

Epidemiology of Dengue in South Vietnam and The Strategy of Its Control

Ha Ba KHIEM, Do Quang HA, Vu Thi Que HUONG,
Huynh Thi Kim LOAN and Dinh Quoc THONG

Pasteur Institute, Ho Chi Minh City, Vietnam.

INTRODUCTION

Dengue haemorrhagic fever (DHF) and Dengue shock syndrome (DSS) have now become a major public health problem in Vietnam.

In South Vietnam, DHF was first recognized in 1960 with about 60 children died. In 1963, an outbreak occurred at Cai Be, Chau Doc, Hong Ngu, Tan Chau and Cao Lanh with 331 clinical DHF cases and 116 deaths¹.

Since then, the number of DHF cases has been continuing to increase² and recorded as the greatest one in South-East-Asia and the Western Pacific Regions³.

In South Vietnam, from 1963 to 1992, DHF has occurred every year. The DHF prevalence has increased annually and major epidemic occurring every 3 to 4 years⁴. In the largest 1987 outbreak, the province which had a highest morbidity was Vung Tau: 1 614/100 000 population and the province with highest lethality was Minh Hai: 12/100 000 population.

Large DHF epidemics in South Vietnam in 1975, 1979, 1983, 1987 occurred at the same time with big epidemics in the whole country⁴.

DHF cases were recorded all year round and epidemics have usually occurred from June to November with peak transmission in July, August and September which have closely related with the rainy season-the breeding period of mosquito vector.

DHF patients are mostly children under 9 years old. The most affected age groups is 5-6 years old and fewer cases occurring in adults (2.75% of DHF patients, in 1990).

Contrarily to the South, the DHF morbidity in adults in the North of Vietnam was high (53.12% in the 1983 epidemic). This is a meaningful difference between the 2 regions⁴.

In 1979, 1983, 1987 large epidemics, the male: female mean ratio was 1.017/1. The difference in sex attacked by DHF in 3 large outbreaks (1979, 1983, 1987) as compared with the remaining ones had no statistic significance ($\chi^2=1.99$ with $P>5\%$). Thus, in South Vietnam, the sex was not a risk factor for DHF/DSS⁵.

During 1983-1990, in Ho Chi Minh city,

* The mean temperature: 27.4°C.

* The relative mean humidity: 77.88%, it was 70.5-71.25% in dry seasons and 82.5

Table 1. Reported DHF/DSS cases and deaths in South Vietnam during 1975-1992

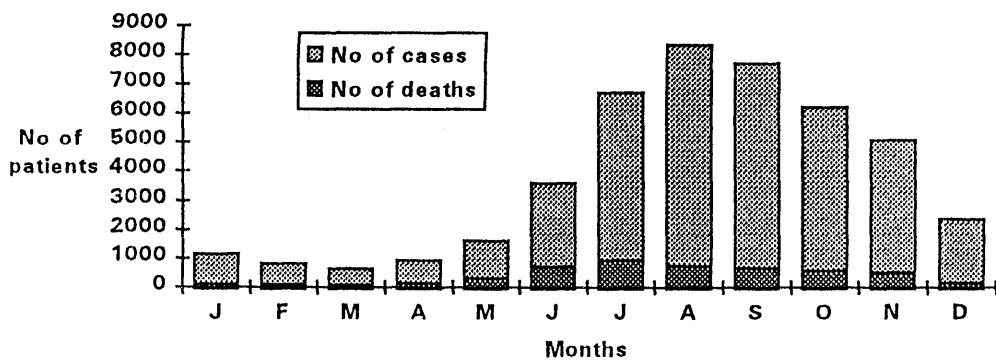
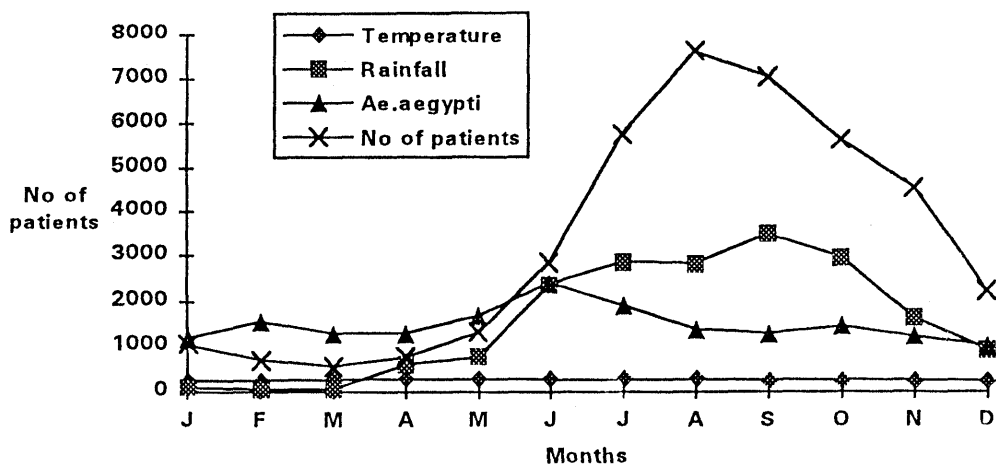
Year	Morbidity		Mortality		CFR
	No.	Rate/10 ⁵	No.	Rate/10 ⁵	%
1975	19,416	112.44	397	2.29	2.04
1976	6,151	35.62	558	3.23	9.07
1977	8,362	47.33	447	2.53	5.34
1978	17,055	94.37	484	2.67	2.83
1979	21,285	115.13	466	2.52	2.18
1980	11,997	63.43	500	2.64	4.16
1981	5,933	30.66	76	0.39	1.28
1982	11,281	56.99	155	0.78	1.37
1983	77,087	380.73	1,301	6.42	1.68
1984	14,562	70.30	286	1.38	1.96
1985	19,927	94.04	209	0.98	1.04
1986	15,647	72.18	243	1.12	1.55
1987	83,905	378.37	904	4.07	1.07
1988	49,237	217.04	587	2.58	1.19
1989	18,923	83.09	178	0.78	0.94
1990	41,517	174.87	298	1.25	0.71
1991	39,917	168.36	244	1.03	0.61
1992	42,363	174.75	173	0.71	0.41

