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Dengue fever in the Solomon Islands

Introduction

Until recently, dengue fever has not been taken seriously in the Solomon Islands. A cabinet paper on vector-borne disease policy, which includes dengue fever and malaria, was passed by the government only in March 2001. A retrospective study and literature search by Andrew Darcy et al.[1] showed circulation of dengue fever in the country every 10 years. As this year is about 10 years after the last outbreak, it should be expected that another outbreak is possible. Unfortunately, due to the effects of the civil unrest and government's inability to fund health activities there is very little surveillance or preparedness in place. This is despite neighbouring countries reporting outbreaks of dengue fever in 2001.

Alert notice

The dengue alert was actually posted to the National EpiNet team via PacNet-restricted on 7 February 2002, following a case of dengue fever imported from the Solomon Islands to New Caledonia. On receiving the alert, the national EpiNet laboratory team member set up an active sero-conversion surveillance on the negative-malaria fevers at the Medical Laboratory and the Solomon Islands Malaria Training and Research Institute (SIMTRI). In a total of 10 patients tested for dengue antibodies using Panbio rapid IgG/IgM duo, three were reactive. One of the three had been a clinical finding by a clinician who was not aware of the dengue alert.

Confirmation

Nine specimens from the original 10 were then sent to the Arbovirus Reference Laboratory at Queensland Health & Scientific Services. The results are shown in the table below.

	IgM/IgG antibody negative	IgM/IgG antibody positive	**Total**
PCR positive	3	0	**3**
PCR negative	1	5	**6**
Total	**4**	**5**	**9**

Antigen positive rate	3/9	(33%)
Antibody positive rate	5/9	(55%)
Total positive rate	8/9	(88%)

[1] Darcy A. et al. 1992/93. Report of dengue tests on samples of blood collected for Hep. B test. (Solomon Islands.)

From the confirmation results it was concluded that about 90% of the fever cases negative for malaria are caused by dengue fever. Two of the three PCR positive specimens were positive for culture, and this was identified as dengue 1. The initial PCR from the alert, as well as the sample group, also showed DEN-1.

Spread

Dengue fever was also suspected and confirmed in the western Solomon Islands region. Gizo (capital of Western Province) hospital reported a clinical case and this was confirmed both by the rapid kit as well as by the Flavivirus IgM at the reference laboratory. Investigation in the neighbouring Hellena Goldie Hospital (in Munda, New Georgia, Western Province) showed some dengue activity. The results were:

Total tested	7
Panbio rapid IgG/IgM positive	2
Confirmation Flavivirus EIA positive	3

Thus there was 42% dengue infection in patients sampled from the Munda/Noro area. There is no surveillance done in any province other than the Western Province. The Central laboratory does not have any resource to do the surveillance and thus the extent of the spread could not be established at this stage.

Laboratory data

The Medical Laboratory started receiving specimens for dengue antibodies testing on 10 February 2002. The guide for selection of patients was quickly drawn up, but training was too short to get it implemented properly. Three sentinel sites were established, but due to severe shortage of syringes these sites could not collect blood for testing. This really affected the monitoring of the outbreak.

