

REVIEW OF EPIDEMIOLOGY AND CONTROL OF DENGUE HAEMORRHAGIC FEVER IN THE SOUTH-EAST ASIA REGION

by

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GENERAL EPIDEMIOLOGICAL SITUATION

In the WHO South-East Asia Region, dengue haemorrhagic fever (DHF) was reported as a new disease for the first time from Bangkok, Thailand in 1958, five years after its first recognition in the Philippines in 1953. Ten years later, a major epidemic of DHF occurred in Surabaya (Indonesia), and subsequently in 1970 in Rangoon (Burma). 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 a few cases in 1967. 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 the Maldives. Otherwise, DHF has been absent in these countries of the Region which are regarded as silent areas. On the other hand, in Burma, Indonesia and Thailand, DHF continued to occur as an endemic disease and is presently among the ten leading causes of hospitalization and deaths of children.

ENDEMICITY IN THE SOUTH-EAST ASIA REGION

In the South-East Asia Region, especially in Burma, Indonesia and Thailand, sporadic cases of DHF were first reported a few years before the first outbreak. After a few outbreaks it became endemic in those affected cities; and a few years later the disease spread 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. Upto the present, we do not know exactly why DHF has occurred only once in Calcutta and no more cases of DHF were reported in spite of the dengue infection being endemic.

In Burma, in the first five years, 1970-74, DHF cases were restricted to Rangoon city, and in 1975 it began to spread to all states and divisions (12) except Kayah and Chin. Since 1975, about 50 per cent of the total cases have been reported from the Rangoon division. During the period 1970-83, the mean incidence of DHF cases was 2 591 with 183 deaths per year and an average case fatality rate (FCR) of 4.3 per cent (Table 1).

TABLE 1. Number of reported cases of DHF and deaths in Burma, Indonesia and Thailand, up to 1983

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	41.3	6 430	71	1.10
1969	-	-	-	167	40	23.9	8 670	109	1.26
1970	1 654	81	4.90	477	90	18.8	2 767	47	1.70
1971	691	34	4.96	267	40	14.9	11 540	299	2.59
1972	1 013	32	3.16	1 400	135	9.6	23 786	682	2.87
1973	349	15	4.30	10 189	470	4.6	8 293	313	3.77
1974	2 477	159	6.42	4 586	180	3.9	8 129	327	4.02
1975	6 750	365	5.40	4 563	368	8.1	17 771	441	2.48
1976	3 158	98	3.10	4 548	214	4.7	9 561	359	3.75
1977	5 364	236	4.40	7 826	320	4.1	38 776	755	1.95
1978	2 029	82	4.04	6 989	384	5.5	12 547	308	2.45
1979	4 685	158	3.37	3 422	165	4.8	11 478	127	1.11
1980	2 026	79	3.90	5 007	243	4.8	43 578	358	0.82
1981	1 524	90	5.91	5 809	217	3.7	25 641	194	0.76
1982	1 706	49	2.87	4 665	193	4.1	22 250	159	0.72
1983	2 856	83	2.91	13 875	533	3.8	30 022	231	0.77
Total	36 282	1 561	4.30	73 848	3 616	4.90	314 312	6 459	1.98

In Indonesia, since the first outbreak in 1968, with 57 clinical cases and a CFR of 41.5 per cent, the number of reported cases has increased each year with a peak in 1983 when 13 875 cases were reported with 530 deaths and a CFR of 3.8 per cent. Since 1979, cases have been

reported round the year from 21 of the 27 provinces and from 162 out of 300 regencies or municipalities. The disease is now endemic in many cities and remote areas as well. On the other hand, some cities, including those that are located between two endemic areas are still free of DHF.

In Thailand, DHF has spread throughout the country since 1958, when it was first recognized in Bangkok. It is now a severe public health problem and the third most common disease (after acute diarrhoea from various causes and acute respiratory tract infection) in children less than 15 years of age (Figure 1). During the period 1958-83, the highest annual incidence occurred in 1980, with 43 578 cases and 358 deaths. The moving average of hospitalized cases for the past few years (1979-83) ranged between 22 500 and 30 500/year. During the same period the CFR declined drastically from 2.45 per cent in 1978 to 0.72 per cent in 1982. Economic loss due to the disease was 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 in 1978 it spread throughout the country. The highest number of cases is usually reported from the north-eastern region where two provinces (Khonkaen and Udo Thai) report most of the cases.

