COMMUNICABLE DISEASES INTELLIGENCE

ISSN 0725 - 3141 VOLUME 20 NUMBER 4 19 February 1996

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EPIDEMIOLOGY OF MALARIA IN AUSTRALIA 1991 - 1995

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Abstract

Australia has been certified malaria free since 1981 but the number of imported cases has increased steadily since 1960. Many of these cases are in returning travellers. Data from the National Notifiable Diseases Surveillance System, supplemented by summaries from States and Territories, provide an overview of the epidemiology of malaria in Australia. Between 1991 and 1995 there were 3,480 cases of malaria notified. The male:female ratio was 2.4:1 and the highest rate of notification was recorded for males in the 25 to 29 years age group. The highest number of cases was notified each year in January and February. In the State and Territory reports *Plasmodium vivax* was the predominate species reported and Papua New Guinea the predominate country of acquisition. A number of jurisdictions reported inadequate prophylaxis as a risk factor. Improved malaria surveillance is required to adequately inform travel health advice and to reduce the rates of imported malaria.

Introduction

The World Health Organization (WHO) certified Australia free of malaria in 1981 but the disease is endemic in many parts of the world. It has been estimated that 300-500 million clinical cases occur globally each year. There are 90 countries where malaria is endemic. Almost half of these countries are in sub-Saharan Africa. There is a high incidence of malaria in parts of South-East Asia, India, Central and South America and the Western Pacific[1]. Travellers from endemic areas introduce cases of malaria into Australia each year.

Surveillance data on malaria have been collated nationally since 1917[2]. In 1994 the National Health and Medical Research Council (NHMRC) restated the recommendation that surveillance of malaria be undertaken in Australia[3]. This surveillance serves a number of purposes. It is believed that the environmental conditions in Australia north of latitude 19^{o}S still favour the transmission of malaria were parasites to be re-introduced. Surveillance is required by public health officials in these areas to ensure that malaria is not re-introduced[4]. Surveillance is also required to inform the work of the NHMRC Malaria Working Party which makes recommendations on prophylaxis for travellers, to meet Australia's WHO reporting requirements and to maintain Australia's malaria-free status.

Between 1991 and 1995 there were two systems for surveillance of malaria in Australia: the Australian Malaria Register (AMR) and the National Notifiable Diseases Surveillance System (NNDSS). Both these systems utilise information collected by States and Territories under their public health legislations.

The AMR is co-ordinated by the Tropical Health Program of the University of Queensland and provides comprehensive information on all cases of malaria notified in Australia. The AMR has published annual reports for 1990 and 1991[4,5].

The NNDSS in its current format was established in 1991 under the auspices of the Communicable Diseases Network Australia New Zealand (CDNANZ). The NNDSS data are collated and analysed fortnightly using notifiable diseases information from States and Territories. The NNDSS contains a minimum dataset of nine fields: a unique identifying number; the disease; the age, sex, Aboriginality and postcode of residence of the case; the date of onset of the disease; and the date of report to the State or Territory health authority.

This article reports on cases of malaria reported to the NNDSS between January 1991 and December 1995. The NNDSS dataset for 1995 is provisional. This information has been supplemented by summaries supplied by

Figure 1. Annual rate of notifications of malaria per 100,000 population, 1960 to 1995

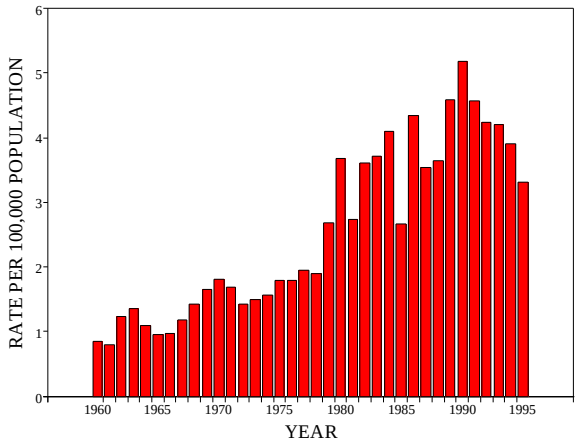
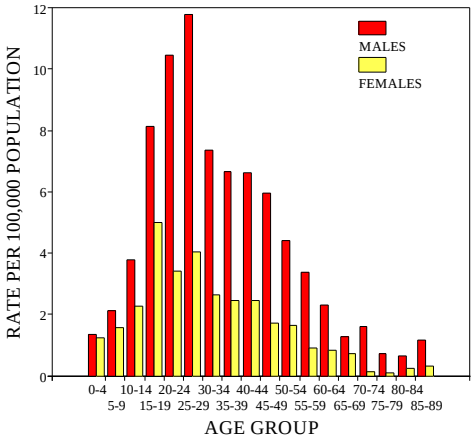


Figure 2. Average annual notification rate of malaria per 100,000 population, 1991 to 1995, by age group and sex



States and Territories about the epidemiology of cases of malaria reported in their jurisdictions. The State and Territory data do not cover the whole period but provide an overview of the epidemiology of malaria in each jurisdiction.

The NHMRC malaria case definition is[3]:

- Demonstration of malaria parasites (*Plasmodium* species) in a blood film.

National Notifiable Diseases Surveillance System

There were 3,480 cases of malaria notified to the NNDSS with onset dates between January 1991 and December 1995. The annual rate of notification decreased slightly after 1991. Historically, there was a steady increase in the rate of notifications of malaria since 1960 with the highest rate recorded for 1990 (5.2 cases per 100,000 population) (Figure 1).

There was a disproportionate number of reports for males, with the male:female ratio 2.4:1. The age group and sex specific notification rates had a bell shaped distribution with the highest rate for males recorded in the 25 to 29 years age group (11.8 cases per 100,000 population). The highest rate for females was in the 15 to 19 years age group (5 cases per 100,000 population) (Figure 2).

A seasonal trend was observed with the highest number of notifications being recorded in January and February each year (Figure 3).

The highest rate of notifications was reported for the statistical division of Far North Queensland (43.5 cases per 100,000 population) (Figure 4).

State and Territory Reports

The Australian Capital Territory - Malaria notifications 1992 to 1994

In the Australian Capital Territory, there were 26 reports of malaria in 1992, 19 in 1993 and 24 in 1994. The male:female ratio was 1.2:1 in 1992. In 1993 and 1994 it was 2.8:1 and 3:1 respectively. The age group distribution was similar to that seen in the national database.

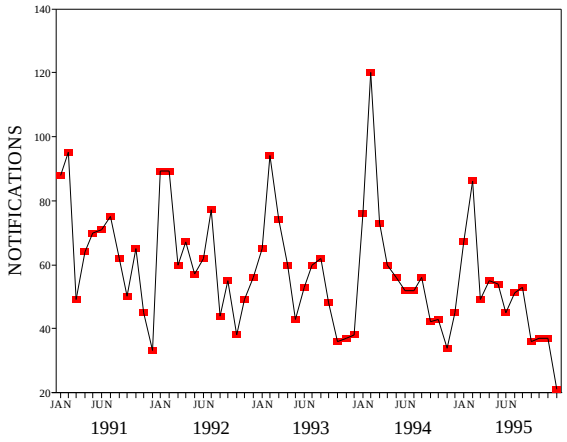
New South Wales - Malaria notifications 1989 to September 1995

There were 1,380 malaria cases reported in New South Wales between January 1989 and September 1995. Seventy-one per cent of the cases were male and 29% female. The median age was 27 years.

Seventy-two per cent (1,001) of the reports were of *Plasmodium vivax* and 22% (309) were *Plasmodium falciparum*. Seventy-one per cent of the cases of *Plasmodium vivax* infection and 23% of the cases of *Plasmodium falciparum* infection had gametocytes in the blood film at the time of diagnosis.

Of the notifications of *Plasmodium vivax* infection, 56% (557) were reported as acquired in Oceania, 18% (184) in South-East Asia, 18% (179) in South Asia and 2% (19) in Africa. Of the notifications of *Plasmodium falciparum* infection, 51% (158) were reported as acquired in Oceania, 31% (96) in Africa, 14% (42) in South-East Asia and 3% (8) in South Asia.

Figure 3. Malaria notifications by month of onset, 1991 to 1995



Data were collected on the use of prophylaxis for 1,185 cases: 68% (800) cases were using prophylaxis and 33% (385) were not. Of those using prophylaxis 29% (228) were using it correctly and 72% (572) were not.

The Northern Territory - Malaria notifications 1985 to September 1995

There were 263 cases of malaria notified in the Northern Territory between 1985 and September 1995. One hundred and forty-four cases were reported as acquired in Papua New Guinea and 119 in Indonesia.

There was a total of 160 cases of *Plasmodium vivax* infection: 62% (99) reported as acquired in Papua New Guinea and 38% (61) in Indonesia. There were 92 cases of *Plasmodium falciparum* infection: 58% (53) reported as acquired in Indonesia and 42% (39) in Papua New Guinea. Between 1990 and 1995 there were 87 notifications of malaria reported as acquired in Papua New Guinea and 91 in Indonesia.

Queensland - Malaria notifications in 1994

There were 285 cases of malaria reported in 1994. The male:female ratio was 2.3:1. There were 187 reports of *Plasmodium vivax*, 92 of *Plasmodium falciparum*, two of *Plasmodium ovale*, two of *Plasmodium malariae* and four indeterminate reports.

Seventy per cent (199) of the reports were for persons who had visited Papua New Guinea, 11% (32) for persons who had visited the Solomon Islands and 4 % (11) for persons who had visited Indonesia.

