick.

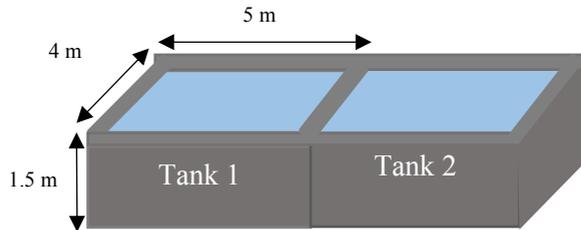


Figure 7.4 Dimensions of a special hatchery with two tanks

- The whole tank should be divided into two equal parts measuring 5 m x 4 m with a central partition of 0.5 m thickness.
- If there is sufficient area, ideally 3 tanks measuring 5 m x 4 m should be constructed;
 - one tank for laying young ones (fingerlings)
 - one tank for holding mature fully grown fish
 - one for stocking fish when cleaning the present tank
- The depth of water in the tank should be 1.5 m
- The inlet should be at 1.25 m height from the bottom.
- There should be an appropriate outlet at the bottom of the tank for the proper drainage of water.

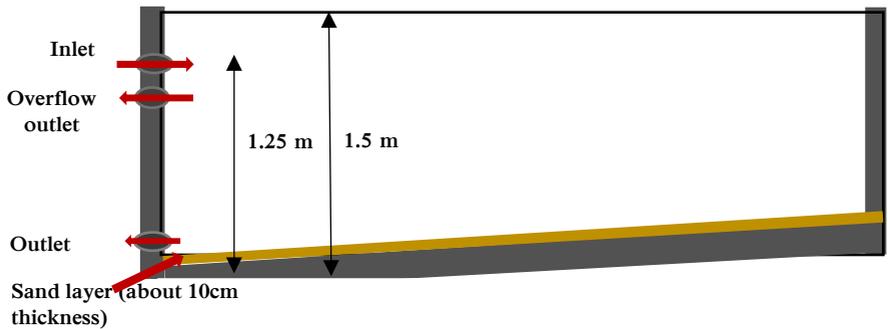


Figure 7.5 Longitudinal section of a special hatchery

- The overflow outlet should be about 5 cm below the inlet and protected with a proper wire mesh to prevent escape of fish
- The floor of the tank should be 0.5 m thick with slope from the partition towards sides.
- Bottom of tank should be covered with a uniform sand layer with thickness for about 10 cm and seeded with organic matter about 2 kg per square meter.
- Leave the tank unutilized 10 to 15 days for maturation.
- Minimum of 25% water should be replaced once a week.
- Mature fish should be transferred as required to avoid overpopulation.
- In case of scarcity of natural food, artificial food may be given.



Figure 7.6 Guppy production tanks

Transportation and distribution of fish

Collection for distribution:

- The collection of fish is done using a net, which is fitted on a circular iron ring (about 60-90 cm in diameter) with a wooden handle.
- Sufficient quantity is collected by repeated dips
- Until these fish are packed for transport, keep in a bucket or other container.



Figure 7.7 Fish hand net

Transportation:

- The fish are best transported in small containers of up to 40 liters, such as in plastic buckets, cans and strong plastic bags.
- Half of the container should be filled with water from the rearing tank.
- Fish should be transported in water at ambient temperatures and should not be exposed to direct sunlight: They may not be viable with a sudden temperature change.
- The container should have sufficient openings to allow flow of air.

When transporting in a polythene bag:

Fish transporting polythene bag should be oxygenated using an oxygen tank before transportation.

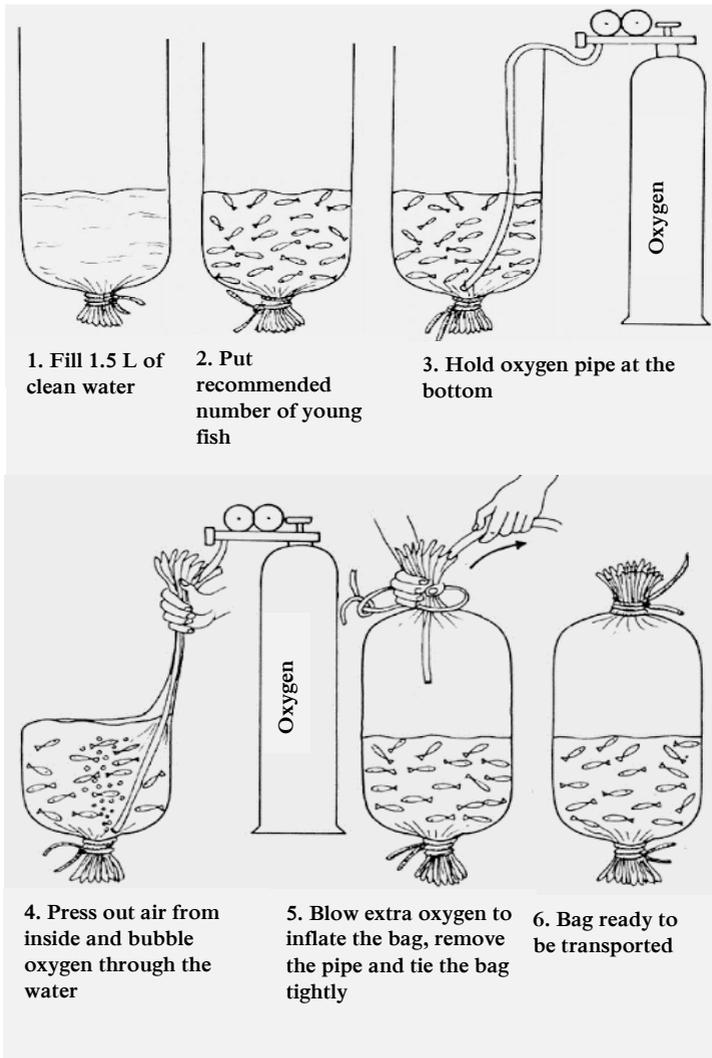


Figure 7.8 Oxygen filling prior to transportation of guppy in a polythene bag

- Take a polythene bag of 3-5 liter capacity
- Fill it with 1.5 liters of water

- Introduce the fish in to the bag and add water until the total volume is 2-3 liters.
- Bubble the oxygen in the bag from an oxygen cylinder or from an air pump as illustrated in figure 7.8
- Close the mouth of bag with a string leaving sufficient space above the water level.
- Place the bag in a thermo cool container and close the lid tightly.
- The container can be transported for a period of 24 hours without further oxygen filling.
- When transportation time exceeds 24 hours, change the water in the bag and oxygenate.

Release of fish in to a water body

- The perimeter of the water body should be measured before releasing fish into it.
- Fish should be released with an approximate number of 10 per 20 liters of water (Release the fish at the rate of 5 to 10 fish per linear meter).
- Release of fish should be done only in the mornings or evenings
- Before releasing, make sure that the temperature of the container and the water body is almost equal.
- Make sure that the water body is free of carnivorous fish/ animals or birds.

Monitoring of released fish

Fish hatcheries should be inspected at least once a month and the sites where fish have been introduced should be regularly monitored for the following:

- Whether the fish have been introduced to the relevant water bodies
- Whether the fish are surviving or not
- Identification of possible reasons, in case the introduced fish have not survived.

