



Burmese Medical Association of North America

Dengue Hemorrhagic Fever Project

Mosquito Eradication Program

Vector Control for Containment of Epidemic

(CDC guidelines provided to BMA-NA by Dr. Daniel B. Fishbein – with minor modifications)

Dengue/dengue haemorrhagic fever outbreaks, whenever they occur, build up in a short time; thus early actions are required to immediately exterminate the infected mosquitoes to interrupt transmission and to reduce or eliminate new breeding grounds of *Aedes aegypti*. Mobilization of government resources to meet such emergencies are always slow and before they come into operation much damage is already done. In countries where no *Aedes aegypti* control programme exists, the things are still worse. This was exemplified by the dengue outbreak in some cities of Member Countries in 1996 as the local authorities were caught unawares and it took a couple of weeks before a full-scale effective vector control campaign could be put into action. Therefore, to meet such emergencies it is essential that everybody at all levels, viz. individual, family, community and government, can contribute to arrest the spread of the epidemic. In the following paragraphs an attempt is made to highlight the actions which everybody can take as and when the first case of DEN/DHF is detected.

a) Self-reliance action for vector control and personnel protection

Individual level

Knock down adult mosquitoes by making use of commercially-available safe aerosols (pyrethroid-based). Spray each bedroom for few minutes and close the room for 15-20 minutes. The timing of spray should coincide with peak biting time, i.e. two hours after sunrise and two hours before sunset.

Empty all water containers, scrub them and dry them. Scrubbing is essential to eliminate eggs glued to the sides of the containers before drying and refilling. This should be followed every week.

Remove all solid waste materials holding rain water and dispose of it in a way that they cannot hold rain water. For example, turning down of large drums upside down or storage under shed.

Clear roof gutters or drainage pipes of sunshades and porch of building to **avoid stagnation of water**.

Cover all water containers in the house to prevent fresh egg-laying.

Remove, on weekly basis, all essential waters in the house, i.e. flower vases, ant traps, desert water coolers (in India) should be removed on weekly basis following the same principle of emptying, scrubbing and drying to maintain sustainability.

At Family level

Families should use mosquito nets to prevent mosquito bites. Infants should be made to sleep under nets during day time.

All members of family should be encouraged to use big-sleeve shirts and full-length pants, socks and boots to avoid mosquito bites.

Family members either staying at home or going for work should use commonly available repellents during day time and also make liberal use of mats, coils, etc., during the night.

Women should get together and form themselves into "women's groups" to create awareness about the disease in other families and together inspect houses in the locality for removal of breeding foci. Weekly checks are essential to maintain sustainability.

At School Children level

Schoolchildren should be provided health education on all aspects of dengue fever, i.e. what is dengue fever, how it spreads, role of mosquito and how they breed and how they can be controlled. After health education school children should be organized to detect and eliminate breeding of *Aedes aegypti* in schools, around schools, in houses and also in the neighbourhood.

At Community level

At the community level the people should form welfare groups and supplement the efforts at family/individual levels. Welfare societies can identify commercial groups, viz. traders dealing in used tyres, water-based commercial establishments (curing tanks for cement-based industries), timber merchants with mandatory maintenance of drums of water to meet fire emergencies water storage trolleys in places of congregation (cinema houses, religious places, etc. and create awareness about dengue and seek their cooperation for removal of breeding places at weekly intervals.



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b) Action by local authorities

1. Chemical Control

For control of, epidemics chemical control of the vector is the only way to interrupt the transmission. The following actions should be organized to achieve the goal. There are two main methods of space spraying for adult mosquito control: (i) cold aerosol, and (ii) thermal fogging. Guidelines for space spraying with adulticides and equipment which have been experimentally proven to be effective in the control of DEN/DHF outbreaks are included in Annex 7.

2. Cold aerosol or ultra-low-volume (ULV) spraying

Technical grade of malathion or fenitrothion at the rate of 0.5 litre per hectare. For smaller areas, among aerosol generators tested and recommended are vehicle-mounted ULV generators, backpack with ULV nozzle or portable mist blower.

3. Thermal fogging

A number of synthetic pyrethroid compounds as well as malathion or fenitrothion in different formulations have been tested, after mixing with diesel oil, with or without pyrethroid mixture. This approach has more operational constraints than ULV but has deeper penetration in crowded urban areas or where vegetation is dense. Swing fog machine and vehicle-mounted generator were once widely distributed in the South-East Asia Region.

4. Focal spraying

Based on epidemiological information, a limited focal spraying is recommended to cover the surrounding area of each reported case of dengue/DFH within a radius of 500 metres. This approach is based on bionomics of *Aedes aegypti*, having a limited flight range of 500 metres or less. Focal spraying with 3-5% malathion thermal fogging in diesel oil had been once widely practiced throughout Indonesia, especially where houses were scattered. This is an ideal approach for taking up immediate action against a local outbreak and for giving public a sigh of relief.

c) Technical considerations for success of control operations

To be successful and effective in interrupting an outbreak of DEN/DHF, the following criteria should be taken into account to make the efforts cost-effective otherwise an epidemic may continue until all adults of dengue vector species in the entire affected area are completely eliminated.

1. Space spraying

The size of the area to be sprayed should be large enough to cover the entire affected area.

Space spraying must be repeated 2 to 4 times at an interval of 3 to 5 days within a period of 1 to 2 weeks, commencing as soon as an outbreak is declared.

Space spraying must be carried out thoroughly under tight technical supervision in terms of dosage, particle sizes and their density.

Space spraying must be carried out when adult mosquitoes are active, i.e. in the forenoon.

Space spraying must be directed or concentrated indoors.

2. Larvicidal application

Water containers which cannot be emptied for various reasons should be treated with temephos (abate), 1% sand core granules applied at a dosage of 1 ppm (10 grams of granules in 100 liters of water) can provide effective control of *Ae. aegypti* for 8-12 weeks if water is not removed/changed.

3. Source reduction

House-to-house searches should be organized for "detection and elimination" of all breeding places in the affected localities. This alone will reduce the breeding load of *Aedes aegypti*.

4. Legislative measures

Legislation is an essential counterpart of all the actions promoted and implemented by dengue/*Ae. aegypti* control programme. Provisions of legislation enacted by a country for epidemic disease control should be invoked and strict compliance of the provisions relating to vector control should be ensured.