Table 2. Reported DHF/DSS cases and deaths in South Vietnam in comparison with the whole country

Year	Region	Morbidity		Mortality		CFR
		Number	Rate/10 ⁵	Number	Rate/10 ⁵	%
1975	Whole country	30,599	76.98	417	1.04	1.36
	South Vietnam	19,416	112.44	397	2.29	2.04
1979	Whole country	63,976	121.30	1,171	2.22	1.83
	South Vietnam	21,285	115.13	466	2.52	2.18
1983	Whole country	149,519	260.60	1,795	3.12	1.20
	South Vietnam	77,087	380.73	1,301	6.42	1.68
1987	Whole country	354,517	581.96	1,566	2.57	0.44
	South Vietnam	83,905	378.37	904	4.07	1.07

Table 3. Age proportion of DHF cases in the South of Vietnam

Age group	1983	1984	1985	1987	1989	1990
≤11 months	8.55	9.81	7.64	11.52	10.39	8.41
1-4	24.90	29.65	28.71	32.43	26.77	23.11
5-9	38.97	34.90	36.23	35.70	37.95	41.35
10-14	23.57	21.10	21.91	15.80	18.10	20.34
15-19	3.95	4.52	3.84	3.60	4.50	4.03
≥20	0	0	1.64	0.95	2.27	2.75
Total No of patients	77,087	14,562	19,927	83,905	18,923	41,517

**Fig. 1.** Monthly distribution of the mean number of DHF patients and fatal cases in South Vietnam, 1983-1990.**Fig. 2.** The correlation between DHF epidemics with temperature, rainfall and *Aedes aegypti* density, 1983-1990.

-85% in rainy seasons.

* The *Aedes aegypti* mean density: 1.02-1.30 in dry season and 1.93-2.43 in rainy season.

Therefore, the climate and weather in South Vietnam allow continuous breeding of mosquito population. Such factors are propitious for DEN transmission that end with DHF outbreak in every year.

VIRUS ISOLATION

In the virological surveillance in Ho Chi Minh city and in some surrounding provinces, several DEN virus strains were isolated from patients' blood as well as from the mosquitoes.

In the 1987 DHF outbreak, DEN-2 was the dominant sero-type (90.5%)². But from 1990 the epidemic sero-type has changed, DEN-1 was introduced and was continuing to grow-up (58%)⁵. Then in 1992 outbreak, the DEN-2 was reintroduced, from 26.3% in 1991 has increased to 41.4%.

Of interest is that if the DEN-2 became the dominant epidemic sero-type in 1993 or 1994, it is possible that a large DHF epidemic will occur.

THE DHF CONTROL STRATEGY IN SOUTH VIETNAM

Objectives of Strategy

- Reduction of morbidity and mortality
- Limitation of DHF outbreaks
- Increased knowledge, attitude and practice of the community on environmental sanitation, mainly elimination of discarded materials.

