

Australia's notifiable diseases status, 1996

Annual report of the National Notifiable Diseases Surveillance System

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Abstract

In 1996 there were 65,024 notifications to the National Notifiable Diseases Surveillance System. The record high number of Ross River virus infection notifications was of particular note. The highest rates were recorded in Western Australia, where an outbreak was documented in the South West, and in Queensland. Most cases occurred in the late summer and early autumn months. The number of measles cases has continued to fall markedly following the outbreak in 1993 and 1994. Rubella notifications also fell in 1996. The number of cases of pertussis remained at a similar level to that recorded in recent years, the highest notification rate being recorded for children under the age of one year. A peak in late 1996 marked a resurgence in the pertussis epidemic which has continued into 1997. Notifications of *Haemophilus influenzae* type b continued to decline reaching a record low rate of 0.3 notifications per 100,000 population. For the enteric diseases, the number of cases of campylobacteriosis rose, with an annual adjusted notification rate of 100.4 per 100,000 population; more notifications were received for this disease than for any other in 1996. The number of hepatitis A cases also rose relative to 1995. This is a reversal of the trend observed in recent years when the notification rate fell. The number of cases of salmonellosis and shigellosis remained stable. Notifications for chlamydial infection and gonococcal infection rose relative to 1995, whilst those for syphilis fell. *Comm Dis Intell* 1997;21:281-307.

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Introduction

Notification of communicable diseases is an important public health activity. It prompts investigation and the use of interventions to control the spread of diseases. Notification also enables the monitoring of the effectiveness of existing control activities. Many communicable disease control activities are conducted at local government or State level. This requires local and State-based surveillance. National surveillance combines data from the State and Territory-based systems. National surveillance is necessary for control activities in outbreaks which affect more than one jurisdiction, to monitor the need for, and impact of, national control programs and to guide national policy development. National surveillance also describes the epidemiology of rare diseases for which there are only a few notifications in each State. It also assists in quarantine activities and facilitates agreed international collaborations such as reporting to the World Health Organization.

The National Notifiable Diseases Surveillance System (NNDSS) was established in its current form in 1991, under the auspices of the Communicable Diseases Network Australia New Zealand (CDNANZ). The CDNANZ monitors the incidence of an agreed list of communicable diseases in Australia. This is achieved through the national collation of notifications of these diseases received by health authorities of the States and Territories. More than forty diseases or disease categories are included, largely as recommended

by the NHMRC¹. Annual reports of the NNDSS have been published since 1991^{2,3,4,5,6}.

Methods

Notifications of communicable diseases were collected during 1996 by the States and Territories under their public health legislations. These were collated and analysed fortnightly by the Department of Health and Family services and published in *Communicable Diseases Intelligence*. Final data sets for cases reported in 1996 were provided by the States and Territories between June and August 1997. Missing data and apparent errors were corrected where possible, and duplicate records deleted, in consultation with the States and Territories. For the purposes of the NNDSS, where a patient being treated in one jurisdiction was diagnosed in another, notifications were made according to the State or Territory of the diagnosing medical practitioner.

The national data set included fields for: a unique record reference number; the disease; age, sex, Aboriginality and postcode of residence of the case; the date of onset of the disease and date of report to the State or Territory health authority; and the confirmation status of the report. Aboriginality was not included in the analyses due to incomplete reporting of this information.

Population notification rates were calculated using 1996 mid-year estimates of the resident population supplied by the Australian Bureau of Statistics. In cases where a disease was not notifiable in a State or Territory an adjusted rate was calculated using a denominator which excluded the population of that State or Territory. Maps were produced using postcode of residence of the case.

Most analyses were based on cases with report dates in 1996. The data included some notifications with onset dates in 1995, and excluded notifications with report dates in 1997 and onset dates in 1996. For analysis of seasonal trends, notifications were reported by month of onset.

Notifications were allocated to the Australian Bureau of Statistics Statistical Divisions for mapping using postcodes of residence of the cases (Figure 1). The two Statistical Divisions which make up the Australian Capital Territory were combined, as the population for one division is very small. Notifications for Darwin and the remainder of the Northern Territory were also combined to calculate rates for the Northern Territory as a whole. For South Australia, data for sexually transmissible diseases were combined for the whole state. In general, notification rates for Statistical Divisions were depicted in maps or discussed in the text only where the number of notifications was sufficiently large for these to be meaningful.

Notes on interpretation

The notifications compiled by the NNDSS may be influenced by a number of factors which should be considered when interpreting the data. Due to under-reporting, notified cases mostly represent only a proportion of the total number of cases which occurred. This proportion may vary between diseases, between States and Territories and with time. Methods of surveillance vary between jurisdictions, each with different requirements for notification by medical practitioners, laboratories and hospitals. In addition, the list of notifiable diseases and the case definitions may vary between jurisdictions.

Postcode information was well reported but, as it is usually the postcode of residence, it may not necessarily represent the place of acquisition or diagnosis of the disease, or the area in which public health actions were taken in response to the notification. Duplicate checking between the State data sets was not possible, so there may be duplicate reports if patients moved from one jurisdiction to another and were notified in both. Some Statistical Divisions have small populations (Figure 1), so small numbers of cases may result in high notification rates in these areas.

The data are limited as they do not include risk factor information other than age, sex, and postcode of residence. Other risk factor information is compiled in data sets supplementary to the NNDSS, for *Haemophilus influenzae* type b infection⁷, tuberculosis and non-tuberculosis mycobacterial infection^{8,9}, and are reported separately.

National HIV and AIDS surveillance is conducted by the National Centre in HIV Epidemiology and Clinical Research, which reports separately¹⁰. The non-tuberculosis mycobacterial infection notifications are included in the National Mycobacterial Surveillance System which also reports separately⁹.