It is advisable that a record book is maintained at institutional level to document these facts by an assigned person.

7.3 Bti bacteria

Bacillus thurengiensis israelensis (Bti) is a spore forming bacteria. It produces highly specific protein called endotoxin which is insecticidal. When mosquito larvae swallow this spore containing endotoxin in water, it causes the death of larvae.

In Sri Lanka, liquid and briquette (slow releasing) formulations of Bti has been approved by Registrar of Pesticides which are available in the market.



Figure 7.9 Bti dunks (briquette)

Bti is recommended for *Aedes aegypti* breeding sites that cannot be eliminated by source reduction methods or where water cannot be emptied at least once a week, e.g., water storage tanks, artificial and ornamental ponds, fountains, abandoned wells and roof gutters, etc.

Types of breeding sites suitable for application of Bti is limited.

Limitations of the use of Bti for dengue vector control

- Bti is not recommended for potable (drinking) water containers/sources
- Frequent applications of Bti formulations are required since it rapidly settles at the bottom of water containers.
- Liquid Bti is usually effective for 10-12 days and the briquette formulation is usually effective for 30 days. Therefore, fortnightly application of liquid Bti and monthly application of Bti briquette is required for effective dengue vector larval control.
- The late stages of larvae and pupae are not killed by Bti as they are non-feeding.

Hence, regular inspection and removal of breeding places is deemed more important.

Chapter 8

Occupational health and safety

Occupational health is a multidisciplinary field concerned with the safety, health, and welfare of people at occupation. When considering the occupational health and safety, relevant protective measures should be taken covering physical, psychological and social well-being of employees.

Field Health Workers should understand that there is a risk of biological (mosquito bites), mechanical (while fogging and operating other machines) as well as chemical (while using insecticides) hazards when performing daily field duties. It is important to work as a team with proper safety measures during premise inspection. Always consider that taking care of health and safety of the field workers as well as the occupants is a major responsibility.

During fogging activities, following personal protective equipment are used as a safety device to minimize health hazards due to contact and inhalation of fumes and chemicals.

- cap
- ear muffs
- goggles
- respirator
- gloves
- protective overall
- boots



Figure 8.1 Personal protective equipment (PPE) for fogging

As field health workers, you must adhere to the safety precautions during fogging and while handling hazardous materials in following situations.

- when storing insecticides
- before using insecticides
- during insecticide mixing and fogging
- after fogging

Safety precautions when storing insecticides:

- Wear PPE including gloves before handling insecticides.
- Store the insecticide in the original container with the label.
- Insecticide containers should be properly closed and sealed.
- Always store insecticides properly in a designated place. This should be a place away from direct sunlight, food, medicine and clothing.
- Store in a locked room with a “warning sign” notice to prevent children and unauthorized persons from entering.
- Use the insecticides in the order of date received and expiry date: This avoids mishandling and wastage due to prolonged storage.
- Thoroughly wash hands with soap after storing insecticides. Avoid contact with chemicals, especially if you have got wounds in hands.

Safety precautions before use of insecticides:

- Read the label carefully
- Understand and follow the directions to use the insecticide and the precautions to be taken.
- Know the first-aid measures and antidotes for the insecticides being used in case of contact with them.

Safety precautions to be taken when mixing insecticides and during fogging

- Make sure kids, pets and non-essential personnel to the procedure is out of the area before mixing and applying insecticides.
- Be sure to wear protective clothing when mixing insecticides.
- Mix insecticides outdoors or in a well-ventilated area.
- Mix only the amount needed for the current use to avoid storing or disposing of excess insecticides.
- Always fogging should be carried out with full PPE.
- Follow precautionary measures while fogging in a small enclosed space such as closet, cabinet or under a table since it may cause the product to explode, resulting in injury to people or damage to property.
- Keep fogging machines away from ignition sources - Accidents are most likely to occur if large amounts of fogging material come into direct contact with an ignition source such as a flame or spark from an electrical appliance.
- Instructions to be given to the household before fogging are mentioned in page 62.

Safety measures to be followed after fogging

- All equipment should be washed thoroughly and stored dry and clean.
- Bathe with soap and water to wash out all the chemicals.
- Wash and clean all personal protective clothing after use.
- Properly discard the empty insecticide containers.
- Keep records of the daily use of insecticide.

Chapter 9

Empowerment and enforcement of the people for sustainable dengue control

Enforcement and empowerment of the community is important to launch effective dengue control programs. Premise inspection and other dengue control activities through shramadana (cleaning) campaigns can be carried out successfully and sustainably through regular community participation and engagement.

Establishment of “Dengue Control Committees” in Grama Niladhari divisions is one of the major activities that can strengthen community participation.

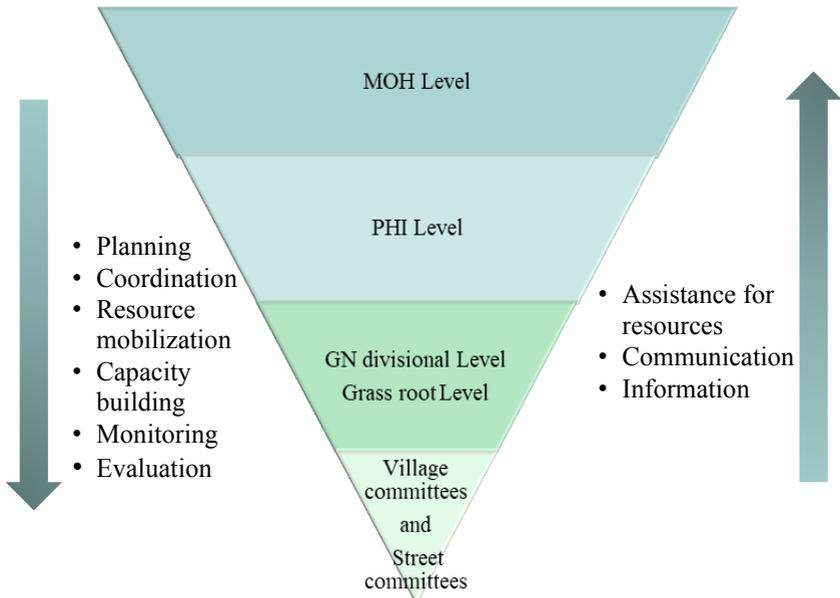


Figure 9.1 Organizational structure for community engagement in dengue control at different levels

As shown in the diagram above, MOH office is made up of several PHI ranges and each range includes several Grama Niladhari divisions. At the village level, one street can be considered as the smallest community unit (and hence the rural committee).