Figure 1: Wards requesting dengue testing

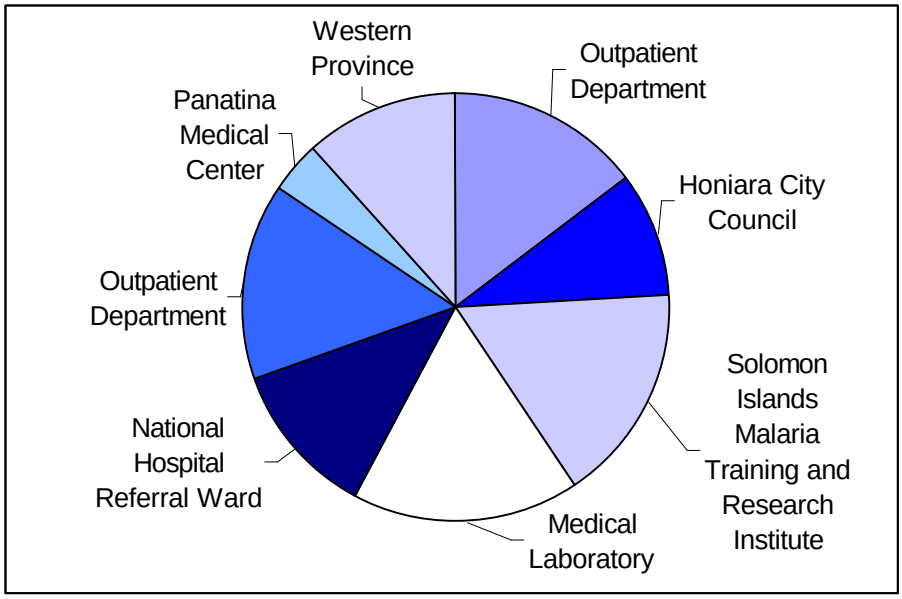
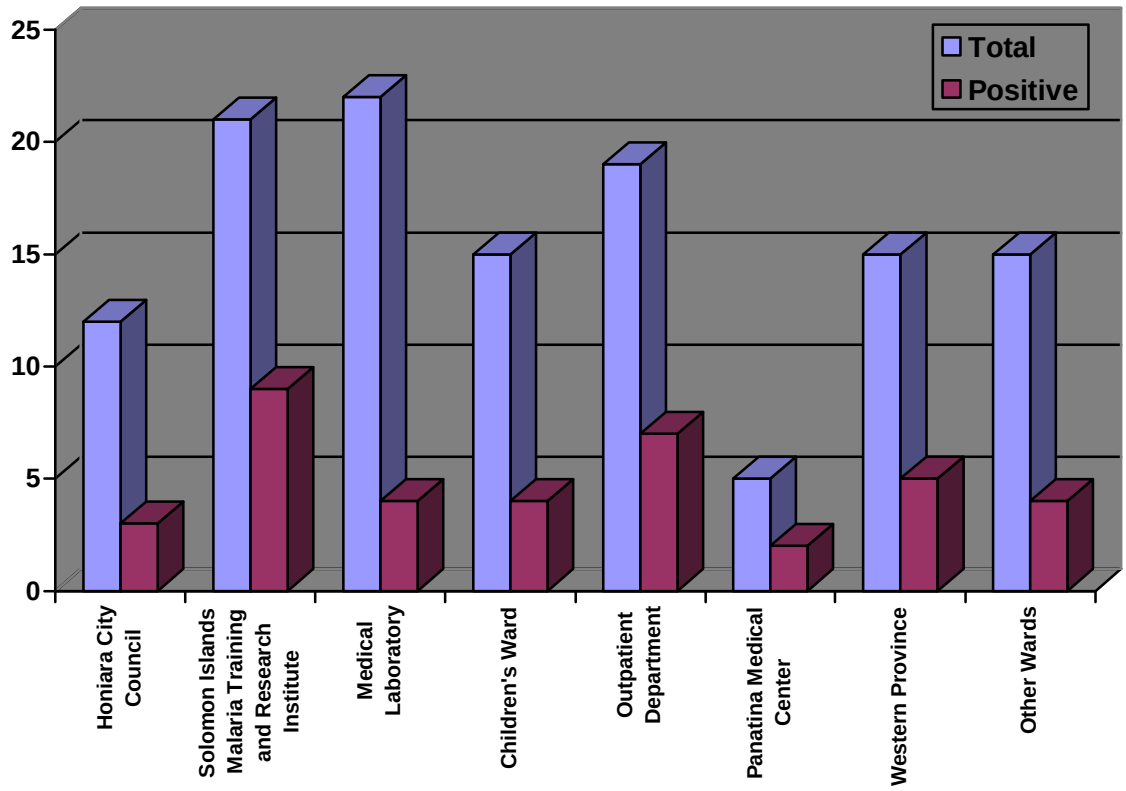