South Australia - Malaria notifications in 1993 and 1994

South Australia had a total of 57 notifications of malaria in 1993 and 1994. Seventy-two per cent (41) of the notifications were for *Plasmodium vivax* and 23% (13) were for *Plasmodium falciparum*.

Forty-four per cent (18) of the cases of *Plasmodium vivax* infection reported visiting Papua New Guinea and 20% (8) reported visiting India. Forty-six per cent of the cases of *Plasmodium falciparum* infection reported visiting Papua New Guinea.

Tasmania - Malaria notifications 1990 to 1994

Tasmania reported 54 cases of malaria between 1990 and 1994.

There were 66 reports of *Plasmodium vivax*, 13 of *Plasmodium falciparum*, and two of *Plasmodium malariae*.

Victoria - Malaria notifications in 1994

In 1994, 84 cases of malaria were notified in Victoria, compared to 129 in 1992 and 89 in 1993. The male:female ratio was 2.5:1 with the highest number of reports recorded for males in the 20 to 29 years age group.

Of the 84 reports, 64% (54) were of *Plasmodium vivax* and 25% (21) were *Plasmodium falciparum*. Two reports were of mixed *Plasmodium falciparum* and *Plasmodium ovale* infection, four of *Plasmodium ovale*, one of mixed *Plasmodium falciparum* and *Plasmodium vivax* and two indeterminate reports.

Of the cases of *Plasmodium vivax* infection, 35% (19) had visited Papua New Guinea, 24% (13) India and 15% (8) Indonesia. Reports of *Plasmodium vivax* were also received for persons visiting Sri Lanka, Burma, Pakistan, Cambodia, Thailand, Solomon Islands, Vanuatu, Sudan and Argentina.

Thirty-three per cent (7) of the reports of *Plasmodium falciparum* were for persons visiting Papua New Guinea (7) and 19% (4) for persons visiting Indonesia. Reports were also received for persons visiting India, Burma, Solomon Islands, Nigeria, East Africa, South Africa, Zimbabwe, Uganda, Ghana and Kenya.

Fifty per cent (27) of the individuals with *Plasmodium vivax* infection and 67% (14) of the individuals with *Plasmodium falciparum* infection had not taken any prophylaxis.

Western Australia - Malaria notifications 1990 to September 1995

There were 202 notifications of malaria in Western Australia between January 1990 and September 1995. The highest number of reports was received for people in the 25 to 29 years age group.

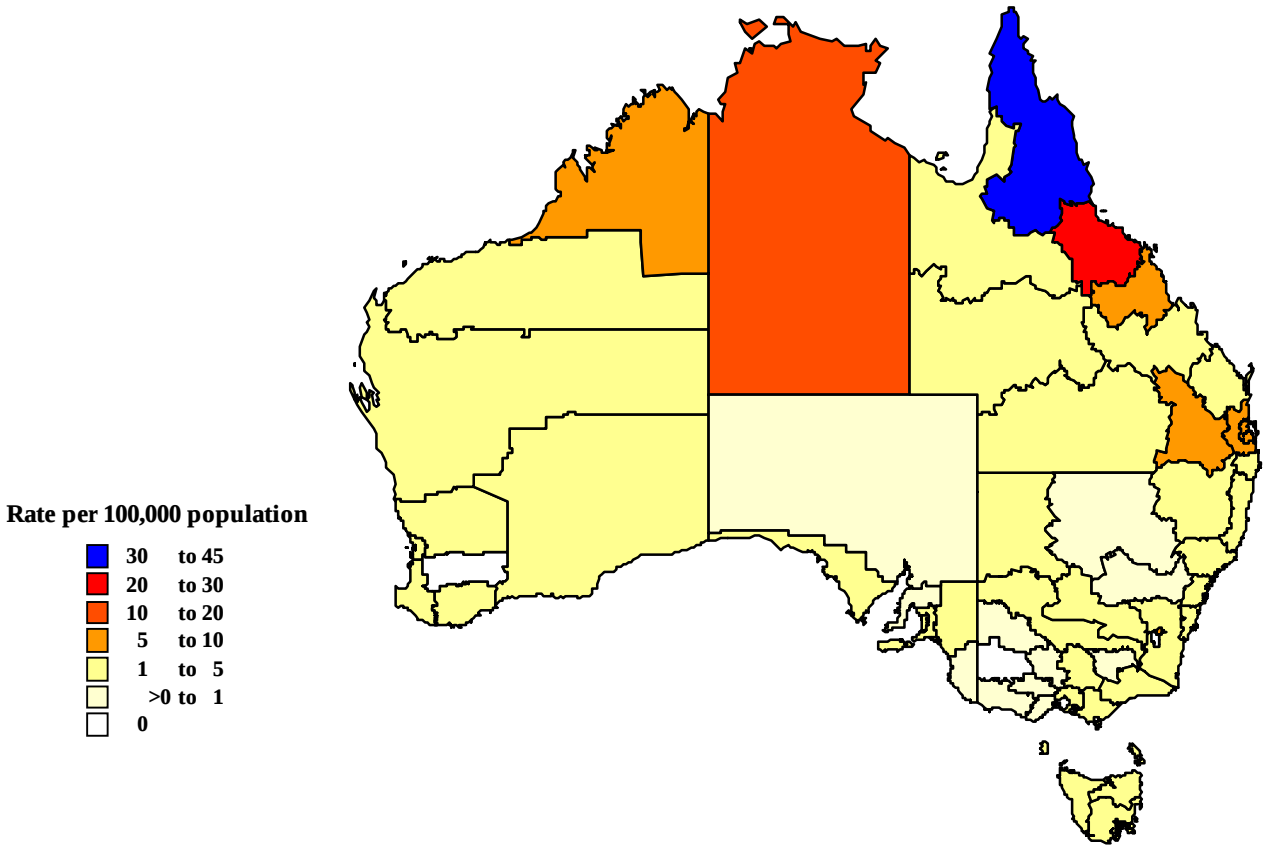
There were 29 reports of *Plasmodium vivax*, six of *Plasmodium falciparum*, two of *Plasmodium malariae*, one of *Plasmodium ovale* and four of mixed infections. For 160 of the reports the species was unknown.

Data on the country of origin of the infection were collected in 1994 and 1995. There were 11 reports of infection acquired in Africa, six in Papua New Guinea, six in Indonesia and two in India.

Discussion

While there have been no reports of indigenous cases of malaria in Australia since 1962[6], the rate of notifications of malaria has steadily increased since the 1960s,

Figure 4. Average annual notification rate of malaria, 1991 to 1995, by statistical division



probably reflecting an increase in the number of travellers to endemic regions. A recent article on overseas travellers reported that 2,299,500 Australians travelled overseas for less than 12 months during 1992 and 1993, with an estimated mean trip duration of 6.3 weeks[7].

The NNDSS data show a disproportionate number of cases in males particularly in the 15 to 29 years age group. This pattern is reflected in the reports from States and Territories. It is probable that this group includes travellers, students and workers. Information on reason for travel was not available for this report.

The seasonal trend observed in the NNDSS is similar to that noted in other reports[4,8]. Analysis by the AMR of 1991 data suggests that this seasonal increase is due to an increase in the number of cases imported from Papua New Guinea in the first few months of the year. Students from endemic areas coming to Australia to commence studies may contribute to the seasonal rise[9].

Plasmodium vivax is the species of malaria responsible for the majority of notifications in the State and Territory reports. Papua New Guinea was most often reported as the country where infection was acquired. This information is similar to the data from the 1991 AMR report[4]. Recent data from the Northern Territory indicate a higher proportion of cases are associated with *Plasmodium falciparum* and with travel to Indonesia.

Public health officials in the 'malaria receptive' zones in the north of Australia have established protocols to follow up each report of malaria in order to ensure that local transmission does not occur.

The provision of appropriate travel health advice is essential to decrease the number of cases of malaria in returning travellers. Information in this report suggests that many travellers do not take adequate prophylaxis. It is important for physicians to take an adequate travel history when treating returning travellers who present with symptoms of malaria and that they follow the appropriate treatment guidelines[10,11].

In 1995 the Commonwealth Department of Human Services and Health, in association with the Australian Medical Association and the Royal Australian College of General Practitioners, conducted a national Travel Safe campaign to increase awareness of travel health recommendations for intending travellers and to provide comprehensive information on travel health to service providers[12]. This type of information is an essential part of health promotion and prevention activities and must be informed by adequate surveillance.

The data from the NNDSS presented in this report provide some basic trend information on the epidemiology of malaria in Australia but these data are inadequate to inform our travel health advisory needs. Additional data are available in States and Territories and are supplied to the AMR but it has been problematic to produce reports in a timely fashion. In October 1995 a meeting was held between the Commonwealth, States and Territories, and the Australian Malaria Register to review national malaria surveillance. This meeting made a number of recommendations to improve the quality and timeliness of malaria surveillance reports. It is anticipated that these recommendations will be implemented in the near future.

If Australia is to decrease the rate of imported malaria in the face of continuing high rates of malaria in many of the countries frequented by Australian travellers, adequate travel health information based on local and international surveillance data is essential.

Acknowledgments

I wish to acknowledge the contributions made by Dr Kath Taylor, Dr Scott Cameron, Clinical Associate Professor Bart Currie, Ms Irene Passaris, Dr John Walker, Dr Jill Rowbottom, Dr Avner Misrachi, Dr Morton Bell and Mr Htoo Myint in the preparation of this report.

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WORLD MALARIA SITUATION IN 1993

Adapted from Weekly Epidemiological Record 1996;71:17-22, 25-29, 37-39 and 41-48

It has been estimated that the occurrence of malaria in the world may be in the order of 300-500 million clinical cases each year, with countries in tropical Africa accounting for more than 90%.

