Dengue Haemorrhagic Fever in Thailand

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Abstract

Dengue haemorrhagic fever was first reported in Thailand in 1950. Since then the reported number of cases has been showing a gradually increasing trend. In earlier outbreaks, the disease was mainly found in Bangkok and surrounding areas. Since 1965, it has been reported from all regions of Thailand. The factors that facilitate the spread of DHF include rapid demographic and societal changes, population movement, uncontrolled urbanization, poor water management systems and indiscreet disposal of used automobile tyres and plastic materials in the environment.

The main interventions used for DHF prevention and control in the past comprised of three approaches: (1) the control of Aedes breeding sites; (2) health education to raise public awareness; and (3) the provision of standard and effective medical care for DHF patients in order to reduce mortality. Despite the active implementation of these efforts, the disease has not been brought under control. The spread of DHF epidemic is on the increase both in terms of the number of people affected and the areas covered. The main weakness of the DHF control programme is its failure to mobilize all sectors who should be involved in the effort.

At present, a series of activities are being undertaken to reform the DHF control programme in Thailand. These include: (1) the formation of a national dengue prevention and control committee; (2) the establishment of a Dengue Division; and (3) the development of a national plan for dengue prevention and control. The main direction of the plan emphasizes the improvement of the environment at home and in the community, human development, and the development of technology to promote dengue prevention
Introduction

Dengue haemorrhagic fever (DHF) is becoming a major health problem in Thailand. It has long been among the top five of the most common communicable diseases in the country, which are: diarrhoeal diseases, conjunctivitis, pneumonia, DHF, and malaria(1). It is also one of the leading causes of morbidity among children under 10 years of age. Although the mortality and case fatality rates of DHF have been gradually decreasing, thanks to the technical advancements and the higher quality of medical care, the morbidity from this disease has been on the increase since the disease was first reported in 1949(2).

Realizing the ever-increasing threat of DHF to the population, especially children and the youth, the Ministry of Public Health has decided to give the DHF control programme the highest priority, with the aim to reduce effectively the DHF morbidity and mortality(3). The problem is so acute that His Majesty the King of Thailand himself has expressed concern about the growing danger of DHF in the country.

Situation and trends of DHF in Thailand

Dengue haemorrhagic fever was first reported in Thailand in 1950. In the beginning, about 50 to 100 cases were diagnosed annually until the first large outbreak of the disease in 1958 when 2158 cases and 300 deaths were...
reported. Since then, the reported number of cases has been gradually increasing. In the first few outbreaks, the disease was mainly found in Bangkok and its surrounding areas, and the majority of cases were children aged between 2 and 6 years. Since 1965, the disease has been reported from all regions of the country.

Wangroongsab (1997)(2) reported the details of the DHF situation in Thailand by presenting a table which showed the number of cases, deaths, the morbidity rate, the mortality rate, and the case fatality rate from 1958 to October 1997. The data presented clearly demonstrated that DHF was on the increase in spite of the active campaigns conducted in the country.

The situation of DHF in 1997 and 1998 deserves serious attention. The number of DHF cases reported was 101,689 in 1997 and 126,348 in 1998 (Table 1)(3,4,5). Since the first outbreak of the disease 40 years ago, the cases for 1998 and 1997 were the second and the third highest ever following the highest ever number of 174,285 cases reported in 1987.

Table 1. Morbidity, mortality and case fatality rates of DHF in Thailand, 1997–1998*

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
<th>Deaths</th>
<th>Morbidity rate</th>
<th>Mortality rate</th>
<th>Case-fatality rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>101,689</td>
<td>253</td>
<td>169.13</td>
<td>0.42</td>
<td>0.25</td>
</tr>
<tr>
<td>1998</td>
<td>126,348</td>
<td>432</td>
<td>207.75</td>
<td>0.71</td>
<td>0.34</td>
</tr>
</tbody>
</table>

*(data as of 4 January 1999)

Fig.1 presents the monthly distribution of DHF cases in 1998. Although 50% of the cases were diagnosed in the rainy season (June to August), the disease was observed all the year round. Table 2 indicates the wide spread of DHF in all the regions of Thailand. Variations in numbers may be due to population density and the extent of movement within each region.