Figure 2: Number of specimens received with results



Response

The first dengue meeting was held on 18 February 2002, followed by a dengue working committee a day later. The committees accepted the provisional results and activated a dengue plan of action as a response. The activities involved in the response action include:

- Clinical awareness and training for the nurses on diagnosis and treatment of dengue fever
- Prevention and control measures for vector-borne disease personnel
- Increase in all health education activities with increased concentration on dengue fever.
- Involving the community in the control programmes.

Mosquito identification

A survey was conducted to identify the species of mosquito responsible for the dengue outbreak. Larvae collected were brought into the laboratory and reared to adult mosquitoes. The mosquitoes were killed by putting them into a deep freezer for

five minutes. The mosquitoes were then mounted and identified. The *Aedes* key developed by Harry Steadfast in SIMTRI in 1997 was followed.

Mosquito species by locality

Locality	*Aedes aegypti*	*Aedes albopictus*	Others
Naha	0	11	17
Mbua Valley	0	9	0
White River 1	0	21	0
White River 2	0	19	0
Rove	0	5	13
Bishop Epale	0	1	3
Rove Barracks	0	0	9
Rifle Range	0	5	6
Independent Valley	0	16	13
Lengakiki	0	27	0

The table shows the absence of *Aedes aegypt;,* only *Aedes albopictus* has been identified. The mosquito species in the column 'Others' were mostly *culex,* but no further identification was done. The survey confirmed a previous survey by Thornly et al. in 1997. The implication therefore is that, because *Aedes aegypti* is absent, one can conclude that the possible transmitter of dengue in Solomon Islands recently is *Aedes albopictus*. This mosquito species is commonly referred to as a secondary vector, but it has been here in large numbers and is capable of causing the minor dengue outbreak.

Outcome

Since malaria is endemic and the clinical presentation of dengue and malaria are very similar, it is impossible to rely on nurses' reports on dengue as the diagnosis. This has created a huge problem for the monitoring team. Thus certain indicators were used to determine the effectiveness of the control measures.

The dengue plan of action was implemented in February 2002 following the increased incidence of fever reported, as shown in the following diagram. The subsequent fall in reports of fever shows up clearly in the diagram.

