

## Dengue Fever in Fiji

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### *Background:*

Fiji Archipelago comprises of about 300 islands of which 105 is inhabited and lies between latitudes 15 and 20 South and on longitudes 175 East and 177 degrees west. Its capital city, Suva, is located in the Central Division 3,167 nautical miles from Sydney and 1,164 nautical miles to the north of Auckland, New Zealand. The dry months are from May to October while the wet months are from November to April. The mean daily rainfall for January ranges from 280 millimeters on the dry side of the main island (Viti Levu) to 310 millimeters on the wet side; while the daily average for July ranges from 50 on the dry side to 160 on the wet side. It is unfortunate however that Fiji lies within the hurricane belt and is therefore subjected to disastrous tropical cyclones almost yearly. The estimated 1986 population was 715,375 reflecting an 8% increase in last 5 years. The racial breakdown of the population: Indians 48.7%, Fijians 46% and Others 5.3%.

*Key words:* Dengue fever, Fiji

### *Introduction:*

Dengue epidemics had occurred periodically in Fiji since 1885, 1930, 1944, 1971. The more serious form of the disease, dengue haemorrhagic fever (DHF), first appeared in the country in 1975 with subsequent outbreaks in 1979-1980 and 1989-90 (Table 1).

**Table 1.** Dengue in Fiji, 1885-1990

Year	Serotype	No. Cases	DHF	Deaths
1885	?	thousands	?	?
1930	?	thousands	?	?
1943-44	1	thousands	?	?
1971-72	2	4,000	None	None
1974-75	1	20,000	Yes	12
1980	?	127**	?	
1881	4*	hundreds(18+)	Yes	1
1882	2	546+	?	
1883	?	237+	?	
1889-90	1	3,686	Yes	30

Source: Personal communication, Dr. J. Mataika, Welcome Virus Laboratory, 1992

\* Serologic evidence

\*\* Reports compiled by South Pacific Commission, as reported by Fiji. (Source: WHO Report ICP/001, Preparedness against outbreaks of arbovirus disease in the Pacific, 1984.)

In the last epidemic (1989–90) more than 3,600 confirmed cases were reported with 30 reported death due to DHF.

An unrelated mosquito-borne virus, Ross River Fever, caused an explosive outbreak of epidemic polyarthritis in 1979. Both this epidemic and the 1989–90 dengue epidemic caused widespread human suffering throughout the three major islands, in rural as well as urban areas.

*Vector Bionomics (Ref. Table 2)*

The second most important dengue vector, *Ae. albopictus*, was discovered in Fiji in October 1988. It was evident in this year that it was already well distributed and established in at least the two main islands. This suggests that local surveillance and quarantine procedures had broken down earlier.

Fiji is now the only country with four known dengue vectors (or possibly even more if

**Table. 2** Absolute numbers of immature *Aedes (Stegomyia)* mosquitoes collected per container type

Study area Container Category	Viti Levu		Vanua Levu			Taveuni
	Suve	Nagall	Labasa	Savusavu	Rural	
Water Storage						
Drums						
200 liter	1,598(9)*	533(3)	437(3)	978(4)	6(1)	72(2)
20 liter	36(1)					
Rubbish						
Tires	3,362(19)	177(1)	3,301(29)	1,642(8)	1,587(5)	598(6)
Botiles/tins	143(3)		1(1)		84(5)	139(4)
Coconut Shells					14(1)	
Disused household/ industrial						
Sinks, buckets	624(4)			23(1)		278(2)
Iron parts	156(1)		1(1)			
Garden Receptacles						
Flower pots	17(1)		9(1)		160(1)	189(2)
Ornamental vases						108(2)
Natural						
Tree holes	64(3)				2(1)	27(1)
Recreational						
Total	6,000(41)	710(4)	3,749(35)	2,643(13)	1,853(14)	1,411(19)

\*The number of positive containers sampled is shown in parenthesis.

*Ae. rotumae* and *Ae. horrescens* are proven). The known vectors are *Ae. aegypti*, *Ae. albopictus*, *Ae. polynesiensis*, and *Ae. pseudoscutellaris*.

As these species often share or compete for the same breeding sites, it is not possible at the moment to accurately predict future prevalence and, therefore the new degrees of risk for various localities. There is some evidence that *Ae. albopictus* may be displacing *Ae. pseudoscutellaris*.

Tyres are a particularly important source of mosquito breeding in towns with industrial complexes. This finding is not irrelevant to villages and settlements.

