Dengue and Dengue Haemorrhagic Fever and its Control in Maldives

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Abstract
Maldives recorded DHF for the first time in 1979, and again in 1983. The first serious outbreak occurred in 1988. During this epidemic 2054 cases with all types of manifestations, viz. DF, DHF and DSS, were registered and nine children <10 years of age died. The 1998 and 1999 outbreaks occurred after a gap of 10 years with 1750 and 1835 cases, respectively. For the first time, using the PanBio diagnostic kits, 81 DF and 15 DHF cases and 59 DF and 38 DHF cases were detected during 1998 and 1999, respectively. One child died in May 1999. The outbreak was controlled by a three-pronged attack in an integrated approach, using space spray, larvicidal application with temephos and community participation with the active involvement of schoolchildren, which was coordinated by the Ministry of Health. No cases were recorded in the port/airport areas because of an effective vector control programme.

Key words: DF/DHF, Aedes aegypti, Community participation, Maldives

Introduction
Maldives is an archipelago in the Indian ocean with a population of about 250,000 people spread over 1190 small coral islands varying in size from 0.25 sq km to 10 sq km. These islands are located about 200 km south-west of India. Most of the islands are at low level elevation from the sea line ranging from 1-5 metres and are devoid of any stream or river. Only 202 islands are inhabited and the source of fresh water supply is from underground aquifor and rain water collections.

Emergence of DF/DHF in Maldives
Till mid 1970s, the DHF epidemic was localized in several south-east Asian
countries. Thereafter there was a dramatic expansion westwards, and by 1980, DHF had taken India, Sri Lanka and Maldives into its orbit.

**DHF outbreak, 1998 and 1999**

Maldives recorded its first outbreak of DF/DHF in 1979 and one thereafter in 1983. The 1988 outbreak was the worst so far when 2054 cases were registered and 9 children (below the age of 10 years) died. All the three types of dengue, i.e. DF, DHF and DSS, were reported. After a gap of 10 years, another outbreak occurred in 1998 when a total of 1750 cases were reported with no death. For the first time, using a series of diagnostic kits from PanBio Pty. Ltd., Australia, the Indira Gandhi Memorial Hospital (IGMH) in Malé, confirmed 81 DF and 15 DHF cases. In 1999, as of September, there were 59 DF and 38 DHF cases, with 1 death. The majority of the cases (78/97=80.4%) occurred during March-June 1999 just before and during the north-west monsoon period (Table 1). In 1999 (up to end of March), out of the 52 DF and 26 DHF cases reported from IGMH, the majority of the cases (34/52=65.4%) and (23/26=88.5%) occurred, respectively, in children less than 10 years of age. It is surprising that for both the DF and DHF infections in Maldivian children, males suffered 2.7 times and 2.3 times more than females respectively and there is no significant difference in the proportion of infected males suffering from DF and DHF infections (\(x^2=0.13, p=0.72\)). DEN-1 and DEN-2 were identified to circulate in the country.

### Table 1. DF and DHF cases during 1998 and 1999 in Malé town in Maldives

<table>
<thead>
<tr>
<th>Month</th>
<th>1998 DF</th>
<th>1998 DHF</th>
<th>1999 DF</th>
<th>1999 DHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>February</td>
<td>0</td>
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<td>2</td>
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<tr>
<td>March</td>
<td>0</td>
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<td>April</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>4</td>
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<tr>
<td>May</td>
<td>33</td>
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<td>13</td>
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<tr>
<td>June</td>
<td>29</td>
<td>7</td>
<td>11</td>
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</tr>
<tr>
<td>July</td>
<td>9</td>
<td>4</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>August</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>September</td>
<td>2</td>
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<td>0</td>
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</tr>
<tr>
<td>October</td>
<td>1</td>
<td>0</td>
<td>58</td>
<td>39</td>
</tr>
<tr>
<td>November</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>December</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>15</td>
<td>117</td>
<td>78</td>
</tr>
</tbody>
</table>

### Vectors

Both Aedes aegypti and Aedes albopictus have been recorded in Maldives. Practically, all the islands have recorded the presence of both the species. However, Aedes aegypti is confined to domestic environment, while Aedes albopictus is most prevalent in peripheral areas, breeding quite frequently in tree holes.

In a study undertaken in Malé town and other atolls during September 1999, it was brought out that the number of positive containers in key premises ranged from 3 to 8 positives containers while the number of larvae in key containers ranged from approximately 500 to 10,000. The key containers detected were rainwater tanks, cemented construction areas and agricultural
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pits. The high-risk areas included schools, mosques and residential areas occupied by expatriates.

Control of outbreak
Maldives does not have a regular dengue control programme. In the event of an outbreak vector control activities are undertaken by malaria and other vector-borne disease control project (Mal & VBDC). For the control of the outbreak in 1998-99, three campaigns of two-week duration each were undertaken during May 1998, December 1998 and May 1999. The control activities included: space spraying using malathion 95% technical premium grade ULV formulation at a dose of 10 litres per 0.25 km of space. This was effected by motorized knapsack sprayers filled with a special nozzle for ULV spraying.

Larviciding with temephos 500 EC
Environmental sanitation and source reduction through community participation with active coordination between the Ministry of Health and Ministry of Education. Large numbers of schoolchildren took part in this activity.

Personal protection. People were encouraged to use all types of repellents (mats, coils, mosquito creams) to prevent mosquito bites.

Vector control at port/airport
Vector surveillance and control activities at the port/airport areas were undertaken regularly by the staff of Malaria Control Programme conforming to international health regulations to keep these areas free of mosquito vector breeding. These activities included source reduction, larviciding with temephos and space spraying of passenger areas and fumigation of storage godowns.

Capacity-building
To improve the skills of staff and give them hands-on experience, two workshops (in May and September 1999) of 3-day duration each on entomological techniques and vector control practices were organized at Malé. Participants were drawn from VBDC, and airport/seaport organizations. Emphasis was laid on the identification of breeding habitats of vectors of malaria, filariasis and dengue and elimination of the same through source reduction and chemical methods under field conditions.

Intersectoral coordination
To promote intersectoral coordination and community participation, a 3-day workshop was organized in September 1999 at Laamu Atoll. Forty participants comprised of family health workers, teachers and island women development committees participated in the workshop. They were familiarized with mosquito surveillance techniques and their control through source reduction and use of fish in a partnership approach.

References