Figure 3: Fever data

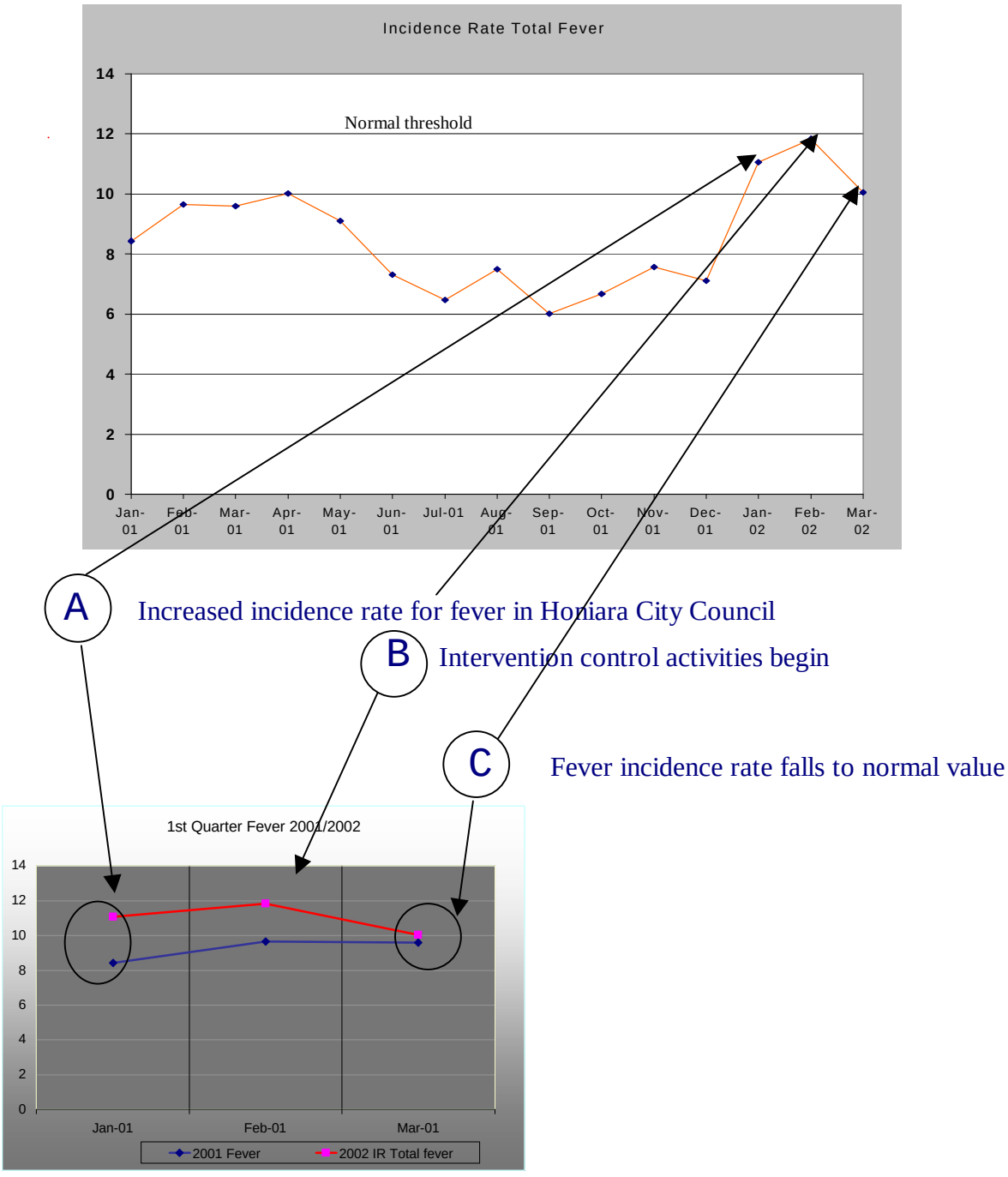


Figure 4: Malaria data

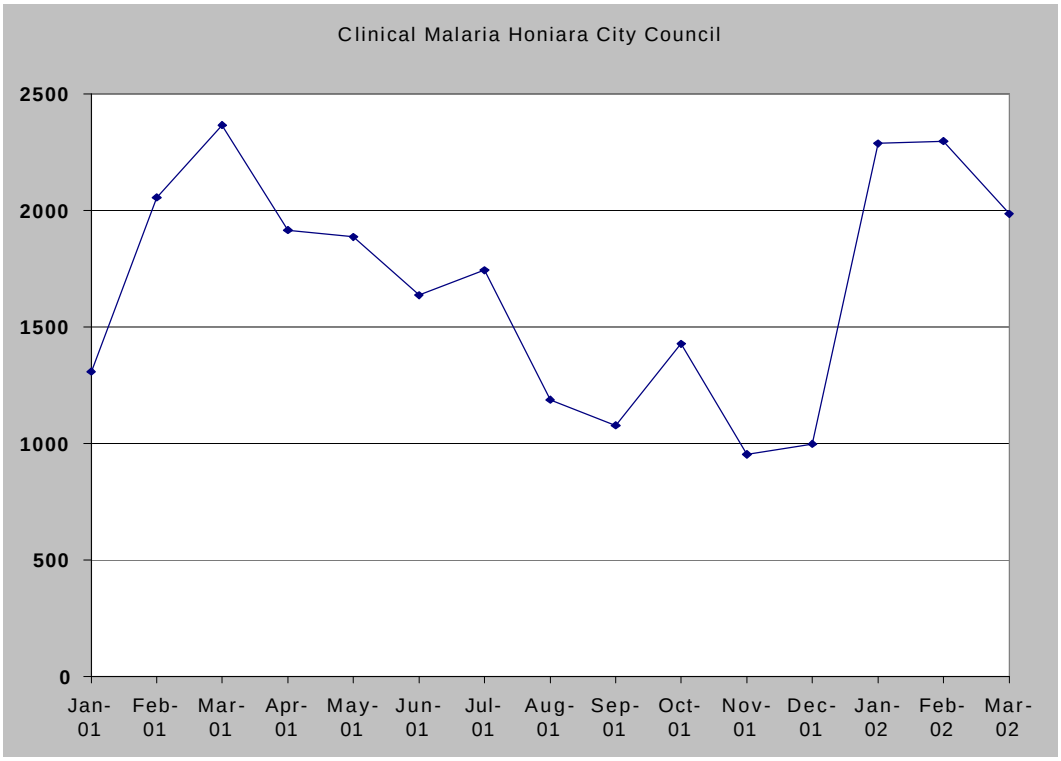


Figure 4 reveals that the clinical malaria data showed an increase in January but levelled out in February, which can be attributed to the publication of information about the dengue fever outbreak. This was also followed by a reduction in March 2002.

