

# Dengue

## Frequently asked Questions (FAQ)

### 1. What is Dengue and how Dengue spreads?

- Dengue is an outbreak prone seasonal viral disease, transmitted through bites of female adult *Aedes* mosquitoes.

### 2. How does the *Aedes mosquito* look like?

- These are small blackish mosquitoes with white stripes on abdomen & legs.
- These are also called tiger mosquitoes.



### 3. How many species of *Aedes* mosquitoes are involved in Dengue transmission?

*Aedes aegypti* & *Aedes albopictus*

### 4. Where *Aedes* mosquitoes breed?

- *Aedes* mosquitoes breed in stagnant water within and around houses.
- *Aedes* mosquitoes are container breeder viz., cement tanks, overhead tanks, underground tanks, tyres, desert coolers, pitchers, discarded containers, junk materials, potholes, rooftop, window parapet, ornamental fountain, lucky bamboo pot, money plant bottle etc, in which water stagnates for more than a week.



**5. Does the *Aedes* breed in dirty polluted water & drains?**

- No, they breed only in clean water.

**6. Can *Aedes* lay egg in stagnant water like in overhead tank etc.?**

- Yes.

**7. What are the risk factors?**

- Dengue is associated with water supply, sanitation and solid waste management. The risk of dengue has shown an increase in recent years due to rapid urbanization, life style changes, industrialization and deficient water supply areas leading to improper water storage practices.

**8. How long eggs of *Aedes* takes to become adult Mosquito?**

- Dengue vector takes one week to become adult from egg.

**9. What are the different stages of Dengue Mosquito in life cycles?**

- Egg, larva, pupa, adult.
- Eggs are laid in water.
- Larval and pupal stages are aquatic.
- Adult mosquitoes are only terrestrial/ aerial



**10. What is the average life span of an adult *Aedes*?**

- The life span for adult mosquitoes is around three weeks.

**11. Where does Dengue vector rest?**

- Dengue vector mosquitoes rest in indoor houses mainly in corners under furniture, beds, shelves, almirah and dark clothing hanging inside.

**12. When does Dengue vector bite?**

- Dengue vector mosquitoes bite during day time usually in morning (8-10 am) & afternoon (3-5 pm) hours.

### 13. What are the preferred host for *Aedes mosquitoes*?

Human being

### 14. How long Dengue vector can go for feeding / breeding / egg laying (Flight range)?

*Usually adult female of Aedes aegypti is limited within 100 meters (Source WHO Regional Publication SEARO No 29 –Prevention and Control of Dengue and DHF Comprehensive Guidelines Page 51)*

### 15. Does mosquito has preference for site on host during bite?

Yes – Legs, Hand, Face, Neck, Ears. However mosquito can bite any exposed body parts.

### 16. What are the Vector control methods?

- Vector control/management includes:
  - Environmental management for Source Reduction
  - Biological Control: Larvivorous fish viz., Gambusia and Guppy are recommended for control of *Ae. aegypti* in large water bodies or large water containers.
  - Chemical control
    - Larval control
      - Temephos as chemical larvicide
      - Diflubenzuron and Pyreproxifen as Insect Growth Regulator
    - Adult control
      - Pyrethrum space spray** is used in indoor situations as space spray
      - Malathion fogging** is used outdoor using insecticide Malathion technical
      - Cyphenothrin 5% EC-** another molecule is also recommended in the programme for fogging which can be used both for indoor and outdoor fogging.
  - Personal protection
    - Protective clothing
    - Repellents as household insecticide products, namely, mosquito coils, mats etc
    - Aerosols against mosquitoes
    - Insecticide treated mosquito nets or long lasting insecticidal nets (LLIN) to protect infants and night workers while sleeping in daytime.

➤ Legislation

- **Civic byelaws:** Under this act fine/punishment is imparted, if breeding is detected. These measures are being enforced in major Corporations.
- **Building Construction Regulation Act:** Building byelaws should be made for appropriate overhead / underground tanks, mosquito proof buildings, designs of sunshades, porticos, etc for not allowing stagnation of water vis-à-vis breeding of mosquitoes.