In 1993, some 90 countries or territories were considered malarious (Figure); almost half of them are situated in Africa south of the Sahara. For comparison, in the mid-1950s there were some 140 countries or territories where malaria was endemic.

The provisional total number of pathologically confirmed cases reported to the World Health Organization (WHO) for 1993 is 5.1 million. This excludes Africa where most cases are not pathologically confirmed.

Estimates of malaria mortality vary from 1.5 to 2.7 million malaria deaths worldwide per year, the great majority of them in Africa. Approximately 1 million deaths among children under 5 years of age can be attributed to malaria alone or in combination with other diseases.

Population at risk

The total world population of about 5,540 million persons may be classified according to the status of malaria risk in their area of residence (all figures are rounded):

(1) Malaria-free areas (3,500 million people, or 63%).

- Areas with 1,540 million people (28%), where malaria has never existed or has disappeared without specific antimalaria measures.
- Areas inhabited by 1,960 million people (35%), where the disease has disappeared or has been eliminated by antimalaria campaigns and the malaria-free status has been maintained (small areas with very low risk are also included in this category).

(2) Areas considered malarious (2,020 million people, or 36%).

- Areas where endemic malaria was considerably reduced or even eliminated but transmission was reinstated and the situation is unstable or deteriorating (1,620 million people, or 29%). These areas include zones with the most severe malaria problems which developed following major ecological or social changes, such as agricultural or other economic exploitation of jungle areas, sociopolitical unrest and population migration.
- Areas, situated mainly in tropical Africa, where endemic malaria remains basically unchanged and most control programmes are in a planning or an early implementation stage with very limited human and material resources (400 million people, or 7%).

Malaria reporting to WHO

Microscopically confirmed cases of malaria are reported by Member States to WHO through its Regional Offices. The provisional total number of cases reported for 1993 is 5.1 million (Table).

Inadequate and irregular reporting, particularly in areas known to be highly endemic and often out of reach of established health services, make it difficult to obtain accurate information on the incidence of malarial disease. The actual number of cases in the Regions is estimated to be about 4 to 5 times higher than shown in the Table.

In the great majority of countries in Africa south of the Sahara reporting is still very fragmentary. The numbers of cases registered are based principally on clinical signs and symptoms of malaria, and are not compara-

Table. Numbers of malaria cases reported, by WHO Region (thousands), 1984 to 1993[1]

WHO Region	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Africa[2, 3]	4422	13207	17927	20588	24712	29381	12302	8994	8384	2590
Americas	932	911	951	1018	1120	1114	1058	1231	1188	984
South-East Asia	3005	2502	2685	2834	2791	2942	2970	3087	3078	3077
Europe	64	57	47	28	25	21	14	16	22	50
Eastern Mediterranean	335	391	613	608	434	528	586	541	309	292
Western Pacific	1410	1177	1307	1145	1002	1071	1032	968	733	674
TOTAL[4] (excluding Africa)	5746	5038	5603	5633	5372	5676	5661	5843	5329	5077

Note: All figures are subject to change; they are updated whenever more recent data become available.

1. The information provided does not cover the total population at risk in some instances.
2. Mainly clinically diagnosed cases.
3. Incomplete figures.
4. Sums may not equal total because of rounding.

Figure. Global distribution of malaria, 1993

ble with those from other Regions. They are therefore not included in the total figures in Table.

Of the total number of cases reported to WHO in 1993 (excluding Africa south of the Sahara), more than two-thirds were concentrated in only six countries (in decreasing order): India, Brazil, Sri Lanka, Viet Nam, Colombia and the Solomon Islands. Within these and other countries, malaria was concentrated in certain areas.

In 1993, following the principles of the Global Malaria Control Strategy, the WHO Study Group on the Implementation of the Global Strategy stressed the importance of early diagnosis and adequate treatment as a basic element of all malaria control programmes.

Patients suspected of having malaria according to their clinical history, signs and symptoms must receive full treatment without delay. Laboratory diagnosis serves primarily as a support to clinical care and is desirable in the case of treatment failures and severe disease. Malaria cases must therefore be defined primarily in association with disease symptoms, and surveillance must give priority to severe and complicated cases, and malaria deaths.

Information systems need to be reoriented accordingly so that they can provide information on malaria disease trends and patterns in order to guide the deployment of scarce resources.

A Regional Working Group on Malaria Control in the African Region was convened in 1993 and developed a Practical Guide for the Evaluation of Control Programmes, providing guidance for case definition and reporting. Globally, a number of countries have already adopted changes in surveillance and reporting or are revising reporting criteria and procedures within the reorientation of their programmes. However, until a sufficient number of countries have introduced these changes, WHO will continue using the case definition based on microscopic confirmation.

Malaria mortality

Severe malaria and malaria mortality are caused by *Plasmodium falciparum*, which is the predominant species in tropical Africa, eastern Asia, Oceania and the Amazon area. In the rest of the world it is far less common. Registration and reporting of severe malaria and malaria mortality are very limited and irregular, particularly in 'frontier areas' of economic development and in areas burdened with armed conflicts, illegal trade and mass movements of refugees, where the problems may be most severe. The available figures are therefore gross underestimates.

The vast majority of malaria deaths occur among young children in Africa, especially in remote rural areas with poor access to health services. Outside of tropical Africa, deaths from malaria occur principally among non-immune people becoming infected with falciparum malaria in areas where appropriate diagnosis and treatment are not available. This is the case for newcomers to endemic areas, such as agricultural workers, labourers, gold and gem miners, refugees and settlers in new colonisation areas. Those most severely affected are young adults.

Estimates of malaria mortality vary from 1.5 to 2.7 million malaria deaths worldwide per year. Approximately 1 million deaths among children under 5 years of age can be attributed to malaria alone or in combination with other diseases.

Malaria resistance to drugs

Among the countries where falciparum malaria is endemic, only those of Central America have not recorded resistance of *P. falciparum* to chloroquine. Chloroquine resistance of various levels is now common in practically all endemic countries in Africa and in many of them, especially in eastern Africa, high levels of resistance pose increasing problems for the provision of adequate treatment. In western and middle South Asia, as well as in Malaysia, Indonesia, the Philippines and Oceania, levels of chloroquine resistance are variable.

Resistance to sulfadoxine/pyrimethamine is widespread in South-East Asia and South America but is focal and uncommon in other parts of the world. In Thailand, more than 50% of falciparum infections in certain areas bordering Cambodia and Myanmar no longer respond to mefloquine therapy.

Reduced susceptibility of *P. falciparum* to mefloquine has been detected by in vitro studies in Africa, but only rarely has this been reflected in in vivo studies. It has not been reported from the Americas.

There is commonly cross-resistance between halofantrine and mefloquine, although halofantrine has retained some efficacy in the areas with mefloquine resistance in Thailand.

In several countries of South-East Asia as well as in Brazil, where quinine plus tetracycline is now the standard treatment for uncomplicated malaria, the sensitivity to quinine is diminishing. Consequently, artemisinin and its derivatives are being deployed for first-line treatment in certain areas.

The resistance of vivax malaria strains to chloroquine, first documented in 1989 in infections from Papua New Guinea, has been confirmed in Indonesia, Myanmar and Vanuatu. In some localised foci in Indonesia and Papua New Guinea, 20% to 30% of patients infected with vivax malaria now have recurrences of parasitaemia one to three weeks after a course of 25 mg chloroquine base/kg.

Malaria situation by geographical area

Africa

In Africa south of the Sahara, malaria remains one of the most serious public health problems. It has been estimated that between 270 and 480 million clinical malaria cases may occur every year, based on the population exposed to malaria risk and the number of fever

episodes from which a person will suffer every year (<1 to more than 6, depending on the age group), half of which are typically due to malaria. About 140 to 280 million of these clinical malaria attacks will occur in children less than 5 years of age. Only a fraction of these malaria cases are reported.

Africa has the highest levels of endemicity in the world. Only about 7% of the population in the WHO African Region live in areas with no or negligible risk of getting malaria. In very large areas malaria transmission is intense and perennial. Some 74% of the population in the WHO African Region live in these highly endemic areas. At altitudes over 1,500 m and rainfall below 1,000 mm / year, endemicity decreases and the potential for epidemic outbreaks increases. Ecological, demographic and meteorological factors, including quasi cyclic occurrence of heavy rains, have led to malaria epidemics in countries such as Botswana and Ethiopia.

In highly malaria-endemic areas, *P. falciparum* is the commonest species. In such areas, about 30% of febrile illnesses among outpatients are attributable to malaria.

Mortality is concentrated in the younger age groups. Among children referred to hospital with severe malaria, case-fatality rates of 10% to 30% have been reported. In rural areas with little access to adequate treatment these rates might be even higher. Taking into account the above morbidity estimates, one could expect malaria mortality to be in the order of 1.4 to 2.6 million annually, of which about 1 million deaths will occur in children below the age of 5 years; malaria may not be the only cause of some of these deaths. Even in non-fatal cases malaria produces considerable impact on the health of young African children, leaving neurological sequelae, increasing susceptibility to other infections and hampering development. In endemic areas, malaria substantially increases the risk of maternal anaemia, abortion, stillbirth, prematurity and low birth weight during a woman's first pregnancy. With subsequent pregnancies this risk diminishes. The risks associated with malaria infection in non-immune pregnant women include spontaneous abortion in up to 60% of cases and a maternal mortality rate of up to 10%.

