Evolution of Dengue Prevention and Control Programme in Indonesia

Rita Kusriastuti* and Sumengen Sutomo**

*Arbovirus Sub Directorate, Directorate of Vector Borne Disease Control, Department of Communicable Disease Control and Environmental Health, Ministry of Health, Indonesia
**Faculty of Public Health, Environmental Sub Division, University of Indonesia

Abstract

Dengue fever (DF)/dengue haemorrhagic fever (DHF) has emerged as an important public health problem in Indonesia due to the high morbidity and mortality in children. According to the Ministry of Health, DHF is ranked as number 8 among the ten most important infectious diseases in the country in terms of funding and political commitment. Currently, more than 300 districts are reporting cases and more than 200 million people living in urban and rural areas are at risk. Social and economic impacts of the disease are second only to malaria. Dengue often spreads rapidly affecting a great number of people during epidemics. Dengue is an environmental issue and many factors contribute to the occurrence of the disease. These include population growth, rural-urban migration, intra-city population movement, inadequate water and sanitation services and lifestyles that contribute to making conditions favourable for mosquito breeding, circulation of multiple DENV strains of serotypes and ineffective national control programme.

The critical strategies for prevention and control of DF/DHF include: (i) DF/DHF case and vector surveillance; (ii) disease management; and (iii) changing behaviour of communities and building partnerships in order to reduce the abundance of, or improve the management of larval habitats.

The proposed new initiatives for strengthening the DF/DHF control programme include laws and regulations related to programme implementation and environmental conditions and strengthening partnerships with the aim of decentralization of governance.

Keywords: DF/DHF, prevention and control, community, partnership, Indonesia.

Introduction

Indonesia is an archipelago located at 95° to 141° east longitude and 6° north to 11° south latitude and consisting of more than 17 000 islands of various sizes, of which 6000 are inhabited. Administratively, the country is divided into 27 provinces and 304 districts (regencies). Being located at the equator, all areas have a tropical climate[1].

DHF is endemic throughout the country and is currently endemic in more than 300 regencies[2]. Aedes aegypti is the principal vector species and breeds extensively in all the islands. A mosquito larval survey carried out between 1992-96 showed an average house index (HI) of 20% in seven cities[2]. All the four serotypes (DENV-1 to 4) are endemic in most of the large cities of the country. The prominent virus serotype varies from year to year. However,
DENV-3 has most frequently been associated with large outbreaks\(^2\).

**DF/DHF Disease Burden**

The DHF incidence in Indonesia in recent years has increased significantly from 9.45 per 100,000 population in 1992 to 30.40 per 100,000 population in 2004 (Table). DF/DHF has affected not only children but also older people both in urban and rural areas. The occurrence of DF/DHF is no longer seasonal but is reported all the year round. Epidemics occur frequently and the latest large epidemics were reported in 1998 and 2004 (January to May). In 1998, the total number of cases for the year was 72,133 with 1,414 deaths (case-fatality rate (CFR) = 1.96%), while in the 2004 outbreak, the total number of cases was 74,811 with 868 deaths (CFR 1.2%), covering 315 districts in 30 provinces.

In Indonesia dengue is predominantly endemic in urban areas where more than 35% of the country’s population (210 million) lives. Rapid industrial and economic development over the past two decades has brought about massive infrastructural development, both in housing and commercial sectors. Large-scale rural-urban migration has created slum settlements where inadequate water and sanitation facilities and poor solid-waste management have resulted in the creation of breeding sites for *Aedes aegypti*. Tropical rainfall provides additional *Aedes* breeding sites and favourable temperature and humidity results in the rise of dengue transmission. These and other factors, like globalization, high connectivity and speed, have facilitated