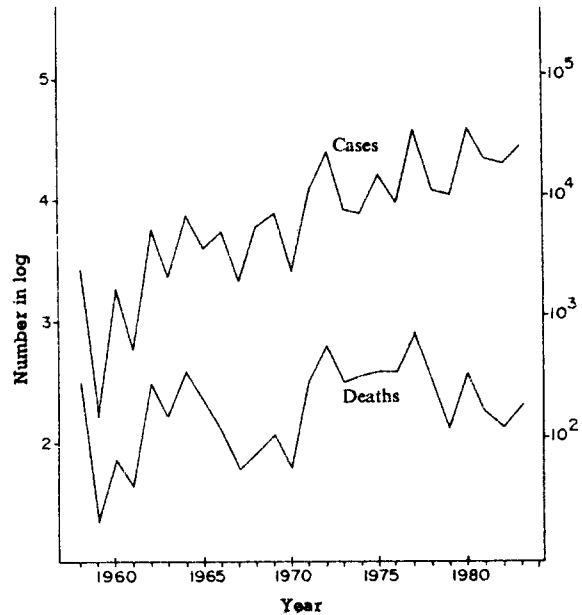


FIG.1 Yearly cases and deaths of dengue/dengue haemorrhagic fever in Thailand, from 1958 to 1983

WHO/SEARO THRUST

WHO has been collaborating with Member States in (i) technical advisory services, (ii) development of dengue virus vaccine, (iii) supply of essential laboratory agents, (iv) strengthening of research and surveillance institutions, and (v) training and research.

Specifically, the support is directed to:

- (1) the promotion of surveillance and research programmes that strive to answer basic questions on crucial clinical, pathological and immunological problems of DHF/DSS;

- (2) research on the detection and quantification of dengue viral antigen, antibody and immune complexes, and their mechanisms involved in the pathogenesis of DHF/dengue shock syndrome (DSS);
- (3) carrying out prospective long-term (five-year) epidemiological studies on DHF in Burma, Indonesia, Sri Lanka and Thailand, which embody clinical, epidemiological and entomological aspects;
- (4) training on serological diagnosis, mosquito inoculation for virus isolation,, identification of serotypes by monoclonal antibodies, CFT, ELISA testing, PRNT, etc., and
- (5) research on the development of dengue vaccine at the WHO Collaborating Centre, Bangkok.

In addition, since 1977, SEARO has organized five Research Study Group (RSG) or Scientific Working Group (SWG) meetings as follows:

- (1) Research Study Group Meeting on Dengue Haemorrhagic Fever, New Delhi, 24-25 February 1977.
- (2) Research Study Group Meeting on Development of Dengue Virus Vaccines, Bangkok, 6-8 February 1978.
- (3) Research Study Group Meeting on DHF Epidemiology, New Delhi, 26-29 March 1979.
- (4) Research Study Group Meeting on DHF, particularly with reference to Dengue Vaccine Development, New Delhi, 30-31 March 1981.
- (5) Scientific Working Group Meeting on Community Participation in the Prevention and Control of DF/DHF, Bangkok, 13-17 December 1983.

VECTOR CONTROL

Aedes aegypti is the most efficient vector because of its domestic habitat which, in most instances is the only vector of DHF in the South-East Asia Region. In recent years, focal anti-aegypti and dengue surveillance programmes have been set up in a few Member Countries, more actively in Burma, Indonesia and Thailand. The control of A.aegypti is their main target by space-spraying, together with larviciding or source reduction through community participation (Table 2).

In Burma in 1982, over 21 000 premises with nearly half a million population were protected by ultra-low volume (ULV) block sprays or focal sprays, whereas larviciding with 1 per cent temephos sand granules (SG) covered nearly 20 000 premises. Source reduction campaigns were conducted

TABLE 2. Anti-vector activities for the control of dengue/DHF
in Burma, Indonesia and Thailand in 1982
(Figures in thousands)

Control measures	Coverage	Burma	Indonesia	Thailand
Space spray (OP compound)	No. of premises sprayed	Unknown	1 006	Unknown
	No. of people protected	400.0	Unknown	6 255.0
	Insecticides	1.3 ^a	14.5	15.4
Larviciding with 1% temephos	No. of premises sprayed	Unknown	346	Unknown
	No. of people protected	100.0	13 457	172.0
	Insecticides	4.0 ^a	119.2	23.0
Source reduction by community participation	No. of premises sprayed	Unknown	140	Unknown
	No. of people protected	427.0	Unknown	Unknown
Health education	No. of people protected	222.0	Unknown	Unknown

^aKilograms

covered nearly 20 000 premises. Source reduction campaigns were conducted throughout the country, water changing or water jar emptying practice being done by the people themselves through voluntary participation, organized with the guidance and leadership of local party and council experts (Table 2).

In Indonesia, since FY 1974-75, focal space spraying with malathion has been carried out in a 100 meter radius of each reported case whereas in "hot" endemic areas, water receptacles are treated with 1 per cent temephos SG by various voluntary organizations, together with source reduction through health education (Table 3). During FY 1983-84 about one million premises were covered with space treatment with 24 500 litres of 96 per cent malathion as compared to 482 000 houses with 110 tons of temephos as larvicidal treatment just before the onset of the rainy season. The annual operational expenditure borne by the Central Government for the control of epidemics and prevention of DHF outbreaks were estimated to be nearly US\$ 800 000-900 000 for the past few years.