Working at the street level for implementation of dengue prevention activities can be considered a very effective strategy. The following activities can be carried out under the guidance of the PHI and the Grama Niladhari of the area;

- Identifying active members of street committees who have willingness and capability to organize local dengue prevention activities.
- Sharing the gravity of the problem, local determinants and risky practices/ behaviours.
- Identifying solutions, changing behaviours and factors necessary for “enabling environment”
- Conducting committee meetings depending on the resources and risk to discuss, plan and implement programs (e.g., weekly, fortnightly, monthly)
- Review of the progress of those programs

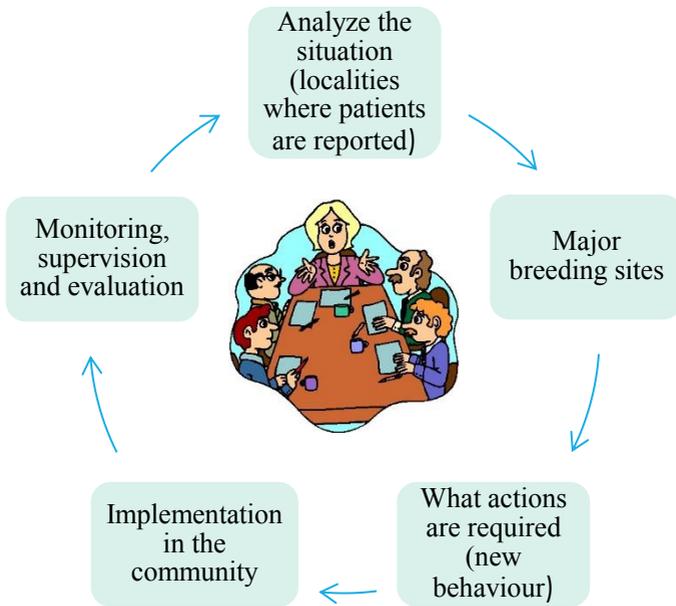


Figure 9.2 Problem analysis in the village committee

Chapter 10

Effective communication and Health education

Effective communication is an important strategy for empowering the community on dengue control activities. The message delivered should be clear, uniform, simple, effective, selective and culturally acceptable.

The following points should be taken into consideration when communicating with people.

- Use health messages which convey the same consistent information to the public without contradiction.
- Use pleasant and friendly words to build the trust of the community.
- Respectfully listen to the queries of the community and advise accordingly.
- Positively appreciate and acknowledge the contribution of the community.
- Craft the message respecting the culture, values and beliefs of the receiver.
- Deliver concrete, specific, tangible messages to minimize misunderstandings.

Advice to keep the premises free of dengue mosquito breeding sites:

Key messages for individuals and families, institutional committees, etc. can be crafted according to the specific breeding sites and gaps in the behaviour. Some messages that have been disseminated are mentioned below:

General messages

- Spend at least 30 minutes every week to inspect and remove mosquito breeding sites in your premises.
- Establish a dengue control committee in every school.
- Allocate 30 minutes each week to inspect and remove mosquito breeding sites from schools.
- If there are children with fever in the school, notify to the relevant MOH office as soon as possible via DENGUE FREE CHILD APP.
- Appoint a team headed by the “Health and safety officer” for the dengue control activities in construction sites to inspect and remove all the mosquito breeding places.
- If any worker in the construction site has suspected to have dengue fever, report to the MOH office.

Specific messages

- Cover wells, water containers and tanks (plastic/ cement) properly to prevent mosquitoes from entering: Introduce larvivorous fish for the wells which cannot be covered.
- Brush and clean the inner surface of water collecting containers, tanks, flower vases and bird baths to remove mosquito eggs. Apply larvivorous fish to the tanks and ponds which cannot be cleaned.
- Brush and clean the inner surface of pet feeders and water storage trays of refrigerators/ air conditioners
- Keep under cover/ fill with sand or perforate used/ discarded tyres to prevent water from getting collected.

- Properly dispose/ recycle/ destroy the discarded containers and items.
- Remove or repair commodes/ cisterns without lids.
- Clean rain covers (polythene) and concrete slabs to prevent water from getting collected.
- Clean or remove roof gutters which are blocked or not properly maintained.
- Cover unused squatting pans with a sand bag.
- Avoid growing ornamental plants which can collect water in the axils. eg. Bromeliad
- Fill the cavities where water can get collected with sand-cement mixture eg. tree holes/ bamboo stumps
- Obtain technical advice from the MOH office on how to prevent mosquito breeding, in the places where retained water cannot be drained.

To get protected from mosquito bites;

- Apply a recommended mosquito repellent on uncovered body parts.
- Wear clothes that cover arms and legs.
- Use a mosquito net at bedtime and when resting.
- Use smoke of recommended herbs. eg. Maduruthala as a repellent.
- Screen windows or any air vent to prevent mosquitoes from entering in.

When dengue fever is suspected;

- If fever persists, consult a qualified doctor in the second day and get a Full Blood Count test done.
- To control fever, use only paracetamol in prescribed dose.
- Do tepid sponging to control fever
- Rest adequately and avoid strenuous physical activities
- Pregnant mothers, infants, elderly and persons with chronic illnesses should seek medical advice from a qualified doctor on the first day, when dengue fever is suspected.
- Alarming symptoms for immediate hospitalization.
 - Severe abdominal pain
 - Drowsiness/ restlessness
 - Persistent vomiting
 - Bleeding manifestations
 - Reduced or no urine output over 6 hours
- Take light, nutritious meals.
- Drink fluids to reduce dehydration caused by fever and vomiting, e.g. Orange, porridge, milk, Jeevani, fruit juices

Chapter 11

Life skills

Life skills are abilities for adaptive and positive behaviour, that enable us to deal effectively with the demands and challenges of everyday life.

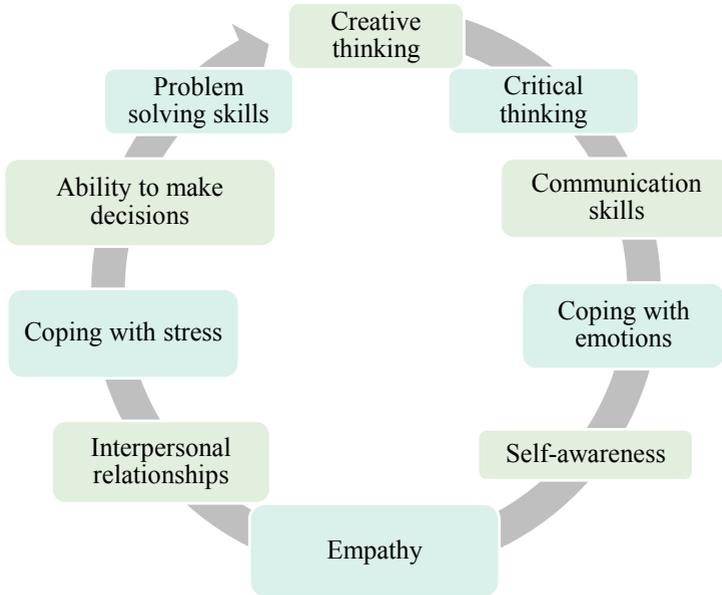


Figure 10.1 Elements of life skills

Life skills that should be developed by Field Health Workers

Field Health Workers may face various problems and challenges in day-to-day dengue control activities. Therefore, a set of skills designed to help you reach your potential at work, as an individual or a team is given below:

- **Problem solving**

Identify the problems which may arise in the field.

Avoid unnecessary conflicts by taking measures to solve problems using the best alternatives. Unnecessary problems can be prevented by identifying and controlling own impulses while working in the field.