**Table. Number of reported cases, deaths, incidence rates and affected areas under DHF in Indonesia, 1992–2004**

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of cases</th>
<th>No. of deaths</th>
<th>Incidence rate (IR) per 10,000</th>
<th>CFR (%)</th>
<th>Provinces affected</th>
<th>Districts affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>17,620</td>
<td>509</td>
<td>9.45</td>
<td>2.90</td>
<td>24</td>
<td>187</td>
</tr>
<tr>
<td>1993</td>
<td>17,418</td>
<td>418</td>
<td>9.17</td>
<td>2.40</td>
<td>25</td>
<td>198</td>
</tr>
<tr>
<td>1994</td>
<td>18,783</td>
<td>471</td>
<td>9.72</td>
<td>2.51</td>
<td>27</td>
<td>217</td>
</tr>
<tr>
<td>1995</td>
<td>35,102</td>
<td>885</td>
<td>18.50</td>
<td>2.52</td>
<td>26</td>
<td>227</td>
</tr>
<tr>
<td>1996</td>
<td>45,548</td>
<td>1234</td>
<td>23.22</td>
<td>2.71</td>
<td>26</td>
<td>222</td>
</tr>
<tr>
<td>1997</td>
<td>31,784</td>
<td>705</td>
<td>15.28</td>
<td>2.22</td>
<td>27</td>
<td>240</td>
</tr>
<tr>
<td>1998</td>
<td>72,133</td>
<td>1,414</td>
<td>35.19</td>
<td>1.96</td>
<td>27</td>
<td>288</td>
</tr>
<tr>
<td>1999</td>
<td>21,134</td>
<td>422</td>
<td>10.17</td>
<td>2.00</td>
<td>26</td>
<td>223</td>
</tr>
<tr>
<td>2000</td>
<td>33,443</td>
<td>472</td>
<td>15.99</td>
<td>1.41</td>
<td>25</td>
<td>231</td>
</tr>
<tr>
<td>2001</td>
<td>45,904</td>
<td>497</td>
<td>21.66</td>
<td>1.08</td>
<td>30</td>
<td>265</td>
</tr>
<tr>
<td>2002</td>
<td>40,377</td>
<td>533</td>
<td>19.24</td>
<td>1.32</td>
<td>29</td>
<td>264</td>
</tr>
<tr>
<td>2003</td>
<td>51,924</td>
<td>792</td>
<td>24.06</td>
<td>1.53</td>
<td>29</td>
<td>257</td>
</tr>
<tr>
<td>2004</td>
<td>74,811</td>
<td>868</td>
<td>34.40</td>
<td>1.16</td>
<td>30</td>
<td>315</td>
</tr>
</tbody>
</table>
Evolution of Dengue Prevention and Control Programme in Indonesia

Social and economic impact

The social and economic impact of DF/DHF on the community is visible. The social impact includes instability of family life due to risk of acquiring disease infection, loss of lives, reduction of life expectancy and absenteeism at school. The direct economic impact on the family includes medical and non-medical costs for treating the disease. The indirect costs include considerable expenses for the family towards hospitalization and care of the patient in addition to travel costs, considerable expenses on the part of local municipalities and government departments for mosquito control and disruption of health care services and economies, including loss of tourism revenue. During economic crisis, it is becoming a heavy burden both for the health service provider and the and the communities at large.

History of dengue prevention and control

The Government of Indonesia, through the Ministry of Health, the Directorate General for Communicable Diseases Control and Environmental Health, is responsible for the DF/DHF prevention and control programme and has carried out control activities since 1968. The objectives of the national prevention and control programme for DF/DHF are to prevent and reduce morbidity and mortality due to DHF at family and community levels.

In the 1970s, the vector control strategy followed the “fire-fighting” tactics. This included: (i) peri-focal space spraying of houses within 100 metres radius of a reported DHF case; (ii) health education in a limited area; and (iii) case management. These measures were further strengthened on the basis of experiences gained and availability of resources. In 1980, in addition to peri-focal spraying, mass larviciding with temephos 1% sand granules (SG) at a dosage of 1 ppm was carried out once a year on total coverage basis before the onset of the transmission season[3]. The measures resulted in a substantial reduction in entomological indices. Between 1986 and 1999 due to resource crunch, mass larviciding was modified to selective larviciding in towns and cities reporting DHF during the last three consecutive years. The frequency was increased to four applications per year[1].

However, during 1990–91, selective larviciding was enforced with two cycles of fogging (weekly interval) in villages (desas) with high prevalence of DHF[1].

