

## Health System for Dengue Control : Early Case Detection and Focal Control

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**Abstract :** *Aedes aegypti* and dengue virus infection continue to spread in the tropical and subtropical world. Since there is no effective dengue vaccine, mosquito control and dengue patient treatment are the most important and practical way for dengue control. Many attempts have been made to control *Aedes aegypti* (adulticidal and larvicidal) to prevent dengue epidemic by large vertically-organized teams of workers. However, most of these methods have not been successful in the aspect of continuation of the effective dengue control. By reviewing several dengue control activities, one possible approach for Dengue Fever (DF) / Dengue Hemorrhagic Fever (DHF) control is presented : 1) development of early case detection by using simple IgM detection methods at the level of health centers, 2) quick fogging of the house and the area of detected case, and 3) development of active community participation in the above activities.

**Key words :** Dengue hemorrhagic fever, Community health care system, Vector control, Focal control, Health cost

### INTRODUCTION

There is the rising trend of DF/DHF cases in many countries, thus there is a growing importance of controlling DF/DHF. In most dengue endemic countries, the vector control activities have been conducted, but most of them have not been effective in reducing breeding site and vector population.

One possible explanation is that there is the time lag between the onset of epidemic and the implementation of vector control projects. Another explanation is that it is difficult to maintain the participation of the community for long time to the larval and adult mosquito control.

The purpose of this paper is to review several dengue control activities with a view to present a possible dengue control approach in dengue endemic countries.

SUCCESS IN *Aedes Aegypti* CONTROL IN CUBA

After the epidemic of DHF in Cuba in 1981 (Kuori *et al.*, 1989 ; Gessa and Gonzalez, 1986), *Aedes aegypti* eradication campaign was initiated in nationwide with mobilizing big manpower and equipment (Table 1). Gessa and Gonzalez (1986) reported that there is a remarkable decline in infestation rate from 5th of August to 30th of September in 1981, and after this campaign the remarkable reduction is maintained (Fig. 1). For this successful activity as much as US\$ 43 million was spent. The success in Cuba has not been replicated in other dengue endemic developing countries, since they have been encountering shortage of fund and manpower for the activities. For example in Indonesia which has some 180 million people, only US\$ 0.3 million was allocated for DF/DHF control, in comparison with the US\$ 43 million of Cuba which has only 10 million people (Gessa & Gonzalez, 1986).

## HEALTH EDUCATION IN THAILAND, MALAYSIA AND VENEZUELA

Health education to the people in the community on the vector control has been conducted in many countries. However, most of them were not successful in relation to reduction of DF/DHF incidence. In Thailand, a health education in the community campaign was implemented in 1987-1990 involving health personnel and the mass media (Swaddiwudhipong *et al.*, 1992). This campaign helped communities to increase the knowledge of DF/DHF (Table 2). However it is difficult to say in some studies (Swaddiwudhipong *et al.*, 1992) that these activities were related to the decrease of the incidence of DF/DHF (Table 3).

From the study in Malaysia, it was found that the increase of knowledge of DF/DHF is not directly related to the control activities. For example, a KAP (knowledge, attitude and practice) study shows that the majority of the respondents knew that dengue is transmitted by mosquitos. Nevertheless, Gratz (1991) reported that 82% of them would continue to store water in a container even though the piped water was available.

**Table 1.** Manpower and equipment for eradication campaign of *Aedes aegypti* in the Republic of Cuba (1981)

Provincial Director	15
Entomologists	60
General Supervisors	27
Team Leaders	729
Inspectors	3,801
Controllers	1,947
Trucks	1,200