Table 2. Region-wise number of DHF cases and deaths reported in Thailand, 1998

<table>
<thead>
<tr>
<th>Region</th>
<th>Cases</th>
<th>Deaths</th>
<th>Case fatality rate (per 1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>21,532</td>
<td>73</td>
<td>3.4</td>
</tr>
<tr>
<td>North-Eastern</td>
<td>48,710</td>
<td>210</td>
<td>4.3</td>
</tr>
<tr>
<td>Central</td>
<td>28,334</td>
<td>59</td>
<td>2.1</td>
</tr>
</tbody>
</table>
It is observed that DHF has a tendency to affect populations in higher age-groups. As compared to 1988, the percentage of patients aged over 15 years increased from 7.25% to 19.75% (Table 3).

Table 3. Age-group-wise number of DHF cases in Thailand, 1998

<table>
<thead>
<tr>
<th>Age-group</th>
<th>Number of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–4 yrs</td>
<td>19 205</td>
<td>15.20</td>
</tr>
<tr>
<td>5–9 yrs</td>
<td>46 787</td>
<td>37.03</td>
</tr>
<tr>
<td>10–14 yrs</td>
<td>35 403</td>
<td>28.02</td>
</tr>
<tr>
<td>15 yrs and over</td>
<td>24 953</td>
<td>19.75</td>
</tr>
<tr>
<td>Total</td>
<td>126 348</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Figure 1. Month-wise No. of DHF Cases Reported in Thailand, 1998
Epidemiological Phases

The DHF situation in Thailand in the past 40 years can be summarised as having four different epidemiological phases(6).

Phase 1: The First Decade of DHF (1958 – 1967)

The epidemics of DHF occurred once every two years with a slightly increasing trend. The average number of patients per year ranged between 2000 and 8000. Most of the patients were in big provinces. The case fatality rate was initially high, over 10%, and gradually declined to 3% at the end of the phase.

Phase 2: The Second Decade (1968 – 1977)

The disease occurred once every 2 to 3 years during this phase. The morbidity increased very significantly, from less than 20 per 100 000 pop. at the beginning of the phase to over 80 per 100 000 at the end. The case fatality rate varied from 1% to 4%, and the trend did not decrease. The average annual number of cases ranged from 3000 to 38 000. The majority of the cases still occurred in big cities, municipal areas, or urban zones.


In this phase, the disease began to spread from urban to rural areas throughout the country. The average number of cases was 50 000 per year. The highest ever incidence of DHF in the country was observed in 1987 when 174 285 cases were reported. However, the case fatality rate was declining significantly from 2.45% in 1978 to 0.58% in 1987.


During this phase, DHF became a major public health problem throughout Thailand. The trend of the disease was on the increase significantly while the case fatality rates were quite low (0.3% – 0.6%). Some unusual features were observed in this phase, and the significance of these observations needs to be explored. For example:

(a) Alteration in the concept of seasonal variations in that the DHF outbreaks in 1997/1998 not
only occurred in the rainy season but throughout the year; and

(b) There seemed to be a shift in the age-groups that got affected – from younger people to older ones.

The extensive spread of DHF in Thailand has resulted in premature death of many patients as well as economic loss due to both direct and indirect costs. A study of the cost of DHF, using the incidence data of 1994 in which 51,688 cases were reported, showed that it cost the country at least US$ 12.6 million, of which 54.8% was borne by the government and the rest by the patients and their families(7).

Causes of spread of DHF

There are many factors that facilitate the spread of DHF in Thailand. Rapid demographic and societal changes have taken place in the past 20 years. The movement of population from rural areas to Bangkok and other big cities has resulted in uncontrolled urbanization with poor water management systems which facilitated the breeding of mosquitoes. The indiscreet scattering around of used automobile tyres and plastic materials further aggravated the already uncontrolled DHF vector multiplication. Moreover, shortage of piped water supply in both urban and rural areas has created the practice of conserving water in household containers which are the most potential breeding places of *Aedes* mosquito, the main vector of DHF in Thailand. The massive population movement in recent years has further facilitated the spread of the dengue virus from high endemic areas to the rest of the country. All these factors coupled with ineffective DHF control measures in the past, have resulted in high morbidity caused by DHF and the ever-increasing trend of the disease in Thailand.