Source reduction by community participation

In 1992, considering the constraints of coverage of mass/selective larviciding (limited to 30% to 40% of endemic areas), organized community efforts were conducted at village level through the DHF Working Group. This group included one member from the PKK (Women Empowerment Welfare Group). This programme called Bulan Gerakan “3M” has three components: (i) Health education using mass media, women’s groups and schoolchildren; (ii) Door-to-door visits by PKK volunteers for implementing the “3M” programme, i.e. (a) covering water containers (Menutup); (b) cleaning water containers (Menguras), and (c) burying discarded containers (Mengubur); and (iii) source reduction using community participation and intersectoral coordination[4].

The capacity-building strategy includes provision of training at all levels through regular training courses, workshops and seminars.
Training in clinical diagnosis has been provided to many doctors and nurses from health facilities such as hospitals and health centres. Sentinel DF/DHF laboratories have been developed for surveillance of the disease.

In 1992, the Ministry of Health issued a law, No. 581, concerning the National DF/DHF Prevention and Control Programme, followed by a series of legislations concerning the implementation of the control programme. These included the commitment and participation of other sectors in the DF/DHF control programme, viz. Ministry of Home Affairs, Ministry of Education, Women Empowerment Welfare Group (PKK) and development organizations called the DF/DHF Working Group set up from the central down to the village level. As of 2000, the strategy of DF/DHF control programme has been focused on community participation in source reduction of breeding places through 3M, with three larval indices as indicators and community participation of >95%.

**Strategy Directions for Prevention and Control of DF/DHF**

The critical strategies for the prevention and control of DF/DHF include: (i) surveillance system for planning and response; (ii) disease management; and (iii) changing behaviour and building partnership. Surveillance of DF/DHF covers both case and vector surveillance.

**Surveillance system**

The purpose of case surveillance is to monitor endemic transmission and for early recognition of impending epidemics. Case surveillance comprises of both passive and active surveillance. Passive surveillance requires case reports from every clinic, private physician, health centre or hospital that provides medical care to the population at risk. However, the passive surveillance system is not sensitive as cases are not laboratory-confirmed. However, it is useful in monitoring trends in dengue transmission in community. The active lab-based surveillance system provides information on the actual dengue transmission in a community and the virus serotypes which are circulating. This system is able to provide an early warning or predictive capability for epidemic transmission for taking action to prevent the spread of the disease. The national reference laboratory and provincial health laboratories have the capacity for the development of a laboratory-based active surveillance system. However, this system has not become fully operational for lack of funds.

**Vector surveillance system**

Surveillance of Ae. aegypti is important to determine the distribution, vector density, major larval habitats, spatial and temporal risk factors related to dengue transmission and levels of insecticide susceptibility. Health centres regularly conduct larval surveys every three months and have developed maps. Several ad hoc surveys have also been conducted in some cities.

**Disease management**

Effective case management of DF/DHF requires well-trained physicians and nurses, reliable laboratory facilities, functioning pharmacies and adequate availability of blood products systems. Early diagnosis of the disease and early admission of patients with or at risk of serious disease to hospital are therefore crucial in order to reduce the case-fatality rate. The CFR for DHF varied from place to place and ranged from 2.5% in Yogyakarta to 4% in Jakarta. The CFR for DSS, however, remains high, ranging from 19.7% to 70%.
Changing behaviour and building capacity

Behavioural change interventions are important to the dengue prevention and control programme as an approach to the delivery of community-based vector control and for ensuring the appropriate and early contact of patients with the health services. The five steps of behavioural change are: (i) situation analysis; (ii) identification of behaviours; (iii) social mobilization and communication; (iv) empowerment of the community; and (v) partnerships. The situation analysis is to identify the current dengue programme through a strength, weakness, opportunity and threat (SWOT) analysis. The stakeholder analysis is to identify all groups and partners that should have a role in the dengue programme. The first step is to identify the behaviour to be changed and the level of intervention. These levels of change include level of individual, household, community, institution, policy-maker and the private sector. When these levels have been identified, specific intervention can be prescribed according to need and demand. Social mobilization should be an integral part of dengue prevention and control programme involving all stakeholders and experts so as to develop effective IEC interventions. Building partnerships is fundamental to efficient and sustained dengue control. In Indonesia, partnerships among various government departments, the private sector and DF/DHF organizations have been developed (e.g. DHF Working Group).