Chloroquine-resistant *P. falciparum* spread over almost all of tropical Africa in the 1980s. More recently, high levels of resistance to chloroquine have become common in some East African countries. Surveillance in some countries (e.g. Malawi and Zaire) has indicated that the evolution of resistance to chloroquine has been accompanied by increasing incidence of severe malaria. Research results from Kenya and Malawi suggest that the prevalence of anaemia in very young children may be increasing in areas where the routine treatment of malaria is often only partially effective. These problems will probably be among the major challenges to control programmes in Africa in the coming years.

In Africa north of the Sahara, where about 800 cases were reported in 1992, incidence decreased to 480 cases in 1993, less than one third of which were of local origin.

The Americas

During 1993, 982,000 confirmed malaria cases (*P. falciparum* and *P. vivax*) were reported compared with 1.19 million in 1992 and 1.23 million in 1991. This seems to mark a reversal in the rising trend of malaria cases observed between 1974 and 1991. The number of cases notified appears to be only a small fraction of the real number of persons suffering from malarial disease.

Data from 20 countries with malaria programmes have shown that 4.6 million complete malaria treatments were administered. This number is 4.7 times higher than the number of cases registered in these countries. Taking into account that the private sector and self-treatments are not included in this number, the 982,000 recorded cases might well represent only a small portion of the actual number of patients with malarial disease. This seems to indicate that immediate treatment of malarial disease, as stressed by the Global Malaria Control Strategy, is already a routine activity in the field, but that the treatments are not yet accompanied by a record of clinically diagnosed malarial disease.

Nearly half of all the cases (47%) were registered in Brazil; 32% originated from the Andean countries (Bolivia, Colombia, Ecuador, Peru, Venezuela) and 17% were from Central America and Mexico. The risk of becoming ill with malaria was highest in Belize (42 per 1,000 population), Guyana (41 per 1,000), French Guiana (29 per 1,000), the Amazon Region of Brazil (25 per 1,000) and Guatemala and Peru (12 per 1,000).

The overall proportion of falciparum infections declined from 34% in 1991 and 1992 to 29% in 1993, However, this proportion increased in Bolivia, Ecuador, French Guiana, Guatemala, Mexico, Peru and Venezuela; 61% of all falciparum infections detected in the Americas occurred in Brazil.

Asia west of India

Bahrain, Cyprus, Israel, Jordan, Kuwait, Lebanon and Qatar continued to be free from endemic malaria and malaria risk is very limited in the United Arab Emirates.

In the malarious countries, most of the confirmed cases were registered in Afghanistan (some 300,000 in 1991), Pakistan (93,000) and the Islamic Republic of Iran (65,000). Falciparum cases were most numerous in Pakistan (41,000) and the Islamic Republic of Iran (26,000).

Middle South Asia

During the last 3 years, the overall number of malaria cases remained stable with 2.6 to 2.7 million cases reported annually. These figures are strongly influenced by those from India which represent some 80% of all cases recorded. According to conservative estimates, the real malaria incidence in this region is about 6 to 7 times higher, representing between 16 and 19 million malaria cases annually.

Most of the malarious areas are situated in forests, forest-fringe areas, forested hills, development project areas and their surroundings. Forest-related malaria remains a serious problem causing nearly half of the total number of cases, of which more than 50% are falciparum malaria. Due to the exploitation of their natural resources, forests become more accessible and the movement of populations with low immunity into such areas result in malaria epidemics. Many of these areas are close to international borders, far away from the centres of development. Their population is very mobile and the peripheral health structure is lacking and inadequate for the early diagnosis and treatment of malaria.

In Bangladesh, the malaria situation has been deteriorating since 1988 when 33,000 cases were reported. Reports nearly doubled to 64,000 cases in 1991, increasing two-fold again to 125,000 cases in 1993. Nearly half of the cases are falciparum infections.

In India, between 2.1 and 2.2 million cases were recorded annually during the years 1991-1993, representing nearly 40% of the total number of cases reported outside Africa. The proportion of falciparum infections, which had not varied much during the years 1986-1990, ranging between 35% and 37%, decreased from 43% in 1991 to 39% in 1993. Urban malaria is a major problem in India.

Eastern Asia and Oceania

Australia, Brunei Darussalam, the Democratic People's Republic of Korea, Hong Kong, Japan, Macao, Mongolia, the Republic of Korea, Singapore, large areas of China and most of Oceania remained free from malaria. These countries notify only imported cases, although a few introduced cases secondary to imported malaria occur occasionally in some of them. These foci are promptly eliminated by appropriate control measures. For example, in Singapore, a localized outbreak occurred in 1993 involving 27 cases of local transmission. The source of infection seemed to have been two Singaporean tourists having acquired malaria in India. Prompt remedial measures controlled the outbreak.

Compared with 1992, the overall incidence in this region declined by some 20%, although some of the countries registered more cases than in the preceding years. About 60% of the confirmed cases occurred in Viet Nam (156,000), the Solomon Islands (126,000), Myanmar (113,000) and Thailand (115,000).

Malaria is a major cause of illness and death in Cambodia; 99,000 confirmed cases and 1,000 deaths due to malaria were recorded in 1993. The real figure is estimated to be about 600,000 clinical cases with 5,000 to 10,000 deaths annually. The most intense transmission occurs in the forested areas along the Thai border and in the north-eastern part of the country.

In China, malaria incidence continued to decline. In 1993, 69,000 confirmed malaria cases were recorded (74,000 cases in 1992 and 102,000 cases in 1991). For comparison, there were 904,000 cases in 1984. Less than 1% of the population resides in areas where incidence exceeds 1 per 1,000 population. Because many cases are likely to be missed among migrating populations, the actual number of cases was estimated to be not less than 100,000. In 1993, the overall proportion of falciparum infections was 9%, compared with 12% in 1992.

In Indonesia, 70% of the population resides in areas where transmission does not exist or occurs only occasionally with an annual malaria incidence below 1 per 1,000 population. The overall malaria situation is not well documented as only limited control activities are carried out in priority areas of social and economic importance. Between 1989 and 1992, 1.9, 1.6, 1.9 and 1.3 million clinical cases were treated annually at health centres.

In Papua New Guinea, malaria remains a serious health problem in coastal and island regions of 15 provinces with persistently high transmission throughout the year. In the other 5 highland provinces malaria is unstable with seasonal outbreaks. The most serious malaria occurs in East Sepik where it is truly holoendemic, very similar to the situation observed in parts of Africa. A total of 67,000 confirmed cases, 55,000 of them due to falciparum malaria, were reported in 1993. In the same year, about 510,000 uncomplicated malaria cases as well as 4,400 treatment failures were recorded.

In the Solomon Islands, where malaria reports more than doubled from 65,000 in 1989 to 153,000 in 1992, the number of cases declined for the first time since 1988, 126,000 cases being recorded in 1993.

Europe, including Turkey and the former USSR

Malaria (*P. vivax* only) continues to be endemic in the south-east and a few other areas in Turkey, and focally in Azerbaijan. A few local cases were reported in Turkmenistan and Uzbekistan.

With regard to the other countries in this region, with very few exceptions only imported malaria cases are being notified. During the period from 1985 to 1989, years for which most countries reported, the number of cases varied between 7,272 and 9,117 (nearly all imported). Surveys in France, Switzerland and the United States of America have shown that about 25% to 50% of all cases are notified to the health authorities. Assuming that only one out of two cases will be notified leads to an annual estimate of about 16,000 malaria cases.

OVERSEAS BRIEFS

In the past fortnight the following information has been provided by the World Health Organization.

Yellow fever in Liberia - update

The following areas have confirmed cases of yellow fever and have been added to the infected area list: Tubmanburg (Boma County), Salala (Bong County), and Greenville (Sinoe County). Suspected cases have been reported from Margibi, Monserado and Grand Gedeh Counties. The immunisation campaign is continuing in all of these areas as well as in Buchanan, Grand Bassa County.

A yellow fever vaccination certificate is required for all travellers over one year of age going to Liberia.

Cholera

Cases have been reported this week from the following countries:

Africa: Burkina Faso, Cape Verde, Mali, Senegal

Americas: Argentina and Ecuador (mainly Imbabura Province).

In the Islamic Republic of Iran the Ministry of Health reports that all areas of the country are free of cholera. The country has been removed from the infected area list.

Haemorrhagic fever with renal syndrome - Bosnia and Herzegovina

A total of 367 cases of haemorrhagic fever with renal syndrome (HFRS) were reported to the Ministry of Health for the period January to November 1995, including five deaths. Cases occurred in all months of the year peaking in March and August. Two hantaviruses have been detected serologically, Puumala and Hantaan. Puumala virus is associated with a less severe form of haemorrhagic fever with renal syndrome. Hantaan, a closely related virus, causes a more severe form of haemorrhagic fever more often leading to death.

Progress towards poliomyelitis eradication

The World Health Organization publication, *Weekly Epidemiological Record* has commenced monthly reporting of country specific poliomyelitis data. The aim is to disseminate information on the progress of the eradication program.

NOTICES TO READERS

International Symposium on Disasters and Health

First Announcement and Call for Papers

October 16 - 18, 1996
Westin Philippine Plaza Hotel
Manila, Philippines

This symposium is jointly organised by the University of the Philippines, Manila (UP Manila) and the International Center for Medical Research, Kobe University, in cooperation with the Japan Society for the Promotion of Science, the World Health Organization, the Department of Health, Philippines, the Department of Science and Technology / Philippine Council for Health Research and Development, the Philippine Medical Association and the Association of Philippine Medical Colleges.

The program outline is shown below.