Dengue prevention and control measures

During the first decade of the DHF epidemics, the primary control interventions were health education and vector control conducted as a vertical programme by medical and health workers(6). The main focus of the vector control activities in the first two decades was spraying of chemicals to reduce the mosquito density in areas where cases of DHF
were reported. In the last two decades, the control programme was integrated into local health services at the provincial level and the logistics were provided by health authorities at the central level. In the last decade, more attention has been given to school settings as the potential risk areas for children who stayed at school during day time, and were therefore more likely to be bitten by *Aedes* mosquito. Cooperation between the Ministry of Public Health and the Ministry of Education has been very successful in mobilizing children to take part in vector control activities in schools\(^{(2)}\). At the same time, patients with DHF are effectively treated which has resulted in a low case fatality rate\(^{(6)}\).

In conclusion, the main interventions for the prevention and control of DHF in the past comprised of three approaches:

1. The control of *Aedes* breeding sites. The interventions included the use of chemical larvicides such as Abate or Temephos sand granules to kill mosquito larvae in uncovered water containers, outbreak investigation, and chemical spraying or fogging after the detection of an outbreak.

2. The provision of health education to familiarize the public about the danger of DHF and to cooperate with other sectors in destroying and eliminating mosquito breeding sites, and self-protection from mosquitoes.

3. The provision of standard and effective medical care for DHF patients in order to reduce the mortality.

Despite the active involvement of the Ministry of Public Health and a few participating agencies such as the Ministry of Education, the disease has not been brought under control. The problem of DHF is rather on the increase both in terms of the number of people affected and the area covered by the disease.

The main constraint of the DHF control programme is its failure to mobilize all sectors who should be involved in the DHF control activities. In the past 40 years, the main agency responsible for the control programme has been the Ministry of Public Health. The experience gained from the HIV/AIDS prevention and control
programme points to the fact that it is almost impossible to control such a major health problem if all key sectors do not actively involve themselves in its control since DHF is an environmental problem, i.e. a problem of inappropriate environment that facilitates the growth of Aedes mosquito. Therefore, all agencies responsible for environmental control, rural development, local administration and mass mobilization should be actively involved in the programme.

Current approaches in DHF control

At present, a series of activities are being undertaken to reform the DHF control programme in Thailand. These include the following:

Formation of National Dengue Prevention and Control Committee

This committee, established with the approval of the Cabinet, comprises 49 representatives from various sectors within and outside the government. The Prime Minister is the Advisory Chairman and the Minister of Health is the Chairman of the Committee. The main responsibilities of this multisectoral committee are: (1) to formulate policies and set up DHF control approaches; (2) to control and monitor the implementation of the DHF control programme; and (3) to direct and coordinate the programme among various agencies as well as to solve all problems of programme implementation in order to achieve the objectives of the programme. A set of specific subcommittees are being formed and regular meetings are held to monitor the progress of the programme.

Establishment of Dengue Division

In the past, DHF control was the responsibility of a small vector control section within the Division of General Communicable Diseases. In order to cope with the increasing trend of the disease, the Office of Dengue Control has been upgraded to the division level and made responsible for the implementation and coordination of DHF control activities conducted by various sectors. It acts as the secretariat of the National Dengue Prevention and Control Committee (NDPCC), similar to the role of the
AIDS Division of the Department in the National AIDS Prevention and Control Programme.

Development of national plan for dengue prevention and control

At present, a multisectoral plan is being developed to be known as the National Plan for the Prevention and Control of Dengue Haemorrhagic Fever in the country\(^9\). The plan will provide policy direction which conforms to the changing disease situation and the consideration of self-reliance. It will reflect the concept of modifying the attitude and the behaviour of the people to realize the importance of and the necessity to control *Aedes* breeding sites. The plan will lay particular emphasis on the following aspects:

(i) Improvement of environment at home and in the community in order to render it unfit for the breeding of *Aedes* mosquitoes.

(ii) Human development. This will include education, information and communication activities aimed at raising the awareness of the people to be conscious about the danger of DHF and to prevent themselves from possible exposure to the disease. The plan will also emphasize the creation of a public norm of controlling the environment and destroying the breeding sites of *Aedes* mosquitoes.

