WHO/CDS/CSR/ISR/2000.1

WHO Report on Global Surveillance of Epidemic-prone Infectious Diseases

World Health Organization

Department of Communicable Disease Surveillance and Response

CHAPTER 6
DENGUE AND DENGUE HAEMORRHAGIC FEVER

Background of the disease

In recent years dengue fever (DF) has become a major international health problem affecting tropical and sub-tropical regions around the world - especially urban and peri-urban areas. The geographic distribution of dengue, the frequency of epidemic cycles, and the number of cases of dengue have increased sharply during the last two decades. In addition, the frequency of a potentially lethal complication of dengue, called dengue haemorrhagic fever (DHF) has begun to occur on a regular basis in countries where only dengue occurred previously.

Dengue fever is caused by four distinct but closely related dengue viruses called serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) and transmitted to humans through the bites of infected mosquitos (*Aedes aegypti* is the primary vector).

Dengue fever is a severe flu-like illness that affects infants, young children and adults, but rarely causes death. Symptoms vary according to age. Infants and young children may be asymptomatic or have undifferentiated fever and rash, whereas older children or adults are more likely to have a more severe set of symptoms including high fever that starts quickly, sometimes with two peaks, and/or severe headache, pain behind the eyes, muscle and joint pains, nausea and vomiting and rash. Infection with dengue confers immunity to infection with the same dengue serotype, but aside from short-lived protection does not prevent infection with other serotypes.

DHF is a life threatening complication of dengue characterized by high fever lasting 2-7 days, haemorrhagic phenomena (including vascular leakage of plasma), low numbers of platelets and sometimes circulatory failure. The condition of some patients progresses to shock. This is known as dengue shock syndrome (DSS), which could be rapidly fatal if appropriate volume replacement therapy is not administered promptly. Without proper treatment, DHF case fatality rates can exceed 20%. With modern intensive supportive therapy, it can be reduced to less than 1%.

While the mechanisms that cause DHF are not completely understood, it is widely accepted that antibodies from previous dengue infections can predispose some individuals to develop DHF when infected by a second dengue serotype. Thus the co-circulation of several different dengue serotypes in a geographical area favours the occurrence of DHF in that area.

Transmission

Dengue viruses are transmitted to humans through the bites of infective female *Aedes* mosquitos. Mosquitos acquire the virus while feeding on the blood of an infected person. Once infected, a mosquito is capable of transmitting the virus to susceptible individuals for the rest of its life, during probing and blood feeding. Infected female mosquitos may also transmit the virus to the next generation of mosquitos by transovarial transmission i.e. via its eggs, but the role of this in sustaining transmission of virus to humans has not yet been delineated. Humans are the main amplifying host of the virus, although studies have shown that in some parts of the world monkeys may become infected and perhaps serve as a source of virus for uninfected mosquitos. The virus circulates in the blood of infected humans for 2-7 days, at approximately the same time as they have fever; *Aedes* mosquitos may acquire the virus when they feed on an individual at this time.

History

Beginning with the latter part of the eighteenth century, and throughout the nineteenth and early twentieth centuries major epidemics of dengue-like illness have been reported in the Americas, southern Europe, north Africa, the eastern Mediterranean, Asia, and Australia, as well as on islands in the Indian

Ocean, the south and central Pacific and the Caribbean.[1] The beginning of these more frequent reports coincides with the time that the *Ae. aegypti* mosquito, the primary dengue vector, began spreading from Africa throughout the tropics, via sailing vessels used in commerce and in the slave trade, and when people began moving more frequently between continents. The mosquito adapted very well to urban environments, living in close proximity to people, breeding in small containers that collect rainwater and in water storage vessels.

There are a number of ecological factors associated with the middle and later parts of the twentieth century which have lead to a dramatic increase in DF, and to the emergence of DHF as a significant public health problem in the Americas and Asia. First, there has been a large increase in unplanned urbanization, resulting in large populations living in high-density areas with inadequate systems of water and solid waste management. These areas provide excellent breeding places for *Ae. aegypti* mosquitos.