A limited number of rooms are available for participants at Westin Philippine Plaza Hotel (the location of

International Symposium on Disasters and Health - program outline

	Morning		Afternoon	
Day 1 (Wednesday 16 October 1996)	Symposium: The environment of disaster and disaster management	Free papers, posters	Symposium: Effects of disaster (The victims of disaster)	Free papers, posters
Day 2 (Thursday, 17 October 1996)	Field trip			
Day 3 (Friday, 18 October 1996)	Symposium: Disaster preparedness and management (coping with disaster)	Free papers, posters	Workshops: A. Areas for collaboration B. Lessons learned from the field trip Plenary and Recommendations	Free papers, posters

the Symposium); inquiries can be made through the UP Manila Development Foundation International Symposium on Disasters and Health C/- the Symposium Secretariat.

This call is made for papers, or poster or video presentations. Abstract forms, which must be lodged by 30 June 1996, are available from the Secretariat. Registration fees, which entitle participants to a conference kit and badge, a certificate of attendance, participation in the scientific program, exhibits, social activities and the field trip to a disaster area, are:

Pre-registration	
(on or before 30 June 1996)	US $250
On site registration	US $300

Inquiries should be made direct to the Symposium Secretariat:

International Symposium on Disasters and Health, Chancellor's Office, 8th Floor Central Block Building, Philippine General Hospital Complex, Taft Avenue, Manila 1000, Philippines.

Tel: (+632) 587 501/526 2267
Telefax: (+632) 521 0184/58 5750/58 5762
e-mail: pso@upm.edu.ph

Yale University Emerging Infections Information Network (EIINET)

The Yale University School of Public Health has commenced Seminars in Emerging Infections which are being held during the Spring semester of 1996. This includes a plan to use state-of-the-art Internet technology to bring a global audience into the seminars. Visual, audio and written-word transmission of these seminars will be made available over the Internet. Each seminar covers a different topic and involves scientific interchange between visiting scientists prominent in the field of emerging infections and a multidisciplinary group of Yale graduate students from public health, medicine, law, business, forestry and environmental studies, religion and international studies.

To provide background information prior to each presentation, two or three scientific articles selected by each presenter will be made available over the Internet at least one week prior to each presentation. Every effort will be made to select articles which are available online.

On Tuesdays between February and May (the first two seminars were held on February 6 and 13), a 'chat-room' interchange with the professor who is lecturing on that particular day will be available to Internet users who have pre-registered. Only individuals registering in advance to participate in this interactive session will be permitted to 'enter' the chat-room (6:00 to 7:00 PM Eastern Time on Tuesdays). Chat-room participants should signal their interest by sending a request to Tassos Kyriakides at EIINET@biomed.med.yale.edu.

Each Wednesday following the Tuesday seminar a one-hour audio version of the seminar will be made available over the Internet. Visual aids (colored slides) which each professor has used will be available.

A partial list of these scientists and their tentative topics is presented below.

Please address all questions to Tassos Kyriakides, Teaching Assistant, EID 559b, Seminar in Emerging Infections, Yale University School of Medicine, Department of Epidemiology and Public Health, 60 College St., P.O. Box 208034, New Haven, CT 06520.

e-mail: EIINET@biomed.med.yale.edu
Telephone: 203-785-2901
FAX: 203-785-7552

Requesters are encouraged to use e-mail. A Web page is available at http://info.med.yale.edu/EIINet/.

EIINET Seminar timetable

Date	Seminar Title	Seminar Leader
March 5	Why was public health caught by surprise by new and resurgent disease?	Richard Levins Professor, Harvard School of Public Health
March 12	Enabling factors of emerging infections	Robert W Ryder Professor, Yale School of Public Health
March 19	How are emerging infections first detected?	Robert W Ryder Professor, Yale School of Public Health
April 2	Ebola fever in Zaire, 1995	David L Heymann Director, Division of Emerging, Viral and Bacterial Diseases Surveillance and Control World Health Organization
April 9	To be announced	Joshua Lederberg Professor, Rockefeller University
April 16	HIV as an emerging infection	Jonathon Mann Professor, Harvard School of Public Health
April 23	Evolution of pathogenicity in emerging infections	Paul Ewald Professor, Amherst College Amherst, MA

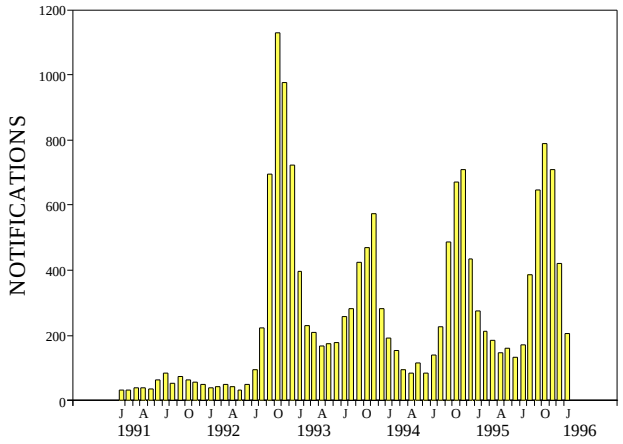
COMMUNICABLE DISEASES SURVEILLANCE

National Notifiable Diseases Surveillance System, 21 January to 3 February 1996

There were 1,923 notifications received for this two week period (Tables 1, 2 and 3 and Figure 3).

- There were 165 notifications of **Ross River virus infection**, more than double the number reported for the previous fortnight. The sex ratio was 1:1 and all age groups were affected, although more than two-thirds of cases were aged between 30 and 54 years. More than 90% of the cases were reported from Queensland and Western Australia.
- Eighteen cases of **Barmah Forest virus infection** were reported from Queensland. It is anticipated that during 1996 more States and Territories will report cases of infection with this virus separately from other arbovirus infections.
- Notifications of **campylobacteriosis** continue at a relatively high level, with 456 cases reported. The male:female ratio was 1.15:1; all age groups were affected, with 23% of cases aged less than 5 years.
- There were 94 notifications of **gonococcal infection**; 63 cases were male and 31 female; 67% were aged between 15 and 29 years.
- Two cases of ***Haemophilus influenzae* type b infection** were reported, a male and a female infant, both from Victoria.
- There were 58 cases of **hepatitis A** reported, including 47 males and 10 females. The majority of cases were younger than 54 years, with 4 occurring in older persons. More than half (31) were reported from the metropolitan statistical division of Melbourne.
- Six cases of **hepatitis B (incident)** were reported; 2 were male and 4 female; all were aged between 20 and 34 years.
- Three cases of **legionellosis** were reported, all in elderly females over 70 years of age, from the metropolitan statistical divisions of Melbourne and Perth.
- Four cases of **leptospirosis** were reported, all in men between 20 and 34 years of age, from 2 rural statistical divisions in Victoria and Western Australia.
- Thirty notifications of **malaria** were received; 22 were male and 7 female, the sex of the remaining case was not reported. Ages ranged from 5 to 70 years. The cases were reported from 12 separate Statistical Divisions in 5 States and Territories.
- Seven cases of **measles** were reported; 3 were male and 4 female. Their ages ranged from 5 to 52 years.
- There were 2 cases of **meningococcal infection** reported, one male and one female from South Australia and Victoria.
- There were 70 notifications of **pertussis**; 32 were male and 38 female. All age groups but one from 0-4 to 60-64 years were represented. Six cases were aged less than one year and a further 5 were less than 5 years of age.
- Two notifications of **Q fever** were received, both from country regions of Queensland; a female in the age group 15-19 years and a male in the age group 30-34 years.
- There were 92 cases of **rubella** reported; 60 were male and 32 female. Recorded ages were from all age groups up to 50-54 years, 37% of the cases (34) were reported in males 15 to 24 years of age and 15% (14 cases) in women aged 15 to 44 years. The number of cases reported with onset between August and December 1995 was nearly 20% greater than in the same period of 1994 and 32% greater than for the same period in 1993 (Figure 1). The very large proportion of cases in young men during 1995 (Figure 2) suggests that a large pool of susceptible males in their teens and twenties remains available to maintain seasonal outbreaks, in spite of routine immunisation for young children and pre-adolescents of both sexes.
- There were 217 cases of **salmonellosis** reported; 94 were male and 115 female; the sex of the remaining 5 cases was not reported; 47% were aged less than 5 years.
- Seventeen cases of **syphilis** were reported; 8 were male and 8 female; the sex of the remaining case was not reported. All age groups from 10-14 to 35-39 years were represented, with one case reported in an older person.

Figure 1. Rubella notifications, January 1991 to January 1996, by month of onset



- There were 19 cases of **tuberculosis** reported; 10 were male and 6 female, the sex of the remaining cases was not reported. All age groups but one between 10-14 and 75-79 years were represented.
- Two cases of **typhoid** were reported; both were female from the metropolitan statistical division of Brisbane.
- Twelve cases of **yersiniosis** were reported; 7 were male and 5 female. Two were reported in children under 5 years of age and all but one of the remainder were aged between 10 and 34 years.