(iii) Development of technology to promote dengue prevention and medical care for DHF patients. This plan will emphasize measures to build people’s capacity to take proper care of the sick persons at home, and to build up responsive medical and health manpower to provide effective treatment for DHF patients.

The main objectives of the National Plan in the first two years (1999–2000) are:

(i) To prevent and reduce the problems resulting from the spread of DHF in Thailand; and

(ii) To reduce the socioeconomic and health impacts resulting from the spread of DHF at the family, community and national levels.
Strategic objectives of the national plan

These are:

(i) To control the environment in the families and the communities so that it will not be suitable as breeding sites of *Aedes* mosquitoes;

(ii) To create the potential of individuals, families, communities, and community-based organizations to control and reduce the sources of DHF; and

(iii) To develop the prevention and care capability of concerned government and non-government agencies and institutions.

Specific objectives of the national plan

These are:

(i) Reduction of morbidity and mortality:
   - To take control measures not to allow the morbidity rate of DHF to exceed 50 cases per 100 000 population.

   - To control the case fatality rate so that it does not exceed 0.2%.

(ii) Reduction of the prevalence of mosquito vector:
   - To eliminate household breeding sources so that the Breteau Index does not exceed 50 in any community.
   - To reduce breeding sources in all schools so that the Container Index does not exceed 10.

Main components of National Dengue Prevention and Control Programme (NDPCP)

The National Plan for Dengue Prevention and Control is comprised of five projects:

(i) Environment improvement for the control of *Aedes* mosquitoes;

(ii) Public information and education for the prevention and control of dengue haemorrhagic fever;

(iii) Manpower development for the implementation of dengue prevention and control;
(iv) Technical development and improvement of prevention technology and medical care; and
(v) Development of a long-term national plan for dengue prevention and control.

Dengue control interventions

The following interventions for DHF control are being implemented in Thailand:

**The Aedes-free programme**

This will be conducted in various institutions and communities such as households, communities, schools and medical and health facilities. The Ministry of Public Health has laid down a policy to conduct the Aedes-free programme in all hospitals, health centres and health facilities in the country in order to demonstrate to other sectors the methodology to implement, monitor and evaluate the programme.

**Integration of DHF control into PHC programme**

This programme will involve all village health volunteers (VHVs) (approximately 650 000 persons) who will be trained and assigned to work primarily on DHF control in 1999. By this approach, DHF control activities in all villages will be conducted and supervised by VHVs.

**Massive public education campaign**

Experiences gained in raising the awareness of the people in HIV/AIDS control will be utilized in the DHF control programme to ensure the implementation of a full-scale public campaign. The role of the private sector in the development of appropriate efforts by the mass media will be promoted.

**National DHF seminar**

The first national seminar in DHF prevention and control will be conducted in April 1999. This will be used as a platform for educating officials from other sectors to realize the importance of DHF control and to ensure their participation in the programme. It will also provide an opportunity for all stakeholders to exchange opinions and experiences in the area of DHF prevention and care.
**DHF Newsletter**

A monthly DHF Newsletter has been developed to provide all stakeholders relevant information about the progress of the programme, including the latest situation of DHF in the country.

**External review**

A team of international experts in DHF prevention and control will conduct a review of DHF control in Thailand in order to collect information, assess the situation, and recommend appropriate strategies for the prevention and control of DHF. This activity, supported by WHO, will be a good opportunity for the country to learn from and exchange experiences with international experts and to learn about its weaknesses.

**Development of technical materials**

With support from WHO, a set of materials will be produced to collect technical information in various areas. A technical forum currently conducting monthly meetings will use this information to develop materials for use in the country.

**Conclusion**

There seems to be no new interventions that are required to make the control of DHF more effective. The main strategies are: mosquito control, awareness about safety measures against DHF, and effective medical care. The main difference between the current programme and the previous one is the active involvement of other sectors, especially those working in the areas of environmental control, rural development, local administration, mass mobilization and basic education. This will ensure that the programme will be implemented by all sectors in the community to provide it the widest possible coverage.

**References**