In addition, two specific occurrences, one in Southeast Asia and the other in the Americas, were additional catalysts for the spread of dengue. First, activities associated with World War II and the immediate post-war period are particularly implicated in the increase of DF and DHF in South-East Asia. The existing water supply and sewage systems were destroyed during the war resulting in more favourable breeding places for *Ae. aegypti.* Second, the movement of (mostly susceptible) troops to the war theatre for short periods of time, presented the virus with a large supply of new susceptible hosts on a continuous basis, increasing the spread of disease. The subsequent movement of those hosts and or war machinery to other areas facilitated the circulation of virus serotypes throughout the region, and fostered hyperendemicity (the circulation of more than one serotype at the same time). During the post-war period millions of susceptible people from the poor rural countryside moved to the cities, providing a continuous influx of large susceptible populations living in poor peri-urban areas that were hyperendemic for dengue.

This led to both the increase in DF and the emergence of DHF as major public health problems. DHF was discovered in Manila in 1953. There had been sporadic reports of disease with symptoms similar to DHF previously, but these were considered to be unusual occurrences. Since 1953, DHF has been increasing in its frequency, geographical scope, and number of cases.

In the Americas, the lapse in mosquito eradication programmes had important consequence for dengue. The *Ae. aegypti* eradication programmes to fight against yellow fever were discontinued in the early 1970s. Subsequently, there was a re-infestation of the Americas with *Ae. aegypti.* The combination of the re-infestation of the Americas with the primary vector for dengue combined with unplanned rapid urbanization and increased travel and commerce has played an important part in the increase of dengue and emergence of DHF in the Americas.

Description of the data

For Asia, WHO has reports of cases and deaths from dengue from 1995-1998. Case reporting from the Americas is available from 1960, and reporting of deaths from 1989. There are separate reports for DF and DHF from the Americas but not from other continents. Although dengue infections occur in Africa they are not routinely reported from Africa.

Strengths and weaknesses of dengue surveillance

Dengue surveillance is difficult to establish and maintain. DF is a complex disease whose symptoms are difficult to distinguish from other common febrile illnesses. Surveillance for DHF holds special problems. First, there are many places where DHF is a rare occurrence. In these places DHF may not be suspected as a cause of particular symptoms. Second, diagnosing DHF cannot be done by clinical judgement alone. Correctly identifying a case of DHF requires laboratory tests (hemotocrits, platelet

[1] There had been some sporadic reports of dengue-like illness before that time – the very first report of an epidemic of a dengue-like illness dates back to an epidemic in China just prior to the year 1000.

counts, virologic or serologic tests) of samples of blood collected from patients with haemorrhagic symptoms. Laboratory equipment to perform these tests are not always available in health centres.

As in other diseases the case definitions used for reporting differ among countries, and some countries report only laboratory confirmed cases whereas other report suspected cases as well. Finally, some countries report cases and deaths from DF and DHF/DSS separately, whereas in other countries reports of DF and DHF are combined. Problems of under-diagnosis, incomplete reporting and reporting delay also weaken surveillance.