In Mumbai, prior to any construction activity, the owners/builders deposit a fee for controlling mosquitogenic conditions at site by the Municipal Corporation. Builders should be held responsible for creating breeding potential and penalized.

### 17. What is fogging?

- Fogging is the insecticidal spray in air to kill adult mosquitoes. Fog is an aerosol spray with droplets of diameter below 50 microns.

### 18. How fogging is done?

- Fogging is done with the help of hand operated or vehicle mounted fogging machines
- Two methods are used viz., Thermal fogging and ULV (Ultra Low Volume) fogging

### 19. What chemicals are used in fogging and how it is done?

- Pyrethrum extract 2%, Malathion technical and Cyphenothrin 5% EC. Pyrethrum is plant product
  - a. **Pyrethrum space spray** is used in indoor situations as space spray
    - Commercial formulation of 2% pyrethrum extract (a plant product) is available
    - It is diluted with kerosene in the ratio of one part of 2% pyrethrum extract with 19 parts of kerosene (volume/volume).
    - One litre of 2% pyrethrum extract is diluted by kerosene into 20 litres to make 0.1% pyrethrum formulation ('ready-to-spray' formulation).
    - After dilution, pyrethrum extract is sprayed with Flit pump or hand operated fogging machine fitted with micro-discharge nozzle @ 30-60 ml/1000 cu. ft
  - b. **Malathion fogging** is used outdoor using insecticide Malathion technical
    - Thermal fogging is commonly used with diesel. The technique is based on the principle that insecticide is vaporized, which condenses to form a fine cloud of

droplets on contact with cooler air when it comes out of the machine. The insecticide is vaporized at a very high temperature inside the machine. Once the fog comes out of the machine, it tends to spread in different directions by mixing with wind. It is visible and psychologically more acceptable but poses traffic hazards by reduced visibility.

- In ULV, **no diluent is used and hence the technique is more cost-effective than thermal fogging but it does not generate a visible fog.**
- **Cyphenothrin 5% EC-** another molecule is also recommended in the programme for fogging which can be used both for indoor and outdoor fogging.
  - For indoor fogging, the dose is 0.5 mg a.i per sq.mt.(20 ml in 1 litres Kerosine Oil)
  - For outdoor, the dose is 3.5 g a.i per hectare (7 ml in 1 litres diesel).

## 20. What time fogging should be done?

- Early Morning & Evening (Dusk) Period depending on wind velocity

## 21. How effective fogging is?

Fogging kills the mosquitoes coming in contact with fog. It is not recommended as routine vector control measure. Fogging should be last option due to limitations:

- Temporary stay of fog in environment with no residual effect
- Effect primarily on adult mosquitoes coming in contact of fog
- Repeated application needed
- Effect on vectors dependent on climatic factors like wind velocity and its direction, humidity, temperature etc.
- Speed of the movement of fogger carrying vehicle or spray men
- Dispersal of fog
- Quality of fogging equipment
- High costs
- Mosquito rests indoor, outdoor fog hardly reach indoor

## 22. Does fogging has any harmful effect ?

- People with respiratory problem may feel discomfort exposed to fogging.

### **23. Duration of protection by repellent etc. ?**

- Usually short duration as it has no residual efficacy.

### **24. Are repellents, coils, mats, house hold spray safe and what precautions to be taken?**

- Usually these are safe as dosages are to repel mosquito and dosage are fixed according to body weight.
- Persons having allergy to these repellents should avoid its use.
- In case of allergy/discomfort, the doors and windows may be open for some time to dilute its effect.