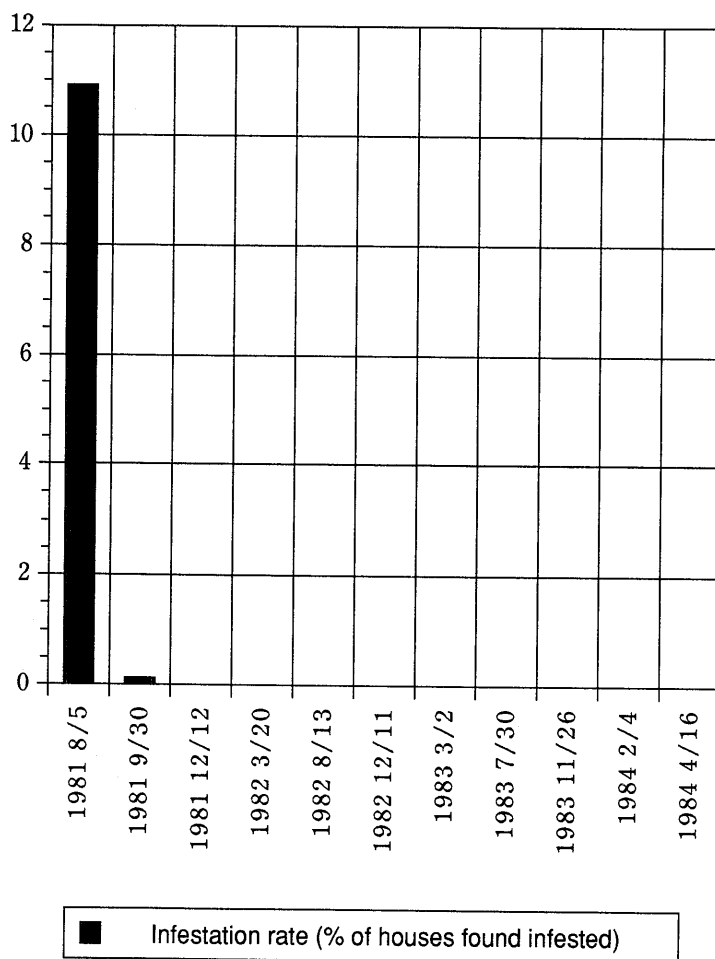


Fig. 1. *Aedes aegypti* house infestation rates observed before and during the eradication program in Cuba (Source: Gessa and Gonzale, 1986)

The same trend was found in a small town in Venezuela (Barrera *et al.*, 1993). The majority of people (60%) said that they are used to store water in a container and would not stop storing water even in case of a reliable supply of piped water become available.

#### INTERVENTION BY FOGGING IN PUERTO RICO

One bottleneck of using large scale fogging for effective DF/DHF control is that there is a time lag between the onset of epidemic and implementation of the fogging. In the Puerto Rico case in 1977 (Morens *et al.*, 1986; Gubler and Casta-Valez, 1991), it took more than 20 days to initiate large scale fogging after the peak of epidemic.

**Table 2.** Proportion of the 417 respondents responding to selected DHF knowledge

DHF knowledge	No.	(%)
Symptoms/signs <sup>1)</sup>		
Fever	312	(74.8)
Bleeding phenomena/rash	200	(48.0)
Nausea/vomiting	35	(8.4)
Shock	5	(1.2)
Don't know	48	(11.5)
Transmission		
Mosquito bites	392	(94.0)
Others	18	(4.3)
Don't know	7	(1.7)
Mosquito vectors		
Aedes	376	(95.9) <sup>2)</sup>
Others	13	(3.3)
Don't know	3	(0.8)
Biting time		
Day-time	314	(80.1) <sup>2)</sup>
Others	74	(18.9)
Don't know	4	(1.0)
Breeding places		
Water jars	280	(67.1)
House drains/water retention in and around houses	206	(49.4)
Ant-traps	75	(18.0)
Cement baths	71	(17.0)
Flower vases/pots	46	(11.0)
Others <sup>3)</sup>	93	(22.3)
Know of abate (temephos sand granules)		
Yes, used it regularly	239	(57.3)
Yes, used it occasionally	63	(15.1)
Yes, but never used it	72	(17.3)
Don't know	43	(10.3)

1) Some reported more than one item.

2) Percentage was calculated among those reporting mosquito bites as disease transmission.

3) Including tin cans, bottles, coconut shells and tyres.

Source: Southeast Asian Journal of Tropical Medicine and Public Health, 23 (2), p. 208, 1992.

**Table 3.** Annual number of cases and incidence rate of DHF in the municipality of Mae Sot District of Thailand

Year	No. of cases	Rate (per 100,000)
1987	181	892
1988	4	20
1989	42	207
1990	139	685

Source : Southeast Asian Journal of Tropical Medicine and Public Health, 23 (2), p. 204, 1992.

### DISCUSSION AND CONCLUSION

From experience of Cuba, it can be said that effective *Aedes aegypti* control is possible in certain setting such as subtropical area and isolated small island countries with extensive mobilization of both human and financial resources. However, the example of Cuba has not been replicated in many other dengue endemic developing countries, since most of them have problems of shortage of human and financial resources. Experience of Puerto Rico for intervention by fogging shows a long time lag of more than 20 days between the onset of dengue epidemic and implementation of fogging. This implies that it is difficult to develop the effective vector control system in community for DF/DHF control. But a experience in Thailand, Malaysia and Venezuela shows that community health education really work to increase people's knowledge of DF/DHF. Also, early case detection method (IgM immuno-blot) become available. Based on the above development, it is highly possible to develop early DF/DHF case detection at the level of health center in community, and to develop system for quick fogging of the house and the area of detected case by conducting health education to the community and involving community in the activities. Based on the above concept, a pilot project of DF/DHF control is prepared and will be initiated in one village of South Viet Nam.

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