

REVIEW OF DHF SITUATION AND CONTROL OF *Aedes aegypti*
IN SOUTH-EAST ASIA

by

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DHF EPIDEMIOLOGY IN THE REGION

The classical form of dengue has been known for more than a century in the tropical areas of South-East Asia and Western Pacific regions. However, DHF was reported as a new disease for the first time from Bangkok, Thailand, in 1958, five years after it was first recognized in the Philippines in 1953. Ten years later, a major epidemic of DHF occurred in Surabaya, Indonesia, in 1968, and subsequently in 1970 in Rangoon, Burma (see Table and Figure). Sporadic cases of DHF were also reported from other countries of the Region. India reported DHF cases associated with dengue and chikungunya viruses in 1963-65 in Calcutta and Visakhapatnam. In Sri Lanka, 26 DHF cases with 6 deaths were reported in 1966 and thereafter a few cases each year. In Bangladesh, in 1968, there was an epidemic fever with symptoms closely related to DHF in areas bordering Burma. In 1977, a few suspected cases of DHF were also reported from Maldives. Otherwise, DHF has been absent in these countries of the Region, which are regarded as silent areas.

In three endemic countries of the Region (Burma, Indonesia and Thailand), DHF, both with and without dengue shock syndrome (DSS), continued to occur as an endemic disease and is presently among the ten leading causes of hospitalization and deaths of children. In almost all localities, sporadic cases of DHF are usually reported a few years before the first outbreak. After a few outbreaks it becomes endemic in the affected cities, and a few years later the disease spreads to other highly populated cities and then to rural towns. At present, DHF outbreaks occur not only in large cities but also in smaller towns, and spread to villages wherever *Aedes aegypti* exists. Most of the urban cities where the disease has once started as epidemic become endemic areas of DHF. The only exception is Calcutta, where outbreaks had occurred during 1963-65, after which the disease disappeared. Until now, it is not known exactly why DHF had occurred only once in Calcutta and no more cases of DHF were reported in spite of the dengue infection being endemic.

DHF SITUATION, BY COUNTRY

In Burma, DHF first appeared in 1970, initially being confined to Rangoon city, and, in 1971, spread to Moulmein and Bassein. By 1975, DHF had been reported from 12 out of 14 states/divisions (except Kayah and Chin). During the period 1970-1986, a total of 43 463 hospitalizations (1 843 deaths) were reported. The highest number of cases occurred in 1975 (6 750 with 363 deaths) and the lowest number was reported in 1973 (349 with 15 deaths). Rangoon division contributed over 97 per cent of the total cases during the first five years (1970-1974). The disease is cyclical with marked increases in cases every two or three years. During the period 1970-1985, the mean annual incidence of DHF cases was 2 579 with 108 deaths and an average case-fatality rate (CFR) of 4.29 per cent.

Nearly 90 per cent of the total reported cases and deaths occurred during the rainy months, May to October. The Breteau index (BI) usually starts to increase in the second month (June) of the rainy season and declines one month after the end of the season. The mean BI for this six-month period with lower BI is 61, about 45 per cent of the average for the highest season (136). During the six months of the rainy season (May to October), DHF cases are usually high - nearly 90 per cent of the total reported cases and deaths.

In Indonesia, DHF was reported as a new disease for the first time in Jakarta and Surabaya in 1968, fifteen years after its authentic recognition in the Philippines in 1953. During the 1968 outbreak, a total of 57 clinical cases and 24 deaths were detected. The number of reported cases since then has increased each year with the highest number of cases recorded in 1983 (13 875 cases and 491 deaths). Since 1979, the disease has spread to 21 of the 27 provinces and 162 out of 300 regencies or municipalities, and cases have been reported throughout the year. A five-yearly casual increase was noted (1973, 1977-1978 and 1983) either in Jakarta or in the country as a whole. After 1972, the case-fatality rate decreased continuously, from 15 per cent in 1971 to 3.9 per cent in 1981 and 3.0 per cent in 1984. During the period 1968-1986, a total of 116 567 cases with 5 092 deaths were reported in Indonesia.

In Jakarta, since the first DHF case was reported in 1969, the number of cases continued to increase with a peak of 3 100 cases with 70 deaths in 1983 - about 22 per cent of the total reported cases for the country. Till 1979, when a nationwide control programme was launched, about 10 per cent of the total cases were reported from Jakarta. During the past several years, Jakarta has contributed nearly 25 per cent of the total cases.

In Thailand, DHF was first recognized in Bangkok in 1958. It is now a severe public health problem and the third most common disease (after acute diarrhoea from various causes and acute respiratory tract infections) in children less than 15 years of age. During the period 1958-86, there were a total of 489 821 cases with 7 471 deaths. The highest annual incidence occurred in 1985 with 79 450 cases and 332 deaths. The moving average of reported cases for the past years (1979-85) ranged between 22 500 and 50 000/year. During the same period, CFR declined drastically from 2.45 per cent in 1978 to 0.42 per cent in 1985. Economic loss due to the disease was once estimated to be about US \$ 10 million/year.