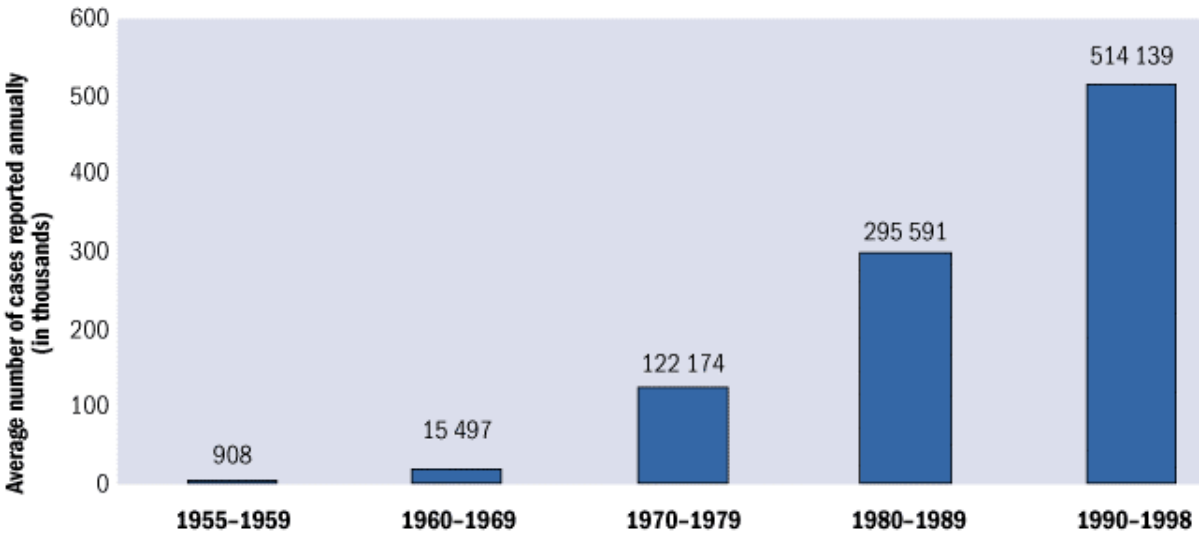
Laboratories play a very important role in surveillance of dengue – not only in confirming DF and DHF cases but also in monitoring serotypes and strains circulating in the population. For example, the introduction of a new serotype may be an important indicator of future epidemics of DHF/DSS. In many countries laboratories need considerable strengthening to conduct adequate surveillance of dengue.

The lack of any systematic reports of dengue cases from Africa is a clear weakness in global surveillance efforts for dengue.

Trends

- The global incidence of DF and DHF has grown dramatically in recent decades (Fig. 6.1).

Fig 6.1 Dengue/dengue hemorrhagic fever, average annual number of cases of reported to WHO, 1955-1998



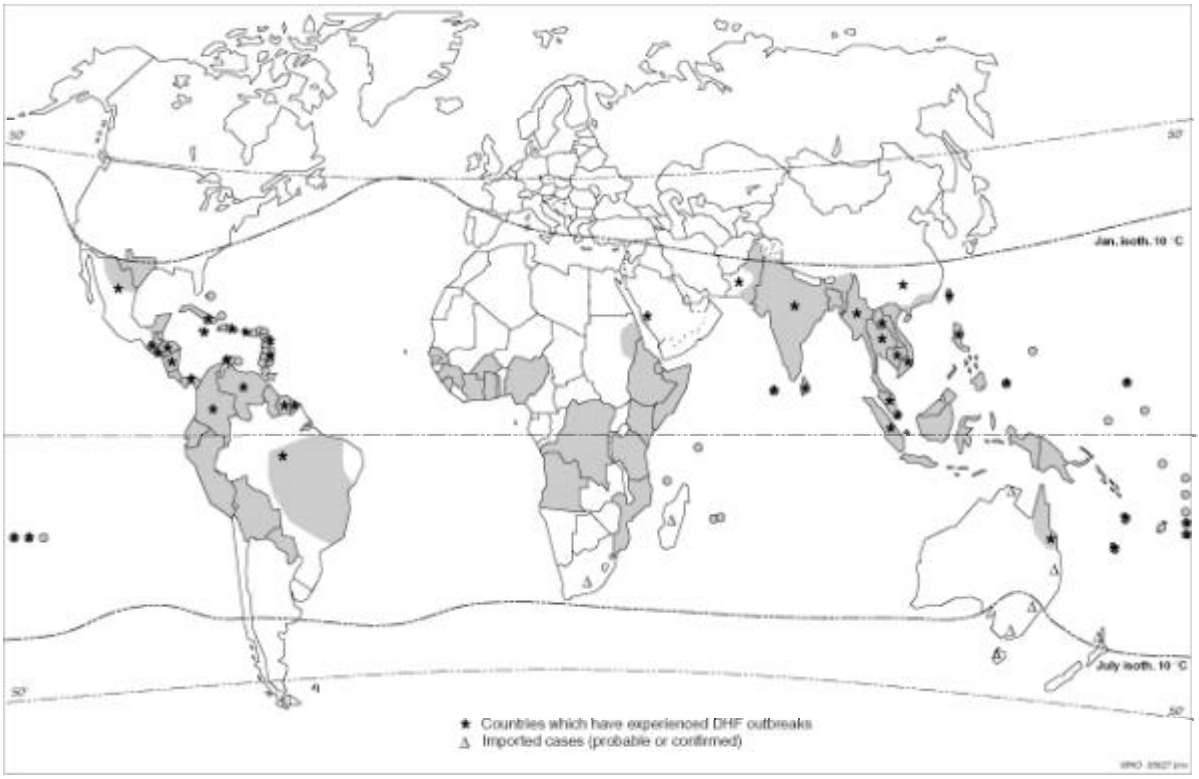
- Indigenous transmission of dengue has occurred in more than 100 countries in Africa, the Americas, the eastern Mediterranean, South-East Asia and the Western Pacific (Map 6.1).