Problem solving – 5 step model

- Identify the problem
 - List all the alternatives that will solve the identified problem
 - Select the best alternative
 - Work out the steps needed to solve the problem using the chosen alternative
 - Look at the result
-
- **Decision making**
Make decisions impartially based on facts. Deal constructively with decisions you make by assessing different options and effects/ consequences of each.
 - **Good interpersonal relationships**
Understand own responsibilities and build up good interpersonal relationships needed to work as a team. Having good relations with team members and being responsible and accountable will improve your ability to work as a team and will succeed in the field.
 - **Self-awareness**
Identify your own strengths and weaknesses, as well as the values and difficulties of other people's lives. This will help you to be successful in field work. Recognizing your opportunities and barriers is also important.

- **Creative thinking**
Look beyond your direct experience. Respond adaptively and with flexibility to daily situations of work to act rationally.
- **Critical thinking**
Improve your ability to analyse information and experiences in an objective manner. Make decisions based on facts to be unbiased.
- **Effective communication**
Develop your ability to express yourselves verbally and non-verbally in ways which are culturally appropriate. Improve ability to express your opinions, as well as the ability to seek help/ advice when needed.
- **Empathy**
Improve your ability to understand what life is confronted for another person, which is meant by empathy. This is very important in situations of ethnic and cultural diversity.
- **Coping with emotions**
Always try to recognize, control and express emotions in an acceptable way
- **Coping with stress**
Recognize stress and the precipitating factors for stress while developing ability to control your level of stress

In any problematic or complex situation, seek necessary advice from MOH, SPHI or PHI who have more experience and technical capacity to give advice and suggestions.

Chapter 12

Field Mosquito Control Assistants

Due to the spread of dengue in many areas of the country and the occurrence of outbreaks from time to time, dengue was considered a major public health problem that should be given national priority. It has been endorsed that additional human resources are required to carry out the preventive measures to control the disease at grassroot level. Field Mosquito Control Assistants were recruited to conduct mosquito control activities at grassroot level in systematic manner for integrated vector management.

12.1 Duties of Field Mosquito Control Assistants

1. Inspection of premises and surrounding areas where patients were reported
2. Field inspection for removal/ advising on elimination of mosquito breeding places
3. Assisting to conduct entomological surveys
4. Control of adult mosquito and larvae
5. Public awareness and community empowerment
6. Dengue control through obtaining inter-sectoral support at grassroot level

12.2 Roles and rules that Field Mosquito Control Assistants should follow

Roles:

1. Premise inspection and control of mosquito breeding sites. Instructing to remove breeding sites and follow up
2. Assisting technical officers in mosquito control during outbreaks and other situations
3. Assisting technical officers in entomological surveys
4. Assisting entomologists at the district level
5. Carrying out fogging activities under the guidance and supervision of technical officers
6. Keeping and maintaining of records pertaining to daily activities in the provided forms
7. Participating in training programs, progress reviews and other events organized at regional, district, provincial and national levels
8. Co-operating to foster inter-sectoral and public relations at grassroot level
9. Supporting the village committees and street committees in collaboration with the people
10. Educating the community on mosquito control through personal communication, leaflets and public announcement

Duty hours: 7.30 am to 4.30 pm on weekdays
7.30 am to 1.30 pm on Saturdays

Responsible and Supervising Officers in the field for dengue control

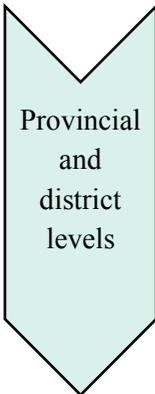


Responsible Officers

Director General of Health Services (DDHS)
Deputy Director General (Public Health Services-1)
Director/ National Dengue Control Unit

Technical Supervising Officers attached to central unit

Consultant Community Physicians
Medical Officers
Entomologists and Public Health Inspectors

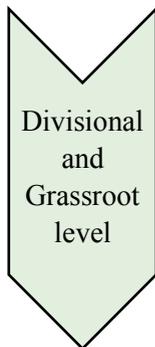


Responsible Officers

Provincial Director of Health Services
Regional Director of Health Services

Technical Supervising Officers

Consultant Community Physicians attached to Province and District
Regional Epidemiologist
Entomologist
Provincial and District Supervising PHI



Responsible Officers

MOH/ AMOH

Technical Supervising Officers

MOH/ AMOH
Supervising Public Health Inspectors
Public Health Inspectors
Health Entomological Officers

Rules to follow while on duty

General

- Always safeguard the dignity of your service.
- Always wear the uniform provided by the National Dengue Control Unit while on duty: Keep it clean and tidy.
- Always wear the identity card.
- Refrain from activities that may bring disrespect to the service, such as wearing fancy jewellery and accessories, styling hair inappropriately, tattooing etc.

When entering premises;

- Introduce yourself before entering the premises and explain the purpose of your visit.
- Maintain discipline during premises inspections and while interacting with the community.
- When advising on eliminating mosquito breeding sites, communicate with the occupants convincingly, building the trust.
- Refrain from accepting bribes or pecuniary incentives from the occupants to evade legal procedures.

** During a premise inspection, it is not incumbent upon you to impose/interfere with legal action to the offenders.

Annexure i - Instruction leaflet for dengue patients who have not been temporarily admitted to the hospital (Ambulatory care leaflet)

Record all your fluid intake and the amount of urine you passed with the time and show your doctor.
You may use the following format:

Date and Time	Consumed fluids (ml)	Date and time	Urine amount (ml)

Warning signs to seek immediate medical advice

- Continued vomiting and diarrhoea (which can result in dehydration)
- Lethargy/restlessness
- Bleeding from any site
- Severe headache
- Severe abdominal pain

If you feel any additional discomfort, please seek medical advice.
Unlike in other conditions, settling of fever is not a sign of recovery in Dengue. Complications may arise as the fever settles.





Epidemiology Unit
Ministry of Health, Nutrition & Indigenous Medicine
National Dengue Control Unit

Name of patient	
Age	
Amount of fluid to be taken within an hour	
Date & time to do the next FBC	

Advice for Dengue patients who are on home based care temporarily

- Even if you are positive(+) for dengue NS1 antigen test you may not need immediate hospitalization.
- Negative NS1 test does not exclude dengue illness.
- Home care should be always guided by a qualified doctor.
- Hospital admissions will be determined by platelet count of the latest full blood count (FBC).

Make sure to follow the instructions given below in order to ensure smooth home based care during early part of the illness.

- Physical Rest**
Physical rest is highly recommended.
Staying at home without exerting yourself is ideal.



- Fever control**
 - Use Paracetamol only.
 - Do not use NSAIDs such as Ibuprofen, Diclofenac, Mefenamic acid, Celecoxib etc.
 - Do not use steroids such as Prednisolone, Dexamethasone etc.
 - Follow your doctor's instructions on the dose of Paracetamol and fever control.
 - Use tepid sponging to bring down the fever in between the Paracetamol dosing.
 - Soak a clean towel in moderately warm water, then squeeze the excess water away and wipe the body to reduce fever.