#### *The 1989–90 Dengue Epidemic (Table 3)*

From September 1989 to December 1990, 199 children with dengue were admitted to the CWM Hospital (Suva). Cases occurred in all months except July and August 1990. The peak of (hospitalizations in) in epidemic was in February and March when 189 (55%) of the cases were hospitalized.

In contrast, national surveillance statistics show the peak of the epidemic in October and November 1989 (Table 3).

**Table 3.** Dengue cases by month of report 1989–1990, Fiji

Year	Month	Number of cases
1989	September	61
	October	808
	November	861
	December	495
1990	January	591
	February	283
	March	413
	April	93
	May	50
	June	18
	July	13
Total		3,686

Source: National surveillance statistics

National surveillance data show that 64 percent of all cases were Fijian and 31 percent were Indian, while hospitalized pediatric cases were 55 percent Indian and 41 percent Fijian. Most of the hospitalized pediatric cases (87 percent) were 5 years of age or older.

The 199 pediatric cases spent 558 days in hospital for an average of 2.8 days. Sixteen percent of patients stayed five days or more.

Twenty–nine percent of patients with dengue came into the hospital more than five days after the onset of illness. This is important to note because delays in seeking medical attention has been shown in other countries to lead to higher rates of mortality.

Six deaths occurred among the CWM pediatric patients, for a case fatality rate of 3 per-

cent. According to the manuscript, only one of these cases was confirmed in the laboratory. A mortality rate of 3 percent is reasonable, but experience in Thailand indicates that hospitalized case mortality can be reduced even further when community awareness is high and with careful clinical monitoring and aggressive fluid therapy.

Most patients had common manifestations such as fever, headache and body ache. Among the CWM pediatric patients, 54 percent had haemorrhagic manifestations, 21 percent had rashes, 5 percent had convulsions, 5 percent had hepatomegaly and 2 percent had comas. The rate of hepatomegaly is lower than that reported in Thailand. The number of patients with shock is not detailed by Dr. Adiao, but Dr. Fagbami's paper indicates that 17 percent of the CWM pediatric hospitalizations had shock.

Seventy percent of patients had platelet counts less than 200,000. The number of patients with platelet counts less than 100,000 (one of the laboratory criteria for meeting the WHO case definition, along with hemoconcentration) was not mentioned in the reports. As has been seen in other countries, a low platelet count was not present in all cases with bleeding and not all patients with low platelet counts bled. No data on hematocrits or the proportion of patients with hemoconcentration are given.

The charts of the six fatal cases at the CWM children's ward showed that the ages of the pediatric patients were 4 months, 5 months, 5 years (two children), 8 years and 12 years. Three were Fijian, two were Indian and the race of one was unclear from the chart. All had significant bleeding, most with coffee ground emesis. At least three cases had shock and three had documented platelet counts of less than 100,000. Of interest is the fact that one patient was diagnosed as having dengue encephalopathy and three others suffered seizures during their hospital course. Hemoconcentration was not documented in any patient. Two patients had hemoglobins of 7.5 or less.

Dr Fagbami's paper indicated that 30 deaths occurred among the 3,686 cases reported (case fatality 0.8 percent) in all age groups. One hundred seventy adult patients were hospitalized during 1989, 22 percent of whom had haemorrhagic manifestations. Of 12 fatal cases for whom details are available, nine were children 15 years of age or younger and three were adults. A table describing 10 of the fatal cases indicates that 8 (80 percent) were Indian. All of these fatal cases had significant bleeding. What proportion of the 10 fatal cases was laboratory-confirmed is not indicated, but the table states that three of the 10, including two children, probably had primary dengue infection.

Of 28 hospitalized dengue cases from the hospital register in Savusavu Subdivisional Hospital, two were labeled as DHF. Six of the patients (21%) were younger than 15 years of age. The two cases called DHF were in a 9 year old and an 11 year old. The dengue hospitalization rate in Savu Subdivision was 88 per 100,000 population. Undoubtedly, many more dengue hospitalizations occurred but were not recorded as such because hospitalizations in January and February 1990 were increased by about a third, with most of these excess hospitalizations due to "nonspecific viral illness." Both of the patients identified as "DHF" cases had bleeding manifestations (epistaxis and hematemesis) but platelet counts were normal. No blood pressures were recorded.

*Virus Laboratory diagnosis:*

The laboratory performs serologic testing for dengue by hemagglutination inhibition (HI) and, occasionally, complement fixation. Virus is isolated by inoculation of *Toxorhynchites* adult mosquitoes and identified by direct fluorescent monoclonal antibody tests. C6/36 *Ae. albopictus* cell culture has been used for virus isolation, but the cell line is not currently in stock.