Conclusions

1. The Americas, South-East Asia and the Western Pacific are most seriously affected. Some 2.5 billion people - two-fifths of the world's population - are now at risk for acquiring dengue.
2. A rapid rise in unplanned urbanization is bringing ever greater numbers of people into contact with *Ae. aegypti* mosquitos by increasing favourable breeding sites for the mosquitos. These include peri-urban and slum areas where household water storage is common and where solid waste disposal services are inadequate.

3. Infection with one serotype predisposes individuals to DHF when subsequently infected with a different serotype. DHF now occurs regularly in countries that previously reported only DF because of the introduction and circulation of multiple dengue virus serotypes.
4. Without proper treatment, DHF case fatality rates can exceed 20%. With supportive therapy, it can be reduced to less than 1%.

Map 6.1 The general distribution of dengue fever and/or dengue haemorrhagic fever, 1975-1996



References

Publications and Documents

Dengue haemorrhagic fever: diagnosis, treatment, prevention and control. 2nd edition. Geneva,World Health Organization, 1997.

Web pages

Dengue and dengue haemorrhagic fever fact sheet:
http://www.who.int/inf-fs/en/fact117.html

WHO dengue web pages:
http://www.who.int/health-topics/dengue.htm

Table 6.1 Dengue fever and dengue haemorrhagic fever, cases reported to WHO and number of countries reporting, 1955-1998

	Dengue fever																			
The Americas	**1960**	**1961**	**1962**	**1963**	**1964**	**1965**	**1966**	**1967**	**1968**	**1969**	**1970**	**1971**	**1972**	**1973**	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**
Anguilla																				
Antigua	0	0	0	0	264	8	0	0	179									2		
Aruba																				
Bahamas	0	0	0	0	0	0	0	0	0	0	0									
Barbados																		1,000		
Belize																			1,200	
Bermuda																				
Bolivia																				
Bonaire																				
Brazil																				
British Virgin Islands	0	0	0	0	0	0	0	0	0			2	2							
Cayman Islands																				
Colombia	0	0	0	0	0	0	0	0	0	0	0									
Costa Rica																				
Cuba																		477,440	75,692	1,497
Dominica			0	2	43	0		0	41	0	0									
Dominican Republic	494	821	822	350	407	527			0	16	0								102	
Ecuador																				
El Salvador																			25	
French Guiana														0	0	0				
Grenada										81	15	27			1					
Guadeloupe																				
Guatemala																			100	
Guyana																			51	
Haiti													3	103	447	28			1,013	
Honduras																			112,492	
Jamaica	0	0	0	1,578	156	35	6	6	367	545	31	14	4	3	2	1				
Martinique																1				
Mexico												2								
Montserrat	0	0	0	0	0	0	0	0												
Netherlands Antilles																				
Nicaragua																				
Panama																				
Paraguay																				