Prevention and Control

The current option available for prevention and control of DHF epidemic is to eradicate the principal vector mosquito *Aedes aegypti*. Source reduction through community participation is the most appropriate method of DHF control.

The basic problem is that the active prevention and control of DHF must be started immediately in the beginning of the silent transmission period prior to the epidemic stage by using the effective active surveillance which based on serological, virological and clinical surveillance. These surveillances aim to provide early and precise information to the public health service for starting the active control. Because if a DEN transmission can be detected early enough, an effective emergency mosquito control implemented immediately at that moment, major DHF epidemic might be prevented.

In South Vietnam the basic proofs for implementing the active DHF prevention and control are based on, in the first trimester of every year :

1. DHF patients have been already detected.

Table 4. The arboviruses isolated in South Vietnam during 1978-1992

Year	Isolated from	Number of isolates						Un-identified	No of (+) /No of specimens
		Sero-type				JE	Chik		
		DEN-1	DEN-2	DEN-3	DEN-4				
1978	Patient's blood				1	1	2		
	<i>Ae. aegypti</i>	1						6+ / 69	
	<i>C. fatigans</i>	1							
1979	Patient's blood						1		
	<i>Ae. aegypti</i>		1		1			10+ / 59	
	<i>C. fatigans</i>		1			3	2		
	<i>Ae. albopictus</i>						1		
1980	<i>Ae. aegypti</i>			1		1	1	8+ / 78	
	<i>C. fatigans</i>	1				3	1		
1982	Patient's blood	1	1				3	5	
	<i>Ae. aegypti</i>								
	<i>C. fatigans</i>					1	1		
1983								0 / 61	
1984	<i>C. fatigans</i>		1					1+ / 46	
1985	Patient's blood		1					1+ / 23	
1986								0 / 50	
1987	Patient's blood	1	48	2	2	4	not done	1	
1988	Patient's blood		4				not done		
	<i>Ae. aegypti</i>					1			
	<i>C. fatigans</i>					2			
1989	Patient's blood		1			1	not done		
1990	Patient's blood	18	10		3		not done		
1991	Patient's blood	9	5	3	2	1	not done	6 contaminated	
1992	Patient's blood	17	12				not done		

Viral isolation was not carried out in 1981.

2. Inapparent and confirmed DHF cases have been serologically diagnosed.
3. DEN viruses have been isolated in this period.

Only (1) and (2) are sufficient proofs to confirm that the DEN transmission has started. Therefore it must be the time the Government should implement the active DHF control programme. It must be emphasized and addressed to the individual responsibility of all persons and they must be made to understand that DHF exists only because they allow mosquitoes to breed in and around their home. Person living in communities must be educated to accept responsibility for their own health destiny, for their own family too.

In the final part of the report, the authors stressed on the "Active surveillance" as a new strategy for controlling the DHF epidemic in an endemic region. The goal of this active surveillance is to have early warning and predictive capability for epidemic dengue, based on virological and serological surveillance. As mentioned above, in South Vietnam, dengue cases were detected in January and February of every year, so the base line is as follows: When first cases of DF/DHF were detected, it needs to be promptly implemented the larval control and insecticide must be sprayed around the patient's houses within a radius of 100 meters.

REFERENCES

- 1) Thoa, N. T. K., Cuong, P. H. et Dong, N. V. (1971): Quelques donnees sur la fièvre hemorragique au Sud Vietnam de 1963 a 1971. Rapport annuel sur le fonctionnement technique, Institut du Pasteur -Vietnam: 113-154.
- 2) Ha, D. Q., Tien, N. K., Hoa, D. T., & Huong, V. T. Q. (1989): Epidemic DHF in South Vietnam, 1987. Dengue Newsletter, WHO, 14, 46-57.
- 3) Ha, D. Q. & Huong, V. T. Q. (1990): Some data on DHF/DSS epidemic in South Vietnam, 1988. Dengue Newsletter, 15, 41-44.
- 4) Ha, D. Q. & Tien, T. (1985): Current DHF/DSS situation in Vietnam from 1975 to 1983. Dengue Newsletter, WHO, 11, 89-99.
- 5) Ha, D. Q., Huong, V. T. Q., Loan, H. T. K. & Thong, D. Q. (1992): DHF/DSS epidemic in South Vietnam during 1975-1990 and the strategy of its control. J. Trop. Infect. Diseases, Publ. Health Assoc. HCM city, 4, 27-32 (in vietnamese).
- 6) Gubler D. J. (1987): Current Research on Dengue. K. F. Harris (ed.). New York, Springer-Verlag 3: 37-56.