

# **Epidemiology Bulletin**

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## **Dengue Control in South-East Asia and the Western Pacific**

The classical form of dengue fever (DF) has been known for more than a century in the tropical areas of the South-East Asia and Western Pacific Regions. However, its severe form, dengue haemorrhagic form (DHF) was first recognized as a new disease in the Philippines in 1953. Since then, confirmed epidemics of this disease have been reported in tropical countries - namely, Burma, Indonesia and Thailand in South-East Asia; Kampuchea, Laos, Malaysia, Singapore and Vietnam in the Western Pacific. Reports of similar cases have been received by WHO from southern China, India and Sri Lanka (WHO, 1985).

Table 1 shows the number of cases and deaths due to DF/DHF for the year 1979-1987 for certain countries in the two regions (the figures compiled from WHO Dengue Newsletter vol. 11, 1985; vol. 12, 1986; vol. 13, 1987; and vol. 14, 1989).

In almost all localities, sporadic cases of DF/DHF are usually reported a few years before the first outbreak. After a few outbreaks the disease becomes endemic in the affected cities and a few years later it spreads to other highly populated cities and then to rural towns.

### **1. Dengue situations**

Brief review of dengue situations is given below for certain countries in the two regions.

- (1) Burma - DHF first epidemic appeared in 1970, confined to Rangoon City. In 1975 there were 6,750 cases with 323 deaths, and the disease occurred almost in the whole country. *Aedes aegypti* is the main vector.
- (2) China - After more than 30 years DF appeared again in Mainland China. An epidemic occurred in 1978 in Fo-shin near Canton with 15,000 cases. The vector is *Ae. albopictus*. During the 1980 epidemic of DF/DHF on Hainan, the main vector is *Ae. aegypti*.

In Guangdong, Guangxi and Hainan there were 22,122 cases and 14 deaths in 1979 (WHO, 1985), 437,469 cases and 64 deaths in 1980 (Huang, 1981), and 85,293 cases and 3032 deaths in 1983 (WHO Dengue Newsletter Vol. 12, 1986). The figures for 1980 and 1983 require confirmation.

- (3) Indonesia - DHF was first recognized in 1968 in Jakarta and Surabaya. Since 1979 the disease has spread to 21 of the 27 provinces. In 1988 there were 43,991 cases and 1,336 deaths. *Ae. aegypti* is the main vector.
- (4) Laos - Not much information was available from Laos. There were 1,759 cases and 15 deaths in 1985, 365 cases and 43 deaths in 1986, and 3,914 cases and 91 deaths in 1987.

- (5) Malaysia – The worst epidemic of DF/DHF in the history of Malaysia occurred in 1982 with 3,052 cases and 36 deaths. The next large outbreak was in 1973 with 2,200 cases and 104 deaths. In 1988 there were 1,428 cases and 3 deaths. *Ae. aegypti* and *Ae. albopictus* are the vectors.
- (6) Singapore – DHF was first recognized in 1960. The first large epidemic occurred in 1973 with 1,324 cases and 27 deaths. The second large outbreak was in 1987, and the cases were mostly clustered around two uncompleted housing projects, due to a build-up of *Aedes* density in the construction sites. The main vector is *Ae. aegypti*, and *Ae. albopictus* is considered as the secondary vector.
- (7) Thailand – The first epidemic occurred in 1958 in Bangkok. In 1987 there were 171,630 cases and 896 deaths, being the worst in the last 30 years. In 1988 there were 24,588 cases (23,494 cases of DHF, 497 of dengue shock syndrome and 597 of DF) with 137 deaths (84 DHF, 52 DSS and 1 DF). The vector is *Ae. aegypti*.
- (8) Vietnam – The most severe epidemic occurred in 1987 with 354,517 cases and 1,566 deaths. Death caused by DF/DHF was 39% of all deaths from communicable diseases in 1987. The total number of cases was more than doubled that of the previous large epidemic in 1983 when 149,519 cases and 1,798 deaths were reported. The vector is *Ae. aegypti*.

## 2. Brief description of the epidemiology of DHF in Thailand

Unghusak and Kunasol (1988) classified DHF situations into three periods since its finding in 1958 up to the year 1987.