Table 6.1 Dengue fever and dengue haemorrhagic fever, cases reported to WHO and number of countries reporting, 1955-1998

	Dengue fever																			
The Americas	**1960**	**1961**	**1962**	**1963**	**1964**	**1965**	**1966**	**1967**	**1968**	**1969**	**1970**	**1971**	**1972**	**1973**	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**
Puerto Rico	0	0	0	25,737	2,440	93	2	1	0	16,665	136	15	85	710	44	1,214				
Peru																				
St. Kitts and Nevis	0	0	0	0	751	0	0	0		0	0								390	
St. Lucia	0																			
St. Martin																				
St. Vincent	0	0	0	0	0	0	0													
Suriname																			60	
Trinidad and Tobago																			373	
Turks and Caicos Islands															30					
United States of America																				
Venezuela	56	0	0	0	18,306	4,040	7,750	1,330	383	3,917	405	5	25	5					100,000	
Virgin Islands (USA)																				
Other Caribbean islands																				
Total no. of cases	550	821	822	27,667	22,367	4,703	7,758	1,337	970	21,224	587	65	119	821	524	1,244	0	478,442	291,498	1,497
No. of countries reporting	12	11	12	12	12	12	10	10	9	9	9	6	5	5	6	5	0	3	12	1

Table 6.1 Dengue fever and dengue haemorrhagic fever, cases reported to WHO and number of countries reporting, 1955-1998

Dengue fever

The Americas	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Anguilla	0	1	0	2	0	0	0	0	0	0	12	0	0			4	1	0	0
Antigua	1	77	5	1	0	0	0	0	0	0	1	1	0			56	12	9	4
Aruba	0	0	0	0	0	24,000	0	0	0	0	0	0	0			37	10	0	
Bahamas	0	0	0	0	0	0	0	0	0	87	2	0	0			1	0	0	126
Barbados	0	6	99	63	63	0	0	78	10	45	236	21	4	55	114	976	130	199	610
Belize	4	7	482	26	127	0	5	0	0	0	2	0	0			107	0	210	17
Bermuda																0	0	0	0
Bolivia	0	0	0	0	0	0	0	1,994	4,847	0	0	0	0	0	0		52	223	49
Bonaire						6			0	0	0	0	0						
Brazil	0	0	12,000	0	0	0	47,370	89,394	190	5,334	40,642	97,209	3,501	6,915	54,453	124,887	175,751	254,942	530,578
British Virgin Islands									13		3	1	2	0	0	9	0	0	1
Cayman Islands																1	0	0	1
Colombia	8,964	10,790	6,776	12,919	7,540	8,272	7,881	17,510	16,308	10,092	17,389	15,103	20,130	25,585	27,885	51,059	33,155	14,958	43,855
Costa Rica									0	0	0	0		4,612	13,929	5,134	2,307	14,267	2,290
Cuba	169	344,203	0	0	0	0	0	0	0	0	0	0	0	0	0			3,012	
Dominica	0	18	0	2	0	0	6	2	0	0	6	12	0	0	1	293	3	0	7
Dominican Republic	54	619	435	538	260	92	6	20	164	7	39	24	105	138	1,211	249	89	64	3,049
Ecuador									25	19	2,109	302	454	9,015	8,145	6,607	5,189	284	4,219
El Salvador	2,060	5,185	5,166	3,814	560	425	916	2,836	1,786	518	2,381	1,273	884	245	281	9,658	790	348	1,354
French Guiana							228				29	269	569	178	164	896	364	851	534
Grenada	0	2	7	6	3	0	0	4	0	1	3	1	1	1	5	74	6	22	
Guadeloupe	0	0			339	216	120	344	41	37	12	51	75	0	0	156	186	0	
Guatemala	30	104	33	2				2,318	5,175	7,448	5,757	10,968	1,286	1,907	2,872	3,980	3,679	5,379	1,593
Guyana	0	51	0	0	0	0	0	0	0	0	3	0	2	0	1	0	0	0	42
Haiti	255	44	211	483	328	20						0	0		0	0	0		
Honduras	2,078	1,612	1,217	729	378	307	569	261	844	2,507	1,700	5,303	2,113	2,847	3,055	27,575	5,047	11,730	22,218
Jamaica	9	0	21	72	12	3	3	3	6	32	9	5	296	0	4	1,884	46	16	68
Martinique	0	10					0	0	97	16	4	0	38	0	0	519	430	235	44
Mexico	51,406	17,046	32,640	19,028	27,645	13,688	19,520	13,371	10,526	7,120	14,485	7,158	8,131	2,899	6,770	17,088	20,687	35,108	23,639
Montserrat									0	0	0	0	0		15	75	3		0
Netherlands Antilles																			
Nicaragua						17,483	484	64	203	659	4,137	1,885	4,936	8,938	20,469	19,260	2,792	3,126	13,592
Panama									0	0	0	0	0	14	790	3,083	811	1,710	2,717
Paraguay									405	41,800	0	0	0	0	0		0		