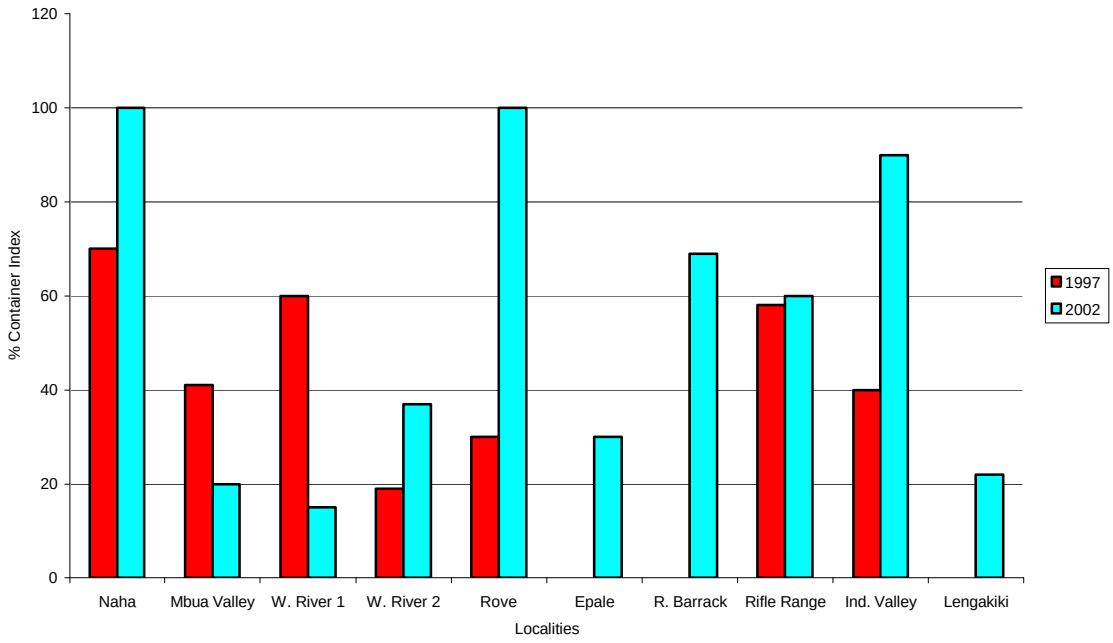
Entomological surveys

An entomological survey conducted after the control interventions showed only the number of containers being reduced. In 1997, breeding sources include tyres, drums, tins, coconut shells and others such as tree holes and banana leaf axils. An increase in vehicle repair workshops has resulted in more harbours which provide an excellent breeding source for *Aedes* mosquito. In addition, the lack of dependable water supply has encouraged the use of an array of makeshift household water storage containers such as drums in Honiara. This resulted in the higher container index in 2002. However, the high container index (53.6%) did not correlate with the low Breteau index (18% — below the WHO standard threshold of 20%). The explanation could be that there is an increase in truck tyres and drums but not containers in individual residential houses (see table below).

	1997 (%)	2002 after intervention (%)
Breteau index	29.2	18.0
Container index	27.0	53.6

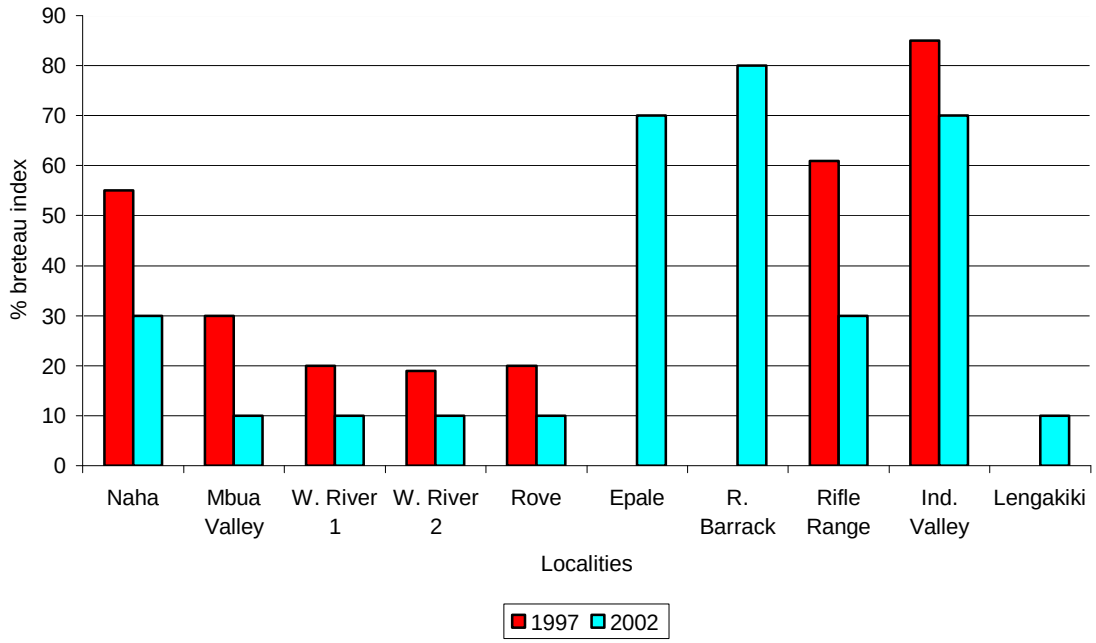
Figure 5 shows details of container index by locality. In 2002, all localities had an index of more than 5% (WHO standard threshold), indicating sensitivity to dengue transmission. In 1997, some of the localities registered 0%. Due to the fact that breeding sources are tyres and drums from vehicle repair workshops and some residual houses, the two-day clean-up campaign conducted was not enough, and it may be that workshop owners did not participate in the clean-up campaign.

Figure 5: Comparison of container index (1997 vs 2002)



The average Breteau index (Figure 6) indicated that Honiara is not very sensitive to dengue transmission. Although contrary to what is indicated by the high container index, this may be due to fact that the majority of residential homes are free of containers. The container index increase is due to the increase in the number of workshops that harbour tyres and unused trucks and other water collecting rubbish within their vicinity.

Figure 6: Comparison of Breteau index (1997 vs 2002)



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