First period: 1958-67

Outbreak every other year, mostly in Bangkok, average incidence 10/100,000 population, case fatality rate 10% in the early period to 3% at the end of the period.

Second period: 1968-77

Outbreak in two consecutive years with 1 or 2 years apart, average incidence 23/100,000, case fatality rate 2-4%, occurred in many cities.

Third period: 1978-87

Outbreak every 2 or 3 years, average incidence 54/100,000, case fatality rate 0.7%.

The above shows increasing incidence – failed in the primary prevention level (morbidity), and decreasing case fatality rate – succeeded in the secondary prevention level (mortality). It means more budget in the treatment of patients but less in vector control to prevent morbidity.

## 3. Methods of vector control

The methods used for vector control are more or less similar in all the areas infected with DF/DHF.

For epidemic control to kill adult mosquitoes, mass application by aerial or ground ULV spraying with malathion or fenitrothion is usually made.

Thermal fogging with 4-5% malathion or fenitrothion in diesel oil is undertaken in a radius of 100 meters around the house of each DHF case. In Thailand, fogging with 1.6% pirimiphos-methyl and 1.2% chlorpyrifos was also tried. In Singapore, every area found to have an *Aedes* house index of 5% or more was fogged with 0.2% bioresmethrin, or premium (96%) malathion applied as a 2% space spray.

Source reduction of larval habitats is launched with public participation through health education and, in some areas, enforcement of sanitary regulations. In many areas of the world, a large-scale application with 1% temephos (Abate) sand granules at the dosage of 1 ppm has been carried out for all water containers (including drinking

water) One application is effective for about 3 months. One of the writers (Chow) personally undertook this application for *Ae. aegypti* control in several hundred houses in Vietnam (Nguyen, Dinh and Chow, 1974). In Malaysia, temephos emulsion (5%) is applied to control *Ae. albopictus* larvae breeding in pandanus and leaf axils of other plants. In certain situations, biological control is also employed.

#### 4. Community participation

Ideally, community involvement starts with the individual, who learns that he can exercise some control over his own health. This leads to community awareness of health.

Although community participation in the control and prevention of DHF is not newly, it has only recently involved inter-disciplinary research. In 1987, the WHO Regional Office for South-East Asia decided to fund the multicenter project on community participation involving Burma, Indonesia and Thailand. In 1988, a workdrop on 'Dengue Control: The Challenge to the Social Sciences' was held at the Johns Hopkins University, Baltimore, U.S.A. The 'Integrated Community-based *Aedes aegypti* Control Project' is being started in the Americas.

The methods for the control of dengue vectors by the community can fall into four general categories as follows:

- (a) prevention of man/vector contact – using mosquito nets and coils, screening of bedrooms, keeping surroundings clean;
- (b) destruction of adult mosquitoes – applying hand aerosols;
- (c) destruction of mosquito larvae – emptying water containers, placing temephos sand granules in water containers; and
- (d) source reduction or alteration – cleaning and covering water storage containers, discarding unused containers.

#### 5. Brief description of dengue control and community participation in Indonesia

Efforts are made to reduce case fatality through accurate diagnosis, proper case management and early reporting of cases to health centers.

Activities for vector control in different areas are listed in Table 2.

In endemic areas where DHF occurs sporadically (low endemic area), mass application of temephos to all water storage containers is usually done by trained village volunteers, and/or village boy scouts as guided by health center personnel, to prevent the expected highest transmission season. For example, in 1983-84, a total of over 86,000 volunteers covered 2.5 million premises in 1,174 villages in 22 provinces with 111 metric tons of 1% temephos SG.

The intensified source reduction campaign is to check all potential breeding habitats by paid temporary workers, each of whom is responsible for 500 premises: door-door visit to 20 premises/day, 4 visits/year for health education and inspection of *Aedes* breeding sites.

When the number of DHF cases was very high, spraying personnel from the health offices were unable to cover all the reported cases so that private pest control companies were engaged to serve the more wealthy community.

#### 6. Legislation and disease-bearing insects

Governments need to give attention to legislation as a means of stimulating community involvement in vector control. Examples of the types of laws and regulations used in Singapore and Malaysia may be helpful in the further development of vector control programs elsewhere.