Table 6.1 Dengue fever and dengue haemorrhagic fever, cases reported to WHO and number of countries reporting, 1955-1998

Dengue fever

The Americas	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Puerto Rico	921	8,350	9,536	2,789	1,865	2,376	10,659	5,835	6,539	9,003	9,450	10,305	13,000	6,600	22,000	6,765	4,655	6,955	14,828
Peru									0	0	7,858	714	1,971	897	1,478	2,732	6,395	1,151	988
St. Kitts and Nevis	0	23	0	0	0	2	0	0	0	0	0	8	0	1	8	27	6	0	
St. Lucia	6	0	31	0	0	0	164	1	2	4	2	4	0	5	0	52	65	14	3
St. Martin		7				2			0	0	0	0	0						
St. Vincent	0		1	0	0	0	0	0	1	0	9	1	7	7	2	224	190	3	112
Suriname	0	22	25	0	0	0	64	1	5	4	16	40	24	171	75	344	677	90	1,230
Trinidad and Tobago	0	15	16	117	31	5	145	125	80	11	526	36	116	268	48	312	3,983	1,357	2,792
Turks and Caicos Islands											0	0	0	0	0	0	0	0	
United States of America	15	201	144	107	63	48	322	95	124	94	102	25	68	57	91	7	0		0
Venezuela	39	71	39	6	20	2		57	12	4,025	10,962	6,559	2,707	9,059	15,046	32,280	9,180	33,654	37,586
Virgin Islands (USA)	0	127	2	1	73	43	74	77	380	275	339	62	48	0	0	0	0	0	0
Other Caribbean islands	7	138	44	11	4	3	170	7						500	275				
Total no. of cases	66,018	388,729	68,930	40,716	39,311	66,993	88,706	134,397	47,783	89,138	118,225	157,340	60,468	80,914	179,187	316,411	276,691	389,917	708,146
No. of countries reporting	32	32	30	30	30	33	31	32	40	39	42	43	42	35	37	40	42	39	35

Table 6.1 Dengue fever and dengue haemorrhagic fever, cases reported to WHO and number of countries reporting, 1955-1998

Dengue haemorrhagic fever

The Americas	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Argentina																			
Aruba						2													
Barbados																2		3	
Brazil							3	1			274	188			24	105	2	35	89
Belize																			1
Bermuda																			
Bolivia																			0
Cayman Islands																			
Colombia						1				1	39	96	493	303	568	1,028	1,757	3,330	5,276
Costa Rica																1			
Cuba		10,312																205	
Curacao																			
Dominica																11			
Dominican Republic									4		2	7	2	4	100	38	17	3	176
El Salvador								79	74			1	0	3	0	129	1		2
French Guiana													38	2	1	1	6	3	1
Grenada																1			
Guadeloupe																7			
Guatemala																1	19	6	1
Haiti																			
Honduras												16	1	1	4	15	0		18
Jamaica																108			
Martinique																3		15	
Mexico					8					4		2			30	539	884	239	372
Montserrat																			
Nicaragua						7							559	97	249	806	49	68	432
Panama																3			1
Puerto Rico						2	31	17	8	12	6	14	9	8	137	24	24	62	133
St. Lucia							164											1	1
Suriname			3											7	1				11
Trinidad and Tobago																		39	189
Venezuela										2,665	3,325	1,980	649	2,884	3,607	5,380	1,680	6,300	5,723
Total no. of cases	0	10,312	3	0	8	12	198	97	86	2,682	3,646	2,304	1,751	3,309	4,721	8,202	4,439	10,309	12,426
No. of countries reporting	0	1	1	0	1	4	3	3	3	4	5	8	8	9	11	19	11	14	18