- When and how often should the Full Blood Count (FBC) be repeated?**
 - Do the FBC in 8-12 hour intervals as recommended by your doctor.
 - Do not delay showing the report to your doctor (at least within 2 hours) to get medical advice.
 - If the platelet count has reached a low value nearing 130,000/mm³, see your doctor immediately.
 - When you see the doctor, bring all your blood investigation reports done during this fever episode.
- Food**
 - If you have appetite take a soft light diet.
 - Avoid taking red or brown colour food or drinks.
This may mimic blood stained stools or vomitus.
- Fluids**
 - Fluids should include not only water but certain electrolyte solutions such as fruit juice, white rice kanji, "Jeewani", king coconut etc.
 - Drink enough fluids to maintain a normal urine output. Please follow the instructions below to calculate the required fluid amount.
 - If the body weight is between 30 to 50 kilograms, take fluids double the weight in milliliters (ml) per hour.
 - If the weight is below 30kg or above 50 kg, change the fluid intake as shown below:

Body Weight	Fluid Volume per hour
5kg	20ml
10kg	40ml
20kg	60ml
30kg	70ml
40kg	80ml
50kg	100ml
>50kg	100ml



- If there is any doubt on how much fluids to drink please ask your doctor.
- You may use a properly calibrated cup to measure the fluid intake.



Measuring Cup



cup (200ml)



Glass (300 ml)

- Urine Output**
 - Ensure adequate amount of fluids are taken to produce a urine volume per hour in milliliter (ml) equal to your body weight in kilograms to prevent dehydration.
 - Ensure urine measurement at least every four hourly to calculate the output.

Body weight	Urine output per hour	Urine output per four hours
20kg	20ml	80ml
40kg	40ml	160ml
60kg	60ml	240ml

 - Passing urine slightly more than the above expected amount is not a problem.
 - If the urine output is less than the expected amount, you should consume more fluids to maintain the above urine output.
 - If the patient is feeling thirsty, taking additional fluids up to 3-4 times per day is allowed until the thirst subsides.
 - But if thirst continues, consult your doctor as soon as possible.

Annexure ii - House inspection format

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නිවෙස් තුළ මදුරුවන් බෝවන ස්ථාන පරීක්ෂා කිරීමේ වාර්තාව පිරවීමේදී,

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ඉවතලන භාජන හා අයිතමයන් ලෙස - (A 1)

ජලාස්ථික් කෝප්ප, යෝගට් කෝප්ප, කිරිහට්ටි, බෝතල්, සෙල්ලම් බඩුකොටස්, පිගන් කැබලි, ටීන්, ලී පෙට්ටි, ඉවතලන පොලිතින් සීට් , ජලාස්ථික් දවටන, පොලිතින්සීට්, පොලිස්ටයිරින් ද්‍රව්‍ය, බියර් කෑන් ආදිය සලකන්න

- ජල ටැංකි සහ ජලය රැස් කරන බදුන් , ජලය නොබසින කානු සහ ගලි වලවල්, වැහි පිහිළි , පොකුණු හා පක්ෂී තටාක, ජලය බැසීම අවහිර වූ මල් බදුන් හා තැටි , කොන්ක්‍රීට් ස්ලැබ්, ටයර්, ගස් බෙන/ බ්‍රොම්ලියා වැනි ශාඛ ගොබ හා වෙනත් ස්ථාන නිරීක්ෂණය කරන්න

වෙනත් ස්ථාන ලෙස - (A 2)

වෙනත් ස්ථාන (ඉවත්කල උළුකැට, කැඩුණු ගොඩනැගිලි අයිතම, අබ්ලිද්ව්‍ය, භූගතබට, ඇන්ටොනා බට, කැඩුණු වැසිකිළි වලවල්, කුහුඹු උගුල්, තාවකාලිකව ජලය රැස්වන ස්ථාන, වතුර කාන්දුවන ස්ථාන සඳහා යෙදූ බකට්, වැසි ආවරණ ලෙස යොදා ඇති පොලිතින් දවටන)

- නිවෙස් තුළ නිරීක්ෂණයේදී;

මල් බදුන්, ශීතකරණ/ වායු සමීකරණ තැටි, භාවිතා නොකරන වැසිකිළි උපාංග සහ ටැංකි නිරීක්ෂණය කරන්න. එහිදී සිස්ටන පියන ඔසවා නිරීක්ෂණය කරන්න. එමෙන්ම එතුළ පවතින ගලි වලද නිරීක්ෂණය කල යුතුවේ. උඩු මහල් පරීක්ෂා කිරීමේදී ජලය රැස් කරන ටැංකි , කොන්ක්‍රීට් ස්ලැබ් සහ වැහි පිහිලි නිරීක්ෂණය කරන්න.

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Annexure iii - Construction site inspection format

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ඉදිකිරීම් පරිශ්‍රය තුළ මදුරුවන් බෝවන ස්ථාන පරීක්ෂා කිරීමේ වාර්තාව පිරවීමේදී,

- ඉවතලන භාජන හා අයිතමයන් ලෙස - (A 1)**

ජලාස්ථික් කෝප්ප, යෝගට් කෝප්ප, පොල් කටු, කිරි හට්ටි, බෝතල්, සෙල්ලම් බඩු කොටස්, පිගන් කැබලි, ටින්, ලී පෙට්ටි, ඉවතලන පොලිතින් සිටි, ප්ලාස්ටික් දවටන, පොලිස්ටයිරින් ද්‍රව්‍ය, බියර් කෑන් ආදිය සලකන්න.

- වෙනත් ස්ථාන ලෙස (A 2)**

පරිශ්‍ර ඇතුළත - ජලය එක් රැස් විය හැකි සඳුළු තල, තාවකාලිකව ජලය රැස්වන ස්ථාන, වතුර කාන්දු වන ස්ථාන සඳහා යෙදූ බකට් පරිශ්‍රවලින් පිටත - ඉවත්කල උළුකැට, කැටුණු ගොඩනැගිලි අයිතම, අබ්ලි ද්‍රව්‍ය, භූගත බට, ඇන්ටොනා බට, කැටුණු වැසිකිළි වලවල්, වැසි ආවරණ සඳහා යොදා ඇති පොලිතින් දවටන, මුනින් නමා ඇති බකට් වල දාර.

- ඉදිකිරීම් පරිශ්‍රය තුළ සම්බන්ධීකරණය කල පුද්ගලයාගේ නම හා තනතුර :
- පසුගිය මාසය තුළ ආයතනයේ බෙංගු රෝගය වැළඳුන සේවකයන් සිටියේද? ඔව් / නැත සිටියේ නම් සංඛ්‍යාව:

ඉදිකිරීම් පරිශ්‍රයේ සාරාංශය

ඉදිකිරීම් පරිශ්‍රයේ නම සහ ලිපිනය	මදුරුවන් බෝවිය හැකි ස්ථාන ගණන		කිටයන් සහිත ස්ථාන සංඛ්‍යාව	නිවේදන නිකුත් කර		නීතිමය පියවර ගෙන	
	තෙත්	වියළි		ඇත	නැත	ඇත	නැත

* එක් පරිශ්‍රයක් සඳහා එක් සාරාංශයක් පිලියල කල යුතුය.