Figure 2. Rubella notifications, 1995, by age group and sex

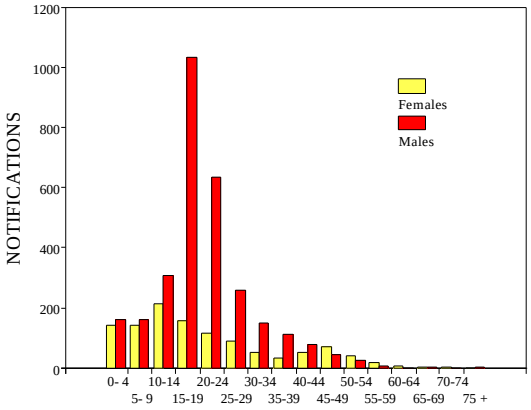
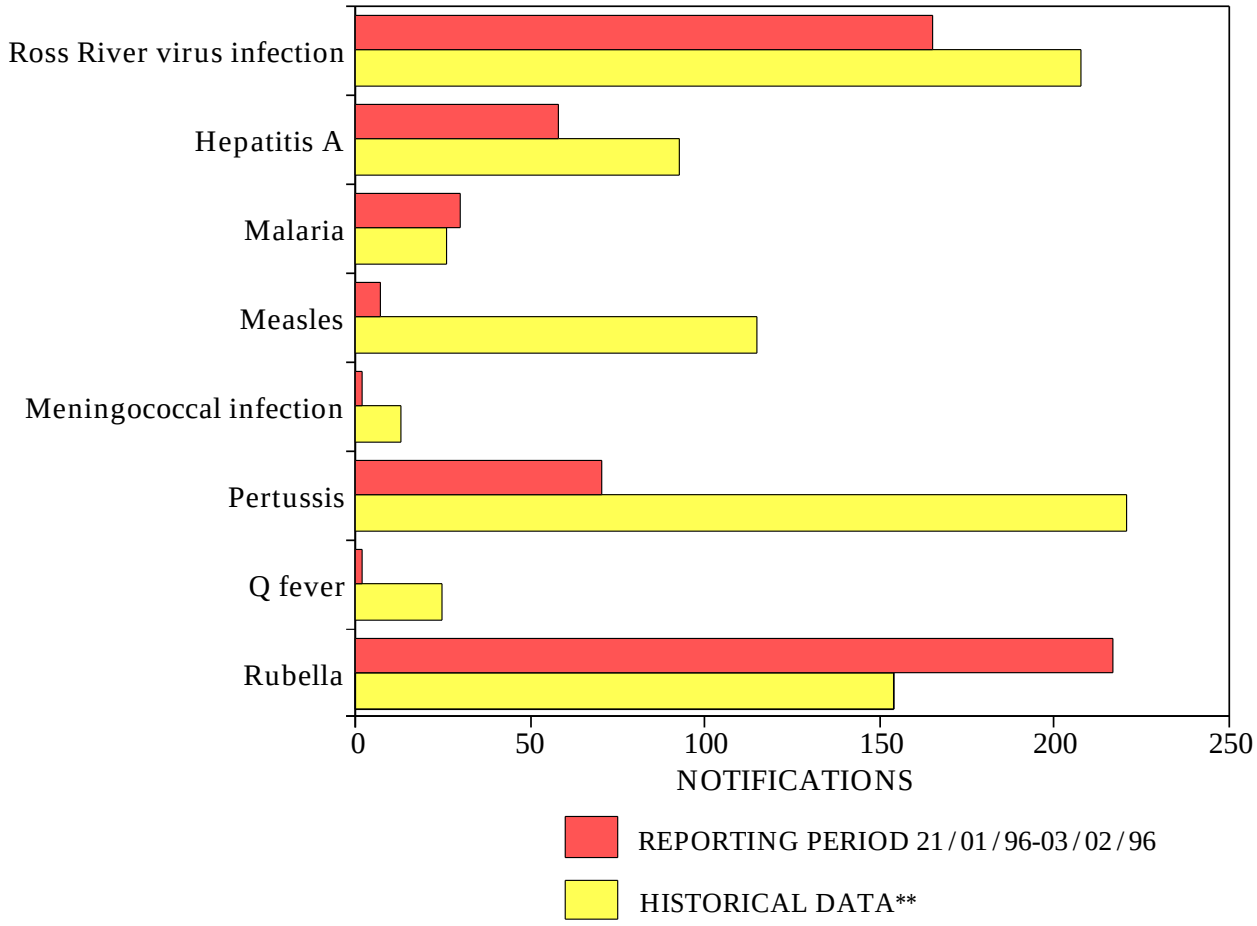


Figure 3. Selected National Notifiable Diseases Surveillance System reports, and historical data[1]



1. The historical data are the averages of the number of notifications in 9 previous 2-week reporting periods: the corresponding periods of the last 3 years and the periods immediately preceding and following those.

Table 1. Notifications of diseases preventable by vaccines recommended by the NHMRC for routine childhood immunisation, received by State and Territory health authorities in the period 21 January to 3 February 1996

DISEASES	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	TOTALS FOR AUSTRALIA[1]			
									This period 1996	This period 1995	Year to date 1996	Year to date 1995
Diphtheria	0	0	0	0	0	0	0	0	0	0	0	0
Haemophilus influenzae b infection	0	0	0	0	0	0	2	0	2	2	7	9
Measles	0	0	0	3	0	0	4	0	7	106	46	325
Mumps	0	0	0	NN	0	0	0	0	0	2	5	14
Pertussis	4	3	1	19	21	1	18	3	70	220	245	577
Poliomyelitis	0	0	0	0	0	0	0	0	0	0	0	0
Rubella	8	0	0	28	4	1	47	4	92	142	392	368
Tetanus	0	0	0	0	0	0	0	1	1	0	1	0

1. Totals comprise data from all States and Territories. Cumulative figures are subject to retrospective revision, so there may be discrepancies between the number of new notifications and the increment in the cumulative figure from the previous period.

NN Not Notifiable.

Table 2. Notifications of other diseases[1] received by State and Territory health authorities in the period 21 January to 3 February 1996

DISEASES	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	TOTALS FOR AUSTRALIA[2]			
									This period 1996	This period 1995	Year to date 1996	Year to date 1995
Arbovirus infection												
Ross River virus infection	0	0	9	60	0	-	1	95	165	116	253	235
Dengue	0	0	1	0	0	-	0	0	1	0	2	1
Barmah Forest virus infection	0	0	-	18	0	0	-	-	18	17	38	36
NEC[3, 4]	0	0	1	0	0	0	2	4	7	4	14	7
Campylobacteriosis[5]	10	-	20	122	98	8	112	86	456	311	1137	1014
Chlamydial infection (NEC)[6]	6	NN	7	109	5	5	74	39	245	304	608	643
Donovanosis	0	NN	2	0	NN	0	0	1	3	3	6	7
Gonococcal infection[7]	2	5	23	24	1	0	13	26	94	149	261	305
Hepatitis A	1	3	1	12	0	0	38	3	58	93	210	221
Hepatitis B	0	0	0	0	0	4	2	0	6	7	27	32
Hepatitis C incident	2	0	0	0	0	0	0	0	2	2	6	4
Hepatitis C unspecified	26	0	12	82	0	6	148	23	297	292	791	719
Hepatitis (NEC)	0	0	0	0	0	0	0	NN	0	4	0	5
Legionellosis	0	0	0	0	0	0	2	1	3	13	11	23
Leptospirosis	0	0	0	0	0	0	3	1	4	3	25	14
Listeriosis	0	0	0	0	0	0	0	0	0	3	7	8
Malaria	1	0	3	18	0	0	6	2	30	15	65	54
Meningococcal infection	0	0	0	0	1	0	1	0	2	13	17	34
Ornithosis	0	NN	0	3	0	0	2	0	5	8	16	22
Q fever	0	0	0	2	0	0	0	0	2	16	29	51
Salmonellosis (NEC)	0	3	30	95	21	4	40	24	217	347	616	712
Shigellosis[5]	0	-	5	2	6	0	3	6	22	43	65	91
Syphilis	1	1	7	4	0	0	0	4	17	82	66	198
Tuberculosis	0	1	0	4	0	0	13	1	19	42	57	117
Typhoid[8]	0	0	0	2	0	0	0	0	2	5	5	6
Yersiniosis (NEC)[4]	0	-	0	9	2	0	1	0	12	27	27	65

1. For HIV and AIDS, see *CDI* 1996:20;71-72. For rarely notified diseases, see Table 3 .
2. Totals comprise data from all States and Territories. Cumulative figures are subject to retrospective revision so there may be discrepancies between the number of new notifications and the increment in the cumulative figure from the previous period.
3. Tas: includes Ross River virus and dengue.
4. WA, NT and Vic: includes Barmah Forest virus
5. NSW: only as 'foodborne disease' or 'gastroenteritis in an institution'.
6. WA: genital only.
7. NT, Qld, SA and Vic: includes gonococcal neonatal ophthalmia.
8. NSW, Vic: includes paratyphoid.

NN Not Notifiable.

NEC Not Elsewhere Classified.

- Elsewhere Classified.

Table 3. Notifications of rare[1] diseases received by State and Territory health authorities in the period 21 January to 3 February 1996

DISEASES	Total this period	Reporting States or Territories	Year to date 1996
Botulism	0		0
Brucellosis	0		3
Chancroid	0		0
Cholera	0		0
Hydatid infection	0		3
Leprosy	0		0
Lymphogranuloma venereum	0		0
Plague	0		0
Rabies	0		0
Yellow fever	0		0
Other viral haemorrhagic fevers	0		0

1. Fewer than 60 cases of each of these diseases were notified each year during the period 1988 to 1994.

Australian Sentinel Practice Research Network

There are currently 99 sentinel general practitioners (recorders) in the Australian Sentinel Practice Research Network (ASPREN, Table 4). Seventy-two of these are in metropolitan areas and 27 are rurally based. Approximately 7,000 consultations are recorded each week. For 1996 a total of 12 conditions is being monitored. These include influenza, rubella, measles, chicken pox, pertussis and gastroenteritis.

The case definitions for these conditions are as follows:

Influenza

(a) Viral culture or serological evidence of influenza virus infection, or

(b) influenza epidemic, plus four of the criteria in (c), or

(c) six of the following:

(i) sudden onset (within 12 hours)

(ii) cough

(iii) rigors or chills

(iv) fever

(v) prostration and weakness

(vi) myalgia, widespread aches and pains

(vii) no significant respiratory physical signs other than redness of nasal mucous membrane and throat

(viii) influenza in close contacts.