### **25. Any role of Neem, lemon grass in controlling mosquitoes?**

- DEET (N,N-diethylmetatoluamide) blocks a mosquito's ability to find people who've applied it. This is applied with a 10% to 30% concentration on skin. Higher concentration of DEET may provide longer protection (about 8 hrs). The 10% concentration protects for about two hours. DEET may be used on adults, children, and infants older than 2 months of age. (<http://www.cdc.gov/malaria/toolkit/DEET.pdf>)
- Picaridin is also one repellent comparable to DEET at similar concentrations.
- Oil of lemon & eucalyptus may offer protection that's comparable to low concentrations of DEET. These are not recommended for children less than 3 years.
- Others. Shorter acting repellents that may offer limited protection generally contain plant-based oils such as oil of geranium, cedar, lemon grass, soy or citronella.

### **26. What is attractant?**

Substance attract mosquito for feeding or egg lying.

Carbon Di Oxide (CO<sub>2</sub> ) is known attractant and is also used in many trap devices.

**27. Whether kerosene or other oils can be used for mosquito control, if yes how and it's mechanism?**

- These oils have ability to spread and thus make a thin film on water surface which creates a barrier for respiration and larvae are killed due to suffocation.

**28. What are the anti-larvals, its availability, frequency and doses used in programme?**

- Temephos 50% EC is recommended at a dose of 1 ppm. Its 2.5 c.c. is mixed in 10 Lit of potable water and it is sprayed @ 20 c.c. per sq. meter surface area or 200 Litres per hectare of ready to use solution at weekly interval. Anti larval measures with Temephos granules may be applied fortnightly.
- Diflubenzuron 25% WP is an Insect Growth Regulator (IGR) and its recommended dose is 25 gm a.i. per hectare in clean water and 50 gm a.i. per hectare in polluted water at weekly interval
- Pyreproxifen 0.5% GR is an Insect Growth Regulator (IGR) and its recommended dose is 2 kg a.i per hectare in clean water and 4 Kg a.i. per hectare in polluted water at 3 weekly interval.

**29. What is the maximum penalty for creating mosquitogenic conditions?**

- It varies from state to state viz. in Delhi it is up to Rs. 500/-, Mumbai Rs 200-500 and for builders Rs 2000-10000, Karnataka Rs. 200-500, and Chennai up to 500/-.

**30. What individuals have to do for Aedes control?**

- Protecting from mosquito bites
- Long – sleeved clothing and mosquito repellents.
- Window & door screening and
- Using mosquito nets (insecticide-treated nets/LLIN)
- Using household insecticides aerosols, mosquito coils or other insecticide vaporizer.

### 31. What is current update on new tools?

**a. GM (Genetically modified Mosquito)** – *(Male sterile mosquitoes are released in environment so as to mate with wild females and produce sterile eggs). It is still in experimental stage*

**b. Wolbachia (Bio-control agent)** - is a symbiont bacteria and reduces average life span of mosquitoes. But it has not been used in any programme beyond experimental stage.

### 32. What are the parameters used for larval breeding?

- Four indices that are commonly used to monitor *Ae aegypti* infection levels are:
  - **House index (HI):** percentage of houses infected with larvae and/or pupae

$$HI = \frac{\text{Number of houses infected}}{\text{Number of houses inspected}} \times 100$$

- **Container Index (CI):** percentage of water holding containers infected with larvae or pupae.

$$CI = \frac{\text{Number of positive containers}}{\text{Number of containers inspected}} \times 100$$

- **Breteau Index (BI):** number of positive containers per 100 houses inspected

$$BI: \frac{\text{Number of positive containers}}{\text{Number of houses inspected}} \times 100$$

- **Pupae Index (PI):** number of pupae per 100 houses

$$PI = \frac{\text{Number of pupae}}{\text{Number of houses inspected}} \times 100$$

### **33. What are important messages for Dengue prevention?**

- Covering all water holding containers & tanks with tight lids
- Emptying, cleaning by scrubbing and drying water coolers at least once a week before refilling.
- Disposing & destroying all unused containers, junk materials, tyres, coconuts shells etc.
- Wearing full sleeved clothing, using mosquito nets (day time) & repellants.