ඉදිකිරීම් පරිශ්‍ර කුල මදුරුවන් බෝවන ස්ථාන පරීක්ෂා කිරීමේ වාර්තාව

සෞ. වෛ.නි. කොට්ඨාශය:		දිනය:	
ම.සෞ.ප. කොට්ඨාශය:		ආරම්භ කල වේලාව:	අවසාන කල වේලාව:
ඉදිකිරීම් පරිශ්‍රයේ නම සහ ලිපිනය:			
පරීක්ෂාකල ප්‍රදේශය/ ග්‍රාම නිලධාරී වසම:			
සහභාගී වූ නිලධාරීන්ගේ තොරතුරු:		කොන්ත්‍රාත් කරු:	
නම:	නම:		
ආයතනය:			

අනු අංකය	නිරීක්ෂණය කල ප්‍රදේශය	මදුරුවන් බෝවිය හැකි ස්ථාන ගණන	මදුරු කීටයන් සහිත ස්ථාන (මදුරු කීටයන් සිටිනම් ස්ථාන ගණන සඳහන් කරන්න) (A)										කීටයන් සහිත පරිශ්‍ර ප්‍රදේශය	කීටයන් සහිත ස්ථාන සංඛ්‍යාව		නිවැරදි කල මුළු ස්ථාන ගණන	සටහන්
			පලය නොබඩිනා කාණු සහ හලි වලටල්	පලය රැස් කර ඇති සීමාවන්හි පොලොව	පලය එක්රැස් වියහැකි යකඩ බව	අවස්ථාන ලෙස සොදා ඇති භෞමික	කොන්ක්‍රීට් ස්ලැබ්	වැසි	ඉවතලන භාජන (A 1) සහ අයිතමයන්	නාවකාලිකව ඉවත් කල අං (A 2)	සේවන වීදු	වෙනත්		ගොඩනැගිලි	විවෘත		
1	ඉදිකරමින් පවතින ගොඩනැගිලි																
	පළමු/විම මහල																
	දෙවන මහල																
	තෙවන මහල																
	සිවවන මහල																
	පස්වන මහල																
	හයවන මහල																
	හත්වන මහල																
	අටවන මහල																
2	වෙනත් ගොඩනැගිලි																
3	සේවක නැවතීමේ ස්ථානය සහ මුළුතැන්ගෙය																
4	සේවක වැසිකිලි																
5	අපද්‍රව්‍ය බැහැර කිරීමේ පරිශ්‍රය																
6	භාණ්ඩ ගබඩා කර ඇති ප්‍රදේශය																
7																	
8																	

Annexure iv - School inspection format

උපදෙස් මාලාව: පාසල තුළ මදුරුවන් බෝවන ස්ථාන පරීක්ෂා කිරීමේ වාර්තාව පිරවීමේදී,

- **ඉවතලන භාජන හා අයිතමයන් ලෙස - (A 1)**
- ජලාස්ථික් කෝප්ප, යෝගට් කෝප්ප, පොල් කටු, කිරිහට්ටි, බෝකල්, සෙල්ලම් බඩු කොටස්, පිගන් කැබලි, ටීන්, ලී පෙට්ටි, ඉවතලන පොලිතින් සිට, ජලාස්ථික් දව්වන, පොලිස්ටයිරින් ද්‍රව්‍ය, බියර් කැන් ආදිය සලකන්න.
- **වෙනත් ස්ථාන ලෙස (A 2)**
පරිශ්‍ර ඇතුළත - ජලය එක් රැස් විය හැකි සඳලු තල, තාවකාලිකව ජලය රැස්වන ස්ථාන, වතුර කාන්දුවන ස්ථාන සඳහා යෙදූ බකට්, පරිශ්‍රවලින් පිටත - ඉවත් කල උළුකැට, කැඩුණු ගොඩනැගිලි අයිතම, අබ්ලි ද්‍රව්‍ය, භූගත බට, ඇන්ටෙනා බට, කැඩුණු වැසිකිළි වලවල්, වැසි ආවරණ සඳහා යොදා ඇති පොලිතින් දව්වන, මුනින් නමා ඇති බකට් වල දාර)
- පාසල නිරීක්ෂණයේදී භාවිතා නොකරන වැසිකිළි උපාංග සහ ටැංකිද නිරීක්ෂණය කරන්න. එහිදී සිස්ටන පියන ඔසවා නිරීක්ෂණය කරන්න. එමෙන්ම එතුල පවතින ගලි වලද නිරීක්ෂණය කල යුතුවේ. උඩු මහල් පරීක්ෂා කිරීමේදී ජලය රැස් කරන ටැංකි , කොන්ක්‍රීට් ස්ලැබ් සහ වැහි පිහිලී නිරීක්ෂණය කරන්න.
 - පාසල තුළ සම්බන්ධීකරණය කල පුද්ගලයාගේ නම හා තනතුර :
 - පසුගිය මාසය තුළ පාසල තුළ වෙංගු රෝගය වැළඳුණ සිසු සිසුවියන් සිටියේද? ඔව් / නැත සිටියේනම් සංඛ්‍යාව:.....
 - මෙම පාසලේ වෙංගු මර්ධන කමිටුවක් / මදුරු මර්ධනය සඳහා පාසල් සමාජ කමිටුව පිහිටුවා ඇතිද? ඔව් / නැත
 - මෙම කමිටුව මගින් කොපමණ කලකට වරක් පාසල් තුළ මදුරුවන් බෝවන ස්ථාන පරීක්ෂා කරන්නේද?

සතියකට වරක්	සති දෙකකට වරක්	මාසයකට වරක්	පරීක්ෂා කරනු නොලැබේ
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පාසලේ සාරාංශය

පාසලේ නම සහ ලිපිනය	මදුරුවන් බෝවිය හැකි ස්ථාන ගණන		කීටයන් සහිත ස්ථාන සංඛ්‍යාව	නිවේදන නිකුත් කර		නීතිමය පියවර ගෙන	
	තෙත්	වියළි		ඇත	නැත	ඇත	නැත

* එක් පරිශ්‍රයක් සඳහා එක් සාරාංශයක් පිළියල කල යුතුය.

Annexure v - Institution and public premises inspection format

උපදෙස් මාලාව: පොදු පරිශ්‍ර ලෙස බස් ඩීපෝ, බස්/ දුම්රිය නැවතුම් ස්ථාන, පොදු වෙළඳ සැලවල්, සුසාන භූමි ආදිය සලකන්න.