During the first two years (1958-60), DHF was confined to the Bangkok metropolis; during 1961-62, it spread to the outskirts of Bangkok and the

adjacent province; during 1963-65, it spread to those provinces that had direct and convenient communication with Bangkok, and by 1967 every province of the country had reported cases of the disease. The highest number of cases is usually reported from the north-eastern region where two provinces (Khon Kaen and Udo Thai) report most of the cases. During the first half of the 1960s, the mean case rate in Bangkok was 22.08 per 100 000 population against 8.2 for the provinces, with a ratio of 27:1. In 1984, the Bangkok:province ratio was reversed to 1:2. National case rates for 1960-70 ranged from 2 to 26 per 100 000 population, which increased to 20 to 90 during the succeeding decade (1971-1980). This dramatic increase is partially due to a change in the DHF surveillance system. In the 1960s, reported cases were primarily DHF or DSS. In recent years, however, clinicians have begun to report uncomplicated DF in the DHF case counts.

VECTOR CONTROL

Aedes aegypti (L) is the principal vector of DF/DHF throughout the tropical zones of South-East Asia, Western Pacific, African and the American regions. It is originally a tree-hole breeder in Africa from where it travelled along with people to Asia towards the end of the last century. Due to its strong adaptation to human habitation, survival under dry condition and breeding in artificial water containers, this species has replaced, in many highly populated urban centres, Aedes albopictus, the Asian mosquito vector of classical dengue in the tropical areas of South-East Asia. It is generally believed that urbanization and urban human ecology have been the major factor in the displacement of A. albopictus.

A. aegypti breeds in a wide variety of microhabitats and in a range of water conditions - from clear to highly contaminated. Eggs are laid in the relatively clear water of domestic water containers and rock pools, in leaf axils, and in water rich in decaying, organic matter, such as in tree-holes. In this region, however, DF/DHF is essentially considered a disease due to man-made containers in and near domestic environs.

In the absence of a safe, effective and economic vaccine against DF/DHF, the basic control strategy, as practised in the endemic countries of the Region, is to reduce case-fatality through early diagnosis and proper case management. In the prevention of outbreak and the spread of the disease, the control of A. aegypti has been their main target by space-spraying, together with larviciding with temephos sand granules (SG) in domestic water containers.

The control programme for DHF is carried out mostly under the general health services of the primary health care system. In many localities, however, the strategy has not become fully operational to ensure coverage of the entire population at risk, both in space and time. Even in localities of the intensified programme, as in Indonesia, the results are not commensurate with the gigantic efforts or the vast amount spent in the process. The insecticides used are expensive on the one hand, and time-consuming, laborious and of limited efficacy on the other.

Unlike in the historical experience of South America in the eradication of aegypti, much as we desire it in the tropical areas of Asia, even aegypti control is unlikely to be conceived of as a practical reality under the present delivery system and at the present level of logistic inputs, which is far less than 0.5 per cent of the total health budget.

Annual DHF cases, deaths and case-fatality rates (CFR)
in Burma, Indonesia and Thailand, 1958-1986

Year	Burma			Indonesia			Thailand		
	No. of cases	No. of deaths	CFR (%)	No. of cases	No. of deaths	CFR (%)	No. of cases	No. of deaths	CFR (%)
1958	-	-	-	-	-	-	2 706	296	10.94
1959	-	-	-	-	-	-	160	21	13.13
1960	-	-	-	-	-	-	1 851	65	3.51
1961	-	-	-	-	-	-	561	36	6.42
1962	-	-	-	-	-	-	5 947	308	5.18
1963	-	-	-	-	-	-	2 215	173	7.81
1964	-	-	-	-	-	-	7 663	385	5.02
1965	-	-	-	-	-	-	4 094	193	4.71
1966	-	-	-	-	-	-	5 816	137	2.36
1967	-	-	-	-	-	-	2 060	65	3.16
1968	-	-	-	58	24	41.38	6 430	71	1.10
1969	-	-	-	167	40	23.95	8 670	109	1.26
1970	1 654	81	4.90	477	90	18.87	2 767	47	1.70
1971	691	34	4.96	267	40	14.98	11 540	299	2.59
1972	1 013	32	3.16	1 400	135	9.64	23 786	682	2.87
1973	349	15	4.30	10 189	470	4.61	8 293	313	3.77
1974	2 477	159	6.42	4 586	180	3.92	8 129	327	4.02
1975	6 750	363	5.37	4 563	368	8.06	17 771	441	2.48
1976	3 158	98	3.10	4 548	214	4.71	9 561	359	3.75
1977	5 364	236	4.40	7 826	320	4.09	38 776	755	1.95
1978	2 029	82	4.04	6 989	384	5.49	12 547	308	2.45
1979	4 685	158	3.37	3 422	165	4.82	11 478	127	1.11
1980	2 026	79	3.90	5 007	243	4.85	43 578	358	0.82
1981	1 524	90	5.91	5 809	231	3.74	25 641	194	0.76
1982	1 706	49	2.87	4 665	255	4.14	22 250	159	0.72
1983	2 856	83	2.91	13 875	491	3.88	30 022	231	0.77
1984	2 323	39	1.67	12 710	382	3.00	69 597	451	0.65
1985	2 666	134	5.03	13 588	460	3.39	80 076	542	0.68
1986	2 192	111	5.06	16 421	600	3.65	29 030	206	0.71
Total	43 463	1 843	4.24	116 567	5 092	4.37	492 519	7 703	1.56