The strategy that is adapted to local situations is evidence-based. It is initially implemented in selected districts and can be improved and expanded nationwide based on the lessons learnt. In addition, DF/DHF is not only becoming a health sector development problem but also a socioeconomic development issue. Therefore, it shall be an integral part of socioeconomic development in the country. The guiding principles of prevention and control of DF/DHF include application of the “bottom-up” approach for mobilizing community participation and resources based on sufficient laws and regulations in environmental sanitation and vector control, provision of general control guidelines and capacity building in line with the decentralization policy.

Mission

The mission of the programme for the prevention and control of DF/DHF is mainly to reduce the high morbidity and mortality in the endemic urban areas. This includes reduction of the incidence, outbreaks, risks and deaths due to DF/DHF in endemic areas. Moreover, the aim is to increase the capability of people in mobilizing their own resources to prevent and control DF/DHF. Since there are too many islands and limited resources, the programme will focus mainly on the endemic urban areas.

The target groups of the programme include individuals, families and the community at large who are living in urban endemic areas to involve them in source reduction practices. Each individual and family should not only be aware of the importance of source reduction but should also keep the environment clean. It is expected that their housing environment, both indoors and outdoors, will be free of larval *Ae. aegypti* breeding habitats.

The programme provides primary health care services, community health education and vector control. The purposes of the primary health care services are to increase access, quality, equity and use of existing health service facilities such as general hospitals, health centres and sub-health centres. Access is defined that every case of DF/DHF shall receive better quality services in clinical diagnosis, treatment and inpatient care at all health care facilities, i.e. hospitals, health centres and sub-health centres.
The programme will increase the professional capability of clinical and non-clinical health care providers through training, research and development. In addition, capacity building is provided to increase the knowledge and skills of physicians and nurses in clinical diagnosis, nurses’ inpatient care and laboratory technicians laboratory skills.

IEC activities are provided to intensify the campaign of 3M on the pattern of “together picket” COMBI experiment in Purwokerto city (Central Java) to reduce larval breeding habitats in community housing and public places in urban areas through advocacy, seminars, workshops, awareness campaigns and training of cadres. The programme will support community self-reliance to be free of diseases, especially DF/DHF.

**Action Required**

The Ministry of Health (MoH) develops and issues guidelines for health care providers, policy-makers, community leaders, cadres and community for the prevention and control of DF/DHF. However, there is no regulation to enforce their strict implementation by health care providers at all levels. Additional laws and regulations need to be developed to ensure effectiveness and efficiency of the control programme. In developing new laws and regulations, the MoH will take into consideration legal provisions as applicable in other sectors which support programme implementation, especially environmental laws. Many strategies of source reduction can be integrated into that programme. The Ministry of Environment and the Ministry of Public Works can carry forward programme objectives by improving environmental conditions such as housing, water supply and solid-waste disposal.

Partnership should become the policy at all levels of the DF/DHF control programme, including the central, provincial and district levels. The programme should be based on “bottom-up” approach in line with the decentralization policy. Partnership between the government, the private sector and civil society organizations is important to guarantee the success of the programme. Efforts to control DF/DHF cannot be carried out only by the health sector. It needs the support of other sectors such as education, public works, tourism, industry, private sector, NGOs, etc., so that the identification of stakeholders as partners or active implementers is done as the first step in collaboration. Partnership networking is being done through regular meetings to share all resources among each partner member.

In the decentralization policy, delegation of authority from the central to province and district programme management level has already been completed, but its functioning is yet to be established. The central level acts as a consultant or provides technical guidance. The DHF programme manager and staff must be able to understand all aspects related to dengue prevention and control such as vector biology, virology, case management, epidemiology, factors related to climate change, social behaviour as well as programme activities and basics of programme planning.

Development of a healthy physical environment is necessary to control dengue transmission. Good quality of healthy environment can reduce the incidence of DHF through elimination of breeding sites. Orientation, advocacy and other health education campaigns to related sectors need to be conducted regularly and aggressively. Although these policies have been built up at the level of decision-makers, they have not yet percolated to the ground level. There is a need to make them operational at the field level.
References