TABLE 3. Number of houses covered with space treatment, larviciding and source reduction in Indonesia (Figures in thousands)

Financial year	Fogging ^a		Larviciding ^b		Source reduction (No. of houses)
	Houses	Malathion ^a (96%)	Houses	Temephos ^b (1% SG)	
1974-75	114	1.8	80	4.0	30
1975-76	200	5.5	177	5.9	140
1976-77	255	3.1	201	5.1	160
1977-78	355	12.0	262	5.8	141
1978-79	272	11.4	280	9.5	164
1979-80	268	9.9	279	12.2	187
1980-81	319	19.8	417	23.2	140
1981-82	296	14.5	347	91.4	7
1982-83	1 006	14.4	346	119.2	1
1983-84	701	24.5	482	110.8	0

^aLitres; ^bKilograms

In Thailand, since 1975 DHF control programmes through anti-vector measures have been implemented in areas of high transmission and DHF disseminated points such as schools, hospitals, etc. by DHF and encephalitis control programmes of the Ministry of Public Health, Thailand. In 1982, a total of over 6 million population was protected by space sprays with 96 per cent malathion or 40 per cent fenitrothion EC, while larvicidal control was carried out in 257 communities of 13 provinces.

COMMUNITY PARTICIPATION

In order to promote community involvement in source reduction for the control of vectors of DF/DHF, general Guidelines were prepared (SEA/VBC/21) as recommended by the Scientific Working Group Meeting held in Bangkok, 13-17 December 1983. In the promotion and motivation of community involvement in

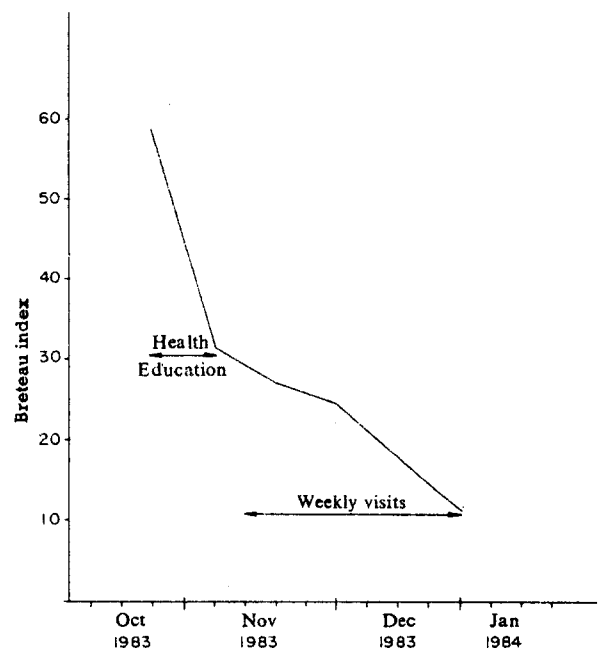


FIG. 2 Breteau index determined before and after source reduction campaign in Perumnas Banyumanik, Semarang Municipality, Central Java, Indonesia

the reduction of breeding containers, it is essential to have appropriate mechanisms to delegate the responsibility, authority and resources to the community. In order to explore appropriate ways of promoting community involvement in the reduction of vector breeding receptacles, Thai scientists at the Division of Medical Entomology have carried out a pilot demonstration project on source reduction for the control and prevention of dengue/DHF in the district of Phanus Nikhom through community participation.

In Indonesia, at the Sub-Directorate of Arbovirus Diseases, CDC, Jakarta there are now a total of eight technical staff (two medical officers, two public health officers and four technical staff). Technical and financial support have been made available to provincial CDC officers and local coordination ensured on almost all field activities for the control and prevention of DHF.

As regards school health education in the prevention and control of DHF during FY 1982-83 with financial support from UNICEF 91 000 flip charts were distributed to elementary schools in the high endemic areas of 27 provinces. Presently health education materials are being developed for the use of television mass media. In August 1983, the campaign was monitored/assessed by larval surveys in 50 schools selected in five municipalities. The results were:

School <u>Aedes</u> index:	Indoor - 42.9%
	Outdoor - 61.0%
Students' house index:	Indoor - 30.1%
	Outdoor - 42.5%

Since 1980 new attempts have been made for the control and prevention of DF/DHF by setting up demonstration projects on:

- (1) source reduction through community participation (Semarang municipality, Figure 2).
- (2) school health education (Pekalongan municipality), and
- (3) protection of domestic water containers from mosquito breeding (Kuala Tungkal, Jambi Province).