Table 4. Geographic locations of ASPREN recorders, 1996

State or Territory	Recorder
Australian Capital Territory	2
New South Wales	23
Northern Territory	1
Queensland	13
South Australia	31
Tasmania	6
Victoria	18
Western Australia	5
TOTAL	99

Rubella

(a) an acute exanthem with enlarged lymph nodes, most prominently sub occipital and post auricular, with a macular rash on the face, spreading to the trunk and proximal portions of the limbs, or

(b) serological evidence of rubella infection.

Measles

(a) serological or virological evidence of acute measles, or

(b) two of the following:

(i) prodrome including infected conjunctivae, fever and cough

(ii) white specks on a red base in the mucous membranes of the cheek (Koplik's spots)

(iii) confluent maculopapular eruption spreading over the face and body, or

(c) an atypical exanthem in a partially immune person during an epidemic of measles.

Chickenpox

An acute, generalised viral disease with a sudden onset of slight fever, mild constitutional symptoms and a skin eruption which is maculopapular for a few hours, vesicular for 3 to 4 days and leaves a granular scab.

Table 5. Australian Sentinel Practice Research Network reports, weeks 1 to 4, 1996

Condition	Week 1, to 7 January 1996		Week 2, to 14 January 1996		Week 3, to 21 January 1996		Week 4, to 28 January 1996	
	Reports	Rate per 1000 encounters	Reports	Rate per 1000 encounters	Reports	Rate per 1000 encounters	Reports	Rate per 1000 encounters
Influenza	24	3.0	35	3.9	33	3.9	17	2.2
Rubella	15	1.8	11	1.2	7	0.8	5	0.6
Measles	1	0.1	0	0.0	1	0.1	1	0.1
Chickenpox	45	5.5	42	4.7	21	2.5	15	1.9
Pertussis	6	0.7	4	0.4	4	0.5	1	0.1
Gastroenteritis	298	36.6	191	21.1	117	13.9	100	12.7

Pertussis

(a) Respiratory infection with a characteristic staccato paroxysmal cough ending with a high-pitched inspiratory whoop, or

(b) respiratory infection with persistent cough (3 weeks) in a contact with known pertussis, or

(c) demonstration of *Bordetella pertussis.*

Gastroenteritis

Intestinal disease, presumed or proven to be infective in origin, recorded once only.

CDI will publish weekly counts for influenza, rubella, measles, chickenpox, pertussis and gastroenteritis in 1996.

Reports for weeks 1 to 4, 1996

Data for the first 4 weeks of 1996 are presented in this issue of *CDI* (Table 5). The rate of reporting of chickenpox rose in early January whilst that for gastroenteritis rose in late December / early January, but has since declined.

Virology and Serology Reporting Scheme

There were 1585 reports received in the *CDI* Virology and Serology Reporting Scheme this period (Tables 6, 7 and 8).

- Six reports of **measles** were received this period. Diagnosis was by IgM detection in all cases.
- **Rubella** was reported for 14 patients this period. Diagnosis was by IgM detection (13) and single high titre (one). Nine patients were male and 5 female. Fewer reports were received in 1995 than for any year since 1992 (Figure 4).
- **Hepatitis A** was reported for 11 patients this period including 7 males and 4 female.
- Positive **hepatitis B** serology was reported for 53 patients this fortnight including 33 males and 19 females (one sex not stated). Thirty-nine of the patients were aged between 15 and 44 years.
- Three hundred and nineteen reports for **hepatitis C** were received this period. Included were 198 males and 108 females (13 sex not stated). Diagnosis was by antibody detection (301) and nucleic acid detection (18).
- Seventy-three cases for **Ross River** virus were reported this period diagnosed by IgM detection (71) and fourfold change in titre (2). Sixty four of the patients were aged between 25 and 64 years. The number of reports has increased in recent weeks (Figure 5).
- Two reports of **Barmah Forest virus** were reported from the Northern Territory both diagnosed by IgM detection. Fewer reports were received for 1995 than for any year since 1991 (Figure 6).
- **Dengue** not typed was reported for two patients this period both diagnosed by IgM detection. Included was a 44 year old female who had recently returned from overseas travel.
- One report of **Kunjin** virus was received this period. The patient was a 62 year old female from the Northern Territory. Diagnosis was by IgM detection.

Figure 4. Rubella laboratory reports, 1993 to 1995, by month of specimen collection

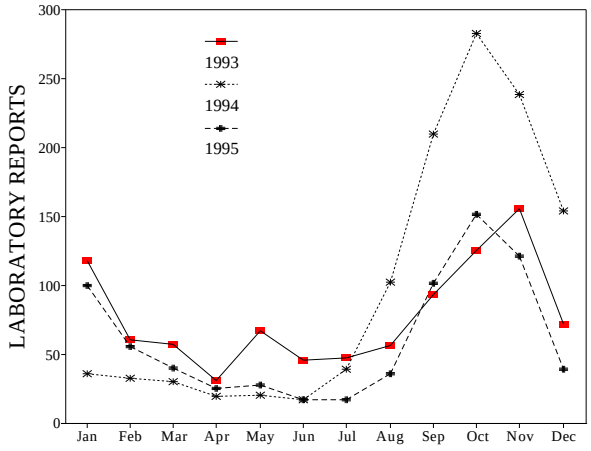


Figure 5. Ross River virus laboratory reports, 1992 to 1996, by month of specimen collection

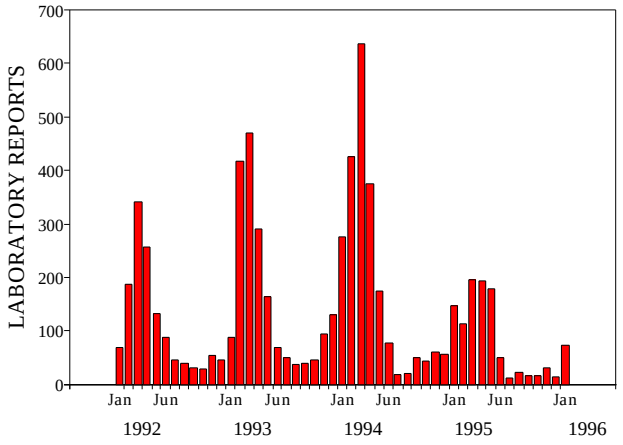
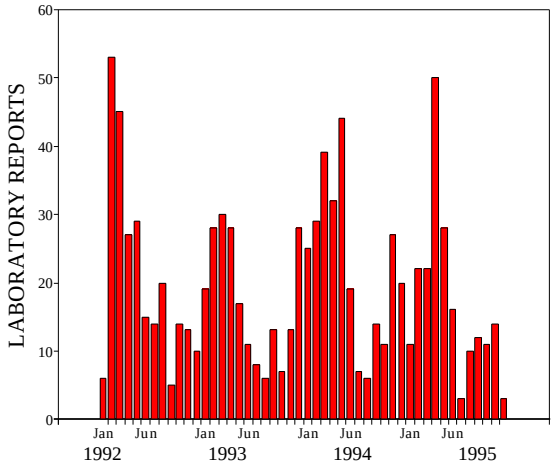


Figure 6. Barmah Forest virus laboratory reports, 1992 to 1995, by month of specimen



- Thirty-one reports of **adenovirus** were received this period diagnosed by virus isolation (21) antigen detection (9) and fourfold rise in titre (one). Reports of **untyped adenovirus** were received for 28 patients.
- **Herpes simplex virus type 1** was reported for 225 patients this reporting period. Diagnosis was by virus isolation (210) and antigen detection (15).
- Two hundred and thirty-nine reports of **herpes simplex virus type 2** were received this period. Diagnosis was by virus isolation (232) and antigen detection (7).
- Five reports of **herpes simplex virus** untyped were received this period all diagnosed by virus isolation.
- Forty reports of **cytomegalovirus** were received this period. Diagnosis was by virus isolation (24), nucleic acid detection (one) and IgM detection (15). Included were 2 HIV/AIDS patients and 6 transplant recipients.
- **Varicella-zoster virus** was reported for 45 patients this period. Diagnosis was by virus isolation (30), IgM detection (8), nucleic acid detection (5) and antigen detection (2).
- Sixty-three reports of **Epstein-Barr virus** were received this reporting period. Diagnosis was by IgM detection in all cases.
- Fourteen reports of **herpes virus group (not typed)** were reported this period. Diagnosis was by virus isolation (13) and nucleic acid detection (one).
- **Molluscum contagiosum** was reported for one patient from Western Australia this period.
- Ten reports of **parvovirus** were reported for this period. Included were 2 males and 8 females. Five of the females were of childbearing age.
- Twelve reports of **Rhinovirus** were received this period. Diagnosis was by virus isolation. Reports were received from New South Wales (3), Victoria (6), South Australia (2) and Western Australia (one).
- Thirty-eight reports of **enterovirus not typed** were received this period. Diagnosis was by virus isolation (28) and nucleic acid detection (4).
- **Influenza A** was reported for 6 patients this period. Diagnosis was by single high titre (5) and total antibody titre (one). Included were 4 males and 2 females.
- **Influenza B** was reported for 2 patients this period. Diagnosis was by single high titre and fourfold change in titre.
- **Parainfluenza virus type 1** was reported for one patient this period. Diagnosis was by single high titre.
- One report of **parainfluenza virus type 2** was received this period, diagnosed by virus isolation.
- **Parainfluenza virus type 3** was reported for 22 patients this reporting period. Diagnosis was by virus isolation (3), antigen detection (2) and single high titre (17). Reports were received from Western Australia (18), New South Wales (2) and South Australia (2). The number of reports has declined in recent months.
- Seventeen reports of **respiratory syncytial virus (RSV)** were received this reporting period. Methods of diagnosis included virus isolation (9), single high titre (5) and antigen detection (3). Reports were received from Western Australia (11), New South Wales (3), Queensland (one), South Australia (one) and Victoria (one).
- **Human T-cell lymphotropic virus (HTLV-1)** was reported for one patient this period. The patient was a 78 year old male from Alice Springs.
- **Rotavirus** was reported for 28 patients this period. Twenty-three reports were for patients under 4

years of age. Included were 16 females and 12 males.