Table 6.1 Dengue fever and dengue haemorrhagic fever, cases reported to WHO and number of countries reporting, 1955-1998

Asia	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Bangladesh																
Cambodia																
China																
India																
Indonesia														58	167	477
Lao People's Dem. Rep.																
Malaysia									41							
Maldives																
Myanmar																1,654
Philippines	96	1,207	152	94	125	551	1,459	134	189	759	652	9,384	1,371	1,116	1,336	922
Saudi Arabia																
Singapore							42					630	826	848	189	71
Sri Lanka											2	13	29	7	1	2
Thailand				2,706	160	1,851	561	5,947	2,215	7,763	4,094	5,816	2,060	6,430	8,670	2,767
Viet Nam						100		283	374	559	171	53				
Total no. of cases	96	1,207	152	2,800	285	2,502	2,062	6,364	2,819	9,081	4,919	15,896	4,286	8,459	10,363	5,893
No. of countries reporting	1	1	1	2	2	3	3	3	4	3	4	5	4	5	5	6

Table 6.1 Dengue fever and dengue haemorrhagic fever, cases reported to WHO and number of countries reporting, 1955-1998

Asia	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Bangladesh										4						
Cambodia										419	498	711	3,545	647	5,980	2,129
China									21,227				85,293			
India																
Indonesia	267	1,400	10,189	4,586	4,563	4,548	7,826	6,989	3,422	5,007	5,909	4,665	13,875	12,710	13,588	16,529
Lao People's Dem. Rep.									927	1,807	486		204	22	1,774	365
Malaysia			1,487	2,200	830	790	780	929	862	668	524	3,052	790	702	367	1,408
Maldives															0	0
Myanmar	691	1,013	349	2,477	6,750	3,158	5,364	2,029	4,685	2,026	1,524	1,706	2,856	2,323	2,666	2,192
Philippines	438	1,570	710	1,665	603	460	376		392	968	123	305	1,684	2,545		839
Saudi Arabia																
Singapore	116	64	1,187	229	59	30	92	384	156	244	133	216	205	86	126	354
Sri Lanka	3	8					4									
Thailand	11,540	23,786	8,280	8,160	17,767	9,616	38,768	12,547	11,478	43,382	25,670	22,250	30,025	69,101	80,076	27,837
Viet Nam		763	14,320	4,261		21,361	45,011	20,027	59,989	68,990	35,323	39,806	143,380	30,496	45,107	46,266
Total no. of cases	13,055	28,604	36,522	23,578	30,572	39,963	98,221	42,905	103,138	123,515	70,190	72,711	281,857	118,632	149,684	97,919
No. of countries reporting	6	7	7	7	6	7	8	6	9	10	9	8	10	9	9	10

Table 6.1 Dengue fever and dengue haemorrhagic fever, cases reported to WHO and number of countries reporting, 1955-1998

