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DF/DHF in Thailand: Current incidence and vector management

Apiwat Tawatsin, Usavadee Thavara
National Institute of Health, Department of Medical Sciences,
Ministry of Public Health, Nonthaburi, Thailand

Dengue fever (DF) and dengue haemorrhagic fever (DHF) are caused by dengue viruses transmitted to humans through the bites of infective *Aedes* mosquitoes. All four serotypes of dengue viruses (DEN-1, DEN-2, DEN-3, DEN-4) are endemic in most of the large cities in the Southeast Asia. The predominant virus serotypes which have been frequently associated with epidemics vary from country to country. The disease is now one of the major public health problems worldwide, especially in the tropical and sub-tropical regions. Before 1970, only nine countries in the world got DHF epidemics, but the disease spreads to other regions and is currently endemic in more than 100 countries in Africa, the Americas, Eastern Mediterranean, Southeast Asia and Western Pacific. The Southeast Asian and the Western Pacific have been more seriously affected nowadays. In Thailand, the first epidemic of DHF occurred in 1958. Since then, the annual incidence of DHF (morbidity per 100,000 populations) has fluctuated over time and increased from 9/100,000 in 1958 to 74.8/100,000 in 2006, with the highest incidence of 325/100,000 in 1987. Moderately severe epidemics occurred in 1984, 1985, 1989, 1990 and 1997 whereas severe epidemics took place in 1987, 1998, 2001 and 2002. Regarding the case fatality rate (CFR) among DHF patients, it was generally greater than 10% in the early 1960s. However, CFR has been reduced to less than 0.5% for the past 18 years. Recently, in 2004, 2005 and 2006, the CFR was 0.12, 0.15 and 0.13%, respectively. DHF occurs all year round with high incidence during the rainy season. The disease mostly affects population in the age group ranging from 6 months old to 15 years old, but sometimes it may affect people older than 15 years but with a minor proportion.

Both species of DHF vectors: *Aedes aegypti* (L.) and *Ae. albopictus* Skuse are found in Thailand. The main breeding places of *Ae. aegypti* are mostly man-made water-storage containers, such as earthenware jars, water-storage drums, cement tanks, ant traps, etc. *Ae. albopictus*, on the other hand, is able to breed in a wide range of natural and artificial types of breeding sources and water holding niches varying from place to place. The main breeding places of *Ae. albopictus* are natural sites, such as leaf axils, tree holes, coconut husks, bamboo stumps, etc., as well as, artificial containers, for example, earthenware jars, water-storage drums, used tyres and a variety of plastic and metal containers found in the domestic environment.

At the outset, initial vector control programs, which were implemented in late 1960s, emphasized the application of chemical sprays to control adult mosquitoes, but this intervention had little or no impact on disease transmission. As a result, the national policy on DHF vector control was redirected to community-based strategy with emphasis on source reduction employing village health volunteers since the 1980s. The current vector control programs for DHF consists of provision of health education to raise public awareness, massive campaign of larval elimination on every Friday, epidemiological and vector surveillance, larval and adult control measures. Satisfactory control has been achieved in some areas, depending on the determination and the strength of local health authorities and community participation. However, the programs have confronted some obstacles, such as difficulty to mobilize community participation in larval control measures, inadequate supply of larvicides, lack of good management in vector control program and lack of systematically monitoring larval and adult susceptibility to the insecticides used. More applied research is needed to develop and implement sustainable surveillance and control programs against DHF vectors. These include identification of appropriate and effective behavior for vector control to be encouraged in the communities, development of new and safe larvicides and their long-lasting formulations, development of early and predictive warning systems employing epidemiological, entomological and serological data, and identification of high-risk areas to be subjected to intensive vector control using geographic information system (GIS) and mathematical models.