- ***Chlamydia trachomatis*** was reported for 172 patients this period. Diagnosis was by isolation (37), antigen detection (7) and nucleic acid detection (128). Included were 121 females and 50 males (one sex not stated).
- ***Chlamydia psittaci*** was reported for one patient this reporting period. Diagnosis was by single high titre.
- Twenty-eight reports of ***Mycoplasma pneumoniae*** were received this period. Included were 14 females and 13 males (one sex not stated). Methods of diagnosis included single high titre (7), IgM detection (7), fourfold change in titre (5) and total antibody (9).
- ***Mycoplasma hominis*** was reported for one patient this period.
- ***Bordetella pertussis*** was reported for 41 patients this reporting period. Diagnosis was by antigen detection (5), single high titre (25), IgA detection (9) and other methods (2). Of the reports received this period, 14 were from Victoria and 27 from Western Australia.
- Two reports of ***Legionella longbeachae*** were reported this period from Western Australia. Diagnosis was by fourfold change in antibody titre.
- Two reports of ***Leptospira species*** were received this period. Included were two males aged 30 and 52 years. Diagnosis was by fourfold change in antibody titre.
- Eight reports of ***Treponema pallidum*** were received this period. Diagnosis was by single high titre (5) and detection of IgM (3). Six of the patients were males and two were female.
- One report of ***Entamoeba histolytica*** was reported this period. Diagnosis was by single high titre.
- Twenty-three cases of ***Schistosoma species*** were reported this period. Diagnosis was by single high titre (22) and fourfold change in titre. Reports received for 1995 (180) were higher than for any other year of the scheme.

Table 6. Virology and serology laboratory reports by State or Territory[1] for the reporting period 25 January to 7 February 1995, historical data[2], and total reports for the year

	State or Territory[1]								Total this ortnight	Historical data[2]	Total reported this year
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA			
MEASLES, MUMPS, RUBELLA											
Measles virus							2	4	6	39.3	11
Rubella virus		2			2			10	14	27.7	119
HEPATITIS VIRUSES											
Hepatitis A virus			2					9	11	15.5	62
Hepatitis B virus						1	4	48	53	76.5	260
Hepatitis C virus		1	16			18	10	274	319	192.7	764
ARBOVIRUSES											
Ross River virus			4					69	73	85.0	101
Barmah Forest virus			2						2	7.0	14
Dengue not typed								2	2	.5	2
Kunjin virus			1						1	.0	1
ADENOVIRUSES											
Adenovirus type 1					1				1	3.2	7
Adenovirus type 3					1				1	2.0	34
Adenovirus type 7					1				1	1.0	12
Adenovirus not typed / pending		3	1		2		5	17	28	30.8	269
HERPES VIRUSES											
Herpes simplex virus type 1		4	3		41	4	30	143	225	164.8	945
Herpes simplex virus type 2			5		41	1	41	151	239	175.5	978
Herpes simplex not typed / pending		5							5	20.0	68
Cytomegalovirus	1	7			4	1	6	21	40	35.0	231
Varicella-zoster virus					6		6	33	45	40.8	207
Epstein-Barr virus		6			11		5	41	63	70.0	318
Herpes virus group - not typed								14	14	.5	24

Table 6. Virology and serology laboratory reports by State or Territory[1] for the reporting period 25 January to 7 February 1995, historical data[2], and total reports for the year, continued

	State or Territory[1]								Total this ortnight	Historical data[2]	Total reported this year
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA			
OTHER DNA VIRUSES											
Molluscum contagiosum								1	1	.2	1
Parvovirus								10	10	6.8	26
PICORNA VIRUS FAMILY											
Echovirus not typed / pending								23	23	.5	23
Rhinovirus (all types)		3			2		6	1	12	14.2	127
Enterovirus not typed / pending							8	30	38	26.7	170
ORTHO / PARAMYXOVIRUSES											
Influenza A virus							1	5	6	11.0	37
Influenza B virus		1						1	2	2.3	20
Parainfluenza virus type 1								1	1	1.2	6
Parainfluenza virus type 2								1	1	.5	6
Parainfluenza virus type 3		2			2			18	22	11.3	177
Respiratory syncytial virus		3		1	1		1	11	17	14.8	177
OTHER RNA VIRUSES											
HIV-1								1	1	2.7	20
HTLV-1			1						1	.2	1
Rotavirus		1		5	12	3	3	4	28	19.3	215
OTHER											
Chlamydia trachomatis not typed		8	27		11	3	19	104	172	88.2	491
Chlamydia psittaci								1	1	6.3	38
Mycoplasma pneumoniae					5		2	21	28	25.3	78
Mycoplasma hominis							1		1	.0	1
Bordetella pertussis			2				14	25	41	25.5	98
Legionella longbeachae								2	2	.0	4
Leptospira species								2	2	.7	5
Treponema pallidum			2					6	8	18.2	44
Entamoeba histolytica								1	1	.5	6
Schistosoma species						1		22	23	1.0	72
TOTAL	1	46	66	6	143	32	164	1127	1585	1265.2	6270

1. State or Territory of postcode, if reported, otherwise State or Territory of reporting laboratory.
2. The historical data are the averages of the numbers of reports in 6 previous 2 week reporting periods: the corresponding periods of the last 2 years and the periods immediately preceding and following those.

Table 7. Virology and serology laboratory reports by clinical information for the reporting period 25 January to 7 February 1995

	Encep halitis	Meningitis	Other CNS	Congenital	Respiratory	Gastrointestinal	Hepatic	Skin	Eye	Muscle/joint	Genital	Other/unknown	Total
MEASLES, MUMPS, RUBELLA													
Measles virus								3				3	6
Rubella virus								6				8	14
HEPATITIS VIRUSES													
Hepatitis A virus							11						11
Hepatitis B virus							3					50	53
Hepatitis C virus							50					269	319
ARBOVIRUSES													
Ross River virus								4		22		47	73
Barmah Forest virus												2	2
Dengue not typed												2	2
Kunjin virus										1			1
ADENOVIRUSES													
Adenovirus type 1					1								1
Adenovirus type 3									1				1
Adenovirus type 7					1								1
Adenovirus not typed / pending					6	14			6			2	28
HERPES VIRUSES													
Herpes simplex virus type 1					3	1		174	3		38	6	225
Herpes simplex virus type 2				1				136			102		239
Herpes simplex not typed / pending								4				1	5
Cytomegalovirus			1		7							32	40
Varicella-zoster virus	1							39				5	45
Epstein-Barr virus					23							40	63
Herpes virus group - not typed								12			1	1	14
OTHER DNA VIRUSES													
Molluscum contagiosum								1					1
Parvovirus								3				7	10
PICORNA VIRUS FAMILY													
Echovirus not typed / pending					19	3						1	23
Rhinovirus (all types)					10							2	12
Enterovirus not typed / pending	2	2	1		10	13		1				9	38
ORTHO / PARAMYXOVIRUSES													
Influenza A virus					5							1	6
Influenza B virus					1							1	2
Parainfluenza virus type 1					1								1
Parainfluenza virus type 2					1								1
Parainfluenza virus type 3					13							9	22
Respiratory syncytial virus					13							4	17

Table 7. Virology and serology laboratory reports by clinical information for the reporting period 25 January to 7 February 1995, continued

	Encephalitis	Meningitis	Other CNS	Congenital	Respiratory	Gastrointestinal	Hepatic	Skin	Eye	Muscle/joint	Genital	Other/unknown	Total
OTHER RNA VIRUSES													
HIV-1												1	1
HTLV-1												1	1
Rotavirus						27						1	28
OTHER													
Chlamydia trachomatis not typed								1	1		119	51	172
Chlamydia psittaci					1								1
Mycoplasma pneumoniae					19							9	28
Mycoplasma hominis												1	1
Bordetella pertussis					36							5	41
Legionella longbeachae					1							1	2
Leptospira species												2	2
Treponema pallidum												8	8
Entamoeba histolytica												1	1
Schistosoma species												23	23
TOTAL	3	2	2	1	171	58	64	384	11	23	260	606	1585

Table 8. Virology and serology laboratory reports by contributing laboratories for the reporting period 25 January to 7 February 1995

STATE OR TERRITORY	LABORATORY	REPORTS
New South Wales	Royal Alexandra Hospital for Children, Camperdown	19
	Royal Prince Alfred Hospital, Camperdown	26
Queensland	Nambour Hospital	8
South Australia	Institute of Medical and Veterinary Science, Adelaide	144
Tasmania	Royal Hobart Hospital, Hobart	31
Victoria	Microbiological Diagnostic Unit, University of Melbourne	4
	Monash Medical Centre, Melbourne	28
	Royal Children's Hospital, Melbourne	56
	Unipath Laboratories	73
Western Australia	PathCentre Virology, Perth	972
	Western Diagnostic Pathology	224
TOTAL		1585