Asia	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Bangladesh												
Cambodia	3,716	1,981	2,237	7,247	1,882	4,695	3,913	1,498	10,199	1,433	4,224	16,216
China		51,510	37,886	376	902	46,095	359	2	6,114	13	647	15
India					6,291	2,683	11,125	7,494	7,847	16,517	1,177	707
Indonesia	23,864	44,573	10,362	22,807	21,120	17,620	17,418	18,783	35,102	44,650	30,730	71,087
Lao People's Dem. Rep.	9,699	1,212		60		138	343	2,585	7,781	8,197	1,536	3,755
Malaysia	2,025	1,428	2,564	4,880	6,628	5,473	5,589	3,133	6,543	14,255	19,544	27,370
Maldives	0	2,054	0	0	0	0	0	0	0	0	0	2,000
Myanmar	7,292	1,181	1,196	6,318	8,055	1,685	2,279	11,647	2,477	1,655	3,993	8,978
Philippines	859	2,922	305	588	1,865	3,980	5,715	5,603	7,413	13,614	12,811	31,829
Saudi Arabia								315				
Singapore	436	245	944	1,733	2,179	2,878	837	1,216	2,008	3,128	4,300	5,183
Sri Lanka		10	203	1,350	1,048	656	750	582	440	1,298	980	800
Thailand	174,285	26,926	74,391	92,002	43,511	41,125	67,017	51,688	59,911	38,109	99,150	126,348
Viet Nam	354,517	85,160	40,205	37,569	111,817	51,311	53,674	44,944	80,447	89,963	108,000	150,898
Total no. of cases	576,693	219,202	170,293	174,930	205,298	178,339	169,019	149,490	226,282	232,832	287,092	445,186
No. of countries reporting	10	12	11	12	12	13	13	14	13	13	13	13

Table 6.1 Dengue fever and dengue haemorrhagic fever, cases reported to WHO and number of countries reporting, 1955-1998

Oceania	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
American Samoa									0	1	1	0	0	0		
Australia									15	13	0	375				
Cook Islands										357	0	0				
Fiji	2,960	446	132	25	16,203	10	1	3	4	127	18	676	238	190	31	269
French Polynesia									4,241	617	673	247	1,546	453	261	229
Guam													0	0		
Kiribati									44	808	109	11				
Marshall Islands																
Micronesia (Fed. States of)																
Nauru									0	538	0	0				
New Caledonia									118	631	1	0				85
New Zealand									15	5	2	2	5	1		1
Niue									0	618		0				269
Palau																
Papua New Guinea											217					
Samoa									248	112	11	25	0	0		
Tokelau												0				
Tonga										3,552	432	259	575	180		1
Tuvalu										15	0	0	0	0		
Vanuatu									31	16	7	0	3	0		
Wallis and Futuna																
Total no. of cases	2,960	446	132	25	16,203	10	1	3	4,716	7,410	1,471	1,595	2,367	824	292	854
No. of countries reporting	1	1	1	1	1	1	1	1	11	14	14	15	9	9	2	6

Table 6.1 Dengue fever and dengue haemorrhagic fever, cases reported to WHO and number of countries reporting, 1955-1998

Oceania	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
American Samoa		4				0	0	246	0	49		
Australia					46	366	690	17	34	43	205	500
Cook Islands				5	833	5	0	0	786	2	1,075	
Fiji	432	22	2,225	1,461		349	39	0	27			24,780
French Polynesia	232	133	8,754			593	355	0	208			
Guam		1						0			1	2
Kiribati		45		0	0	0	0	0				
Marshall Islands			81					0				
Micronesia (Fed. States of)							0	0	20			275
Nauru								0	0			
New Caledonia	5	60	2,499	92	16	10	0	0	1,820		154	2,618
New Zealand		1	3							11		
Niue	6						0	0	0			
Palau		1,254					0	0	636			
Papua New Guinea					475				0			
Samoa			450			3	2		278	1,013	163	49
Tokelau						0	0	0				
Tonga		17	4	896	115	35	8	0		3		460
Tuvalu						811		0	0			
Vanuatu		2	58	52		113	27	16				131
Wallis and Futuna						0	0		3			395
Total no. of cases	675	1,539	14,074	2,506	1,485	2,285	1,121	279	3,812	1,121	1,598	29,210
No. of countries reporting	4	10	8	6	6	13	15	17	14	6	5	9