මදුරුවන් බෝවන ස්ථාන පරීක්ෂා කිරීමේ වාර්තාව පිරවීමේදී,

- ඉවතලන භාජන හා අයිතමයන් ලෙස - (A 1)**
 ජලාස්ථික් කෝප්ප, යෝගට් කෝප්ප, පොල් කටු, කිරි හට්ටි, බෝතල්, සෙල්ලම් බඩු කොටස්, පිගන් කැබලි, ටින්, ලී පෙට්ටි, ඉවතලන පොලිතින් සිටි, ජලාස්ථික් දවටන, පොලිස්ටයිරින් ද්‍රව්‍ය, බියර් කැන් ආදිය සලකන්න.
- වෙනත් ස්ථාන ලෙස (A 2)**
 පරිශ්‍ර ඇතුළත - ජලය එක් රැස් විය හැකි සඳලු තල, තාවකාලිකව ජලය රැස්වන ස්ථාන-වතුර කාන්දු වන ස්ථාන සඳහා යෙදූ බකට්.
 පරිශ්‍රවලින් පිටත - ඉවත්කල උළුකැට, කැඩුණු ගොඩනැගිලි අයිතම, අබිලි ද්‍රව්‍ය, භූගත බට, ඇන්ටෙනා බට, කැඩුණු වැසිකිළි වලවල්, වැසි ආවරණ සඳහා යොදා ඇති පොලිතින් දවටන, මුනින් නමා ඇති බකට් වල දාර.
- ආයතන පරිශ්‍රය නිරීක්ෂණයේදී මල්බදුන්, ශීතකරණ/ වායු සමීකරණ තැටි, භාවිතා නොකරන වැසිකිළි උපාංග සහ ටැංකි නිරීක්ෂණය කරන්න. එහිදී සිස්ටන පියන ඔසවා නිරීක්ෂණය කරන්න. එමෙන්ම එතුල පවතින ගලි වලද නිරීක්ෂණය කල යුතුවේ. උඩු මහල් පරීක්ෂා කිරීමේදී ජලය රැස් කරන ටැංකි, කොන්ක්‍රීට් ස්ලැබ් සහ වැහි පිහිලි නිරීක්ෂණය කරන්න.
 - රජයේ/ පෞද්ගලික/ අධ්‍යාපන ආයතන/ කර්මාන්තශාලා/ ආගමික ස්ථාන හා පොදු පරිශ්‍රය තුල සම්බන්ධීකරණය කල පුද්ගලයාගේ නම හා තනතුර:
 - පසුගිය මාසය තුල ආයතනයේ/ ආගමික ස්ථානයේ බේංගු රෝගය වැළඳුන අයෙකු සිටියේද ? **ඔව් / නැත** සිටියේ නම් සංඛ්‍යාව:.....
 - මෙම ආයතනයේ බේංගු මර්ධන කමිටුවක් පිහිටුවා ඇතිද? **ඔව් / නැත**
 - මෙම කමිටුව මගින් කොපමණ කලකට වරක් ආයතනය තුල මදුරුවන් බෝවන ස්ථාන පරීක්ෂා කරන්නේද ?

සතියකට වරක්		සති දෙකකට වරක්		මාසයකට වරක්		පරීක්ෂා කරනු නොලැබේ
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ආයතනයේ/ කර්මාන්තශාලාවේ/ ආගමික ස්ථානයේ/ පොදු පරිශ්‍රයේ සාරාංශය

නම සහ ලිපිනය	මදුරුවන් බෝවිය හැකි ස්ථාන ගණන		කීටයන් සහිත ස්ථාන සංඛ්‍යාව	නිවේදන නිකුත් කර		නීතිමය පියවර ගෙන	
	තෙත්	වියළි		ඇත	නැත	ඇත	නැත

* එක් පරිශ්‍රයක් සඳහා එක් සාරාංශයක් පිළියල කල යුතුය.

රජයේ/පෞද්ගලික/අධ්‍යාපන ආයතන/කර්මාන්තශාලා/ආගමික ස්ථාන හා පොදු පරිශ්‍රයක මදුරුවන් බෝවන ස්ථාන පරීක්ෂා කිරීමේ වාර්තාව

සෞ. වෛ.නි. කොට්ඨාශය: _____ දිනය: _____
 ම.සෞ.ප. කොට්ඨාශය: _____ ආරම්භ කල වේලාව: _____ අවසාන කල වේලාව: _____
 ආයතනයේ නම සහ ලිපිනය: _____
 පරීක්ෂාකළ ප්‍රදේශය/ග්‍රාම නිලධාරී වසම: _____
 සහභාගී වූ නිලධාරීන්ගේ තොරතුරු _____
 නම: _____ නම: _____ නම: _____
 ආයතනය: _____

අනු අංකය	පරීක්ෂා කල ප්‍රදේශය	මදුරුවන් බෝවිය හැකි ස්ථාන ගණන	මදුරු කීටයන් සහිත ස්ථාන (මදුරු කීටයන් සිටිනම ස්ථාන ගණන සඳහන් කරන්න) (A)												කීටයන් සහිත ස්ථාන සංඛ්‍යාව	කීටයන් සහිත මුළු ස්ථාන ගණන	සටහන්
			කීටයන් සහිත ස්ථාන සංඛ්‍යාව														
			ඉවතලන හැටි (A1)	පල වැනි සහ ජලය රැස් කරන බිඳුන්	ජලය තොබවීන කානු සහ ගලී වලවල්	වැහි පිහිලී	පොකුණු සහ පහිඹි තටාක	ජලය බැසීම අවහිර වූ මල් බිඳුන් සහ තැටි	කොන්ක්‍රීට් සැලැඹ	ටැප්	ගස්බොව/බිඳුන්ගලීය ගෘහ	භාවිතා නොකරන වැසිකිලී	ජංගමයන් වැනි	ශීතකරණ/වායු සම්පූර්ණ තැටි			
1	කාර්යාල පරිශ්‍රය																
2	තනි මහල් ගොඩනැගිලි																
3	මහල් ගොඩනැගිලි-පළමු/බිම් මහල																
	දෙවන මහල																
	තෙවන මහල																
	සිව්වන මහල																
	පස්වන මහල																
	හයවන මහල																
	හත්වන මහල																
	අටවන මහල																
4	වෙනත් ගොඩනැගිලි																
5	ගුවණාගාර පරිශ්‍රය																
6	ආපනශාලා පරිශ්‍රය සහ මුළුතැන්ගෙය																
7	ඉදිකිරීම් පරිශ්‍රය *																
8	වැසිකිලි පද්ධති පරිශ්‍රය																
9	අපද්‍රව්‍ය බැහැර කිරීමේ පරිශ්‍රය																
10	වහන අංශනය																
11																	
12																	

Annexure vii- Monthly report of premise inspection - construction sites

අපරම අංක 02 ඉදිකිරීම් පරිශ්‍රය තුළ වෙංගු මදුරුවන් බෝවිය හැකි ස්ථාන පරීක්ෂා කිරීමේ මාසික වාර්තාව

සාමාන්‍ය තොරතුරු

- කොන්ත්‍රාත්කරු :
- සම්බන්ධ කර ගන්නා පුද්ගලයාගේ නම සහ අංකය:
- වැඩබිම/වාසාපාතිය :
- සේවාදායකයා :
- මාසය :
- සෞ.වෛ.නි කාර්යාලය:

ස්ථාන පරීක්ෂා කිරීම හා වෙංගු රෝගීන් පිළිබඳ තොරතුරු

➤ මදුරුවන් බෝවිය හැකි ස්ථාන නිතර පරීක්ෂා කිරීම සඳහා කැප වූ කණ්ඩායමක් සිටීම.	ඔව්/නැත
➤ පසුගිය මාසය තුළ හඳුනා ගත් හදුනාගත් මදුරුවන් බෝවිය හැකි ස්ථාන ගණන.
➤ පසුගිය මාසය තුළ ලියාපදිංචි පළිබෝධ පාලන ආයතනයක සේවය ලබා ගන්නා ලදී.	ඔව්/නැත
➤ එසේ නම්, එම ආයතනයෙහි නම
➤ සේවාව ලබාදුන් වාර ගණන.....
පසුගිය මාසය තුළ සෞ.වෛ.නි කාර්යාලයේ සෞඛ්‍ය කණ්ඩායම් වැඩබිම පරීක්ෂා කිරීමට පැමිණි වාර ගණන.
අතතුරු ඇඟවීම් දීම/ රතු නිවේදන නිකුත් කිරීම.	ඔව්/නැත
පසුගිය මාසය තුළ වාර්තා වූ උණ රෝගීන් ගණන.

හදුනා ගත් මදුරුවන් බෝවන ස්ථාන සඳහා ගන්නා පියවර පිළිබඳ තොරතුරු

පරිශ්‍රය තුළ සහ අවට ඇති ජලය රැස්විය හැකි යන්ත්‍රෝපකරණ හා උපාංග වැසි ජලය රැස් නොවන සේ වහලක් යට ලබන ලදී.	
භාවිතා නොකරන තාවම් හා භාජන ජලය නොරැඳෙන සේ ගබඩා කරන ලදී.	
මහල්, සඳළුතල හා මල් පෝච්චි, තාවකාලික ආවරණ (පොලිතින්, ඉටි කොල) කොන්ක්‍රීට් වහල (Slab) හා කැනපි මත ජලය නොරැඳෙන සේ සකස් කරන ලදී.	
යකඩ/PVC බට ඇතුළු අනිකුත් සවිකෘත (fittings) තුළ ජලය නොරැඳෙන සේ ආවරණ (end cap) දමන ලදී.	
ජලය රැස්කර ගන්නා භාජන/වැනි මදුරුවන්ට ඇතුළු විය නොහැකි සේ හොඳින් ආවරණය කිරීම හෝ රැස් කරන ජලය දවසක් හැර දවසක් මාරු කිරීම සිදු කරන ලදී.	
ජලය රැස් කරන වැනි/භාජන යනාදියේ ඇතුළත පෘෂ්ඨ අවම වශයෙන් දින තුනකට වරක් බුරුසුබාකින් හොඳින් අතුල්ලා පිරිසිදු කරන ලදී.	
කෘතු, ගලී වලවල් තුළ ජලය ගලා යන සේ සකස් කරන ලදී.	
සෝපාන ලිං තුළ රැඳී ජලය දින 03කට වරක් ඉවත් කරන ලදී.	
ඉවතලන ද්‍රව්‍ය, සුන්බුන් හා භාණ්ඩ නිසි පරිදි බැහැර කරන ලදී.	
සන අපද්‍රව්‍ය වෙන්කර ප්‍රතිචක්‍රීකරණය කරන ලදී	
නැවත භාවිතයට ගන්නා හෝ ඉවතලන ටයර් ජලය එක්රැස් නොවන සේ ගබඩා කිරීම /වැලි පිරවීම / සිදුරු කරන ලදී.	
ඉවත් කිරීමට නොහැකි ජලය රැඳී ඇති ස්ථාන/ බදුන් තුළට කීට නාශක යොදන ලදී	
අවශ්‍ය තාක්ෂණික උපදෙස් සෞඛ්‍ය වෛද්‍ය නිලධාරී කාර්යාලයෙන් ලබා ගන්නා ලදී.	

මෙම වාර්තාව ප්‍රදේශයේ අදාළ පළාත් පාලන ආයතනය, සෞඛ්‍ය වෛද්‍ය නිලධාරී කාර්යාලය හා CIDA වෙත ඊලඟ මාසයේ 10 දිනට පෙර යවන්න.
 ඉදිකිරීම් කොන්ත්‍රාත්කරුවන් වශයෙන් මදුරුවන් බෝවීම වැළැක්වීමේ ජාතික වැඩසටහනට ඔබ දක්වන සහයෝගය ඉතා අගය කොට සලකමු.

Annexure viii - monthly premise inspection report of institutions

Monthly report on inspection of mosquito breeding places in the Government and Private Educational Institutions				
Date of Inspection	Potential breeding sites		Larvae positive sites	Actions taken
	Wet	Dry		

Annexure ix

ROP approved mosquito repellent list

Trade Name	Active Ingredient and Strength	Imported Company	Registration Status	Category (RES/GEN/DOME)
Mino 8	Ethylbutyl acetylaminopropionate 80g/L	George Steuart Health (Pvt) Ltd.	Repellent	Domestic
Soffell	N, N-diethyl-m-toluamide 13%	Rattan Merchant	Repellent	Domestic
Soffell Spray	N,N-diethyl-m-toluamide 13%	Rattan Merchant	Repellent	Domestic
Moso	Icaridin 20% (w/w)	EB Creasy Co. & Plc.	Repellent	Domestic

Larvicides for Generalized(construction sites) and Domestic use-April 2019

	General name	Product name register under ROP	Type of category	Dosage	Frequency of Application	Targeted mosquito breeding place	Company address and contact details
01.	<i>Bacillus thuringiensis</i> var <i>israelensis</i> serotype H-14	Bactivec(Liquid)	Domestic	using mistblower 3.5 litres of Bactivec for 6.5 litres of water- (For 1sqmeter 2.43 ml to be applied)	3 weeks	-Wet floors -Non-use equipment and machineries -Drains -covering items	Omaxx Healthcare(pvt)ltd,46/48C, Robert Drive, Off Robert Gunewardene Mawatha, Kiralapone 011-2513939
02.	<i>Bacillus thuringiensis</i> var <i>israelensis</i> serotype H-14	Mosquito Dunk	Domestic	0l dunk/ 100 ft ²	4 weeks	-Wet floors -Drains -lift wells -water collected tanks/barrels	Kayak Surgi Pharma(Pvt)ltd, 526/C2, Eriyawetiya rd., Kiribathgoda, 0115022832
03.	Pyriproxyfen	Sumilarv 0.5 G (granule)	General	2g per cubic metre of water volume	4-6 weeks	-Wet floors -Drains -lift wells -water collected tanks/barrels	Niakemi NN(Ceylon) Ltd, 9/1, Barnes Place , Colombo 07 011-2694867
04.	Novaluron	Rimon®10 EC(Liquid)	General	40 ml per 100 m ² of water volume	4weeks	-Wet floors -Drains -lift wells -water collected tanks/barrels -Covering items	A.Baurs & Co. Limited., Upper Chatham Street, P.O.Box 11,Baur' s Building, Colombo 01 071
05.	Polydimethylsiloxane	Aquatain AMF(Liquid)	General	1ml per m ² of water volume	4weeks	-Wet floors -Drains -Non-use equipment and machineries, -lift wells -water collected tanks/barrels -Covering items	PCL Solutions(Pvt)ltd, 111, Negombo Rod, Peliyagoda, 0112933085
06	S-Methoprene	Vioprin	General	0.05ml in 25 liters of water	12 weeks	Wet floors -Drains -Non-use equipment and machineries -lift wells -water collected tanks/ barrels -Covering items	CIC Holdings PLC, 199, Kew Rd, Colombo 02 0773613292