Results

There was a total of 65,024 communicable disease notifications for 1996 (Table 1). Notification rates per 100,000 population for each disease are described in Table 2. There was an increase of 13% in total notifications compared with 1995 (Table 3). The total number of notifications has remained fairly stable over the last five years.

Data were missing from some fields in some records. Information was missing in the field for sex for 244 notifications (0.3%), age for 436 (0.7%), and postcode of residence for 2,535 (3.9%). The proportion of reports with missing data in these fields varied by State or Territory, and also by disease.

There were changes in notification totals and rates for several diseases in 1996 compared with recent years. These included decreases in *Haemophilus influenzae* type b infection, measles and rubella. There were increases in notifications for Ross River virus infection, campylobacteriosis and chlamydial infection.

In the remainder of this report, data on individual notifiable diseases are described and discussed in disease groups.

Surveillance reports

Bloodborne diseases

In Australia, as in most developed countries, bloodborne transmission is an important mechanism for the spread of hepatitis B, hepatitis C, hepatitis D and HIV infection^{11,12}. For some of these diseases, other modes of transmission, including sexual contact and vertical transmission are also important. Many other diseases can be transmitted via blood, blood products, serum and other body fluids¹¹.

Within the NNDSS, data are collated for hepatitis B, hepatitis C and hepatitis D. The notification of incident and unspecified cases of these diseases has varied between States and Territories, and over time.

National case definitions for incident hepatitis B and hepatitis C require the presence of current clinical illness together with serological evidence of infection; or alternatively, specific serological evidence of recent infection or seroconversion¹. Notifications for hepatitis B or hepatitis C which are not accompanied by evidence of recent infection are classified as 'unspecified'.

Since 1994, all States and Territories have distinguished incident cases of hepatitis B in data provided to the NNDSS. However, hepatitis C infection may cause very mild or subclinical illness, and in the absence of symptoms, ascertaining the time of infection currently requires the documentation of prior testing and seroconversion. Further, three States do not currently distinguish hepatitis C (incident) cases from other reports of hepatitis C infection in notifications reported to the NNDSS. Reports of hepatitis C (unspecified) are therefore included in this report, although data for this category are not submitted by New South Wales or South Australia.

Map 1. Australian Bureau of Statistics Statistical Divisions

Statistical Division	Population	Statistical Division	Population	Statistical Division	Population
<i>Australian Capital Territory</i>		<i>Queensland continued</i>		<i>Victoria</i>	
805 Canberra	307,692	320 Darling Downs	199,912	205 Melbourne	3,283,014
810 ACT - balance	333	325 South West	26,496	210 Barwon	239,722
<i>New South Wales</i>		330 Fitzroy	178,046	215 Western District	100,228
105 Sydney	3,879,370	335 Central West	12,506	220 Central Highlands	134,767
110 Hunter	555,503	340 Mackay	120,262	225 Wimmera	52,233
115 Illawarra	372,973	345 Northern	192,373	230 Mallee	87,239
120 Richmond-Tweed	200,663	350 Far North	210,695	235 Loddon-Campaspe	157,472
125 Mid-North Coast	262,602	355 North West	35,954	240 Goulburn	182,796
130 Northern	178,589	<i>South Australia</i>		245 Ovens-Murray	89,159
135 North Western	117,275	405 Adelaide	1,079,184	250 East Gippsland	80,670
140 Central West	172,483	410 Outer Adelaide	104,406	255 Gippsland	153,517
145 South Eastern	179,002	415 Yorke & Lower North	44,071	<i>Western Australia</i>	
150 Murrumbidgee	149,156	420 Murray Lands	67,477	505 Perth	1,295,132
155 Murray	110,937	425 South East	62,718	510 South West	167,452
160 Far West	25,341	430 Eyre	33,028	515 Lower Great Southern	50,168
<i>Northern Territory</i>		435 Northern	83,505	520 Upper Great Southern	19,840
705 Darwin	82,408	<i>Tasmania</i>		525 Midlands	51,484
710 NT - balance	99,515	605 Greater Hobart	195,795	530 South Eastern	56,449
<i>Queensland</i>		610 Southern	34,466	535 Central	59,030
305 Brisbane	1,520,596	615 Northern	134,097	540 Pilbara	40,509
310 Moreton	618,060	620 Mersey-Lyell	110,234	545 Kimberley	25,674
315 Wide Bay-Burnett	224,209			TOTAL AUSTRALIA	18,308,487

Table 1. National Notifiable Diseases Surveillance System reports, 1996, by State or Territory and disease

Disease	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
Arbovirus infection NEC ¹	0	15	28	3	0	0	6	0	52
Barmah Forest virus infection	1	169	-	576	2	0	41	48	837
Botulism ²	0	-	0	NN	0	0	0	NN	0
Brucellosis	0	0	0	34	0	0	3	1	38
Campylobacteriosis ²	256	-	262	3,030	2,638	456	3,555	1,961	12,158
Chancroid	0	0	0	0	NN	1	2	0	3
Chlamydial infection (NEC)	119	NN	645	3,254	1,094	277	1,614	1,417	8,420
Cholera	0	2	0	1	1	0	0	0	4
Dengue	1	16	6	11	3	0	0	6	43
Diphtheria	0	0	0	0	0	0	0	0	0
Donovanosis	0	NN	21	5	NN	0	0	24	50
Gonococcal infection ³	18	538	787	1,028	305	2	366	1,129	4,173
<i>Haemophilus influenzae</i> type b	2	13	5	11	7	1	11	1	51
Hepatitis A	62	980	76	416	38	9	460	109	2,150
Hepatitis B - incident	4	47	5	34	18	8	98	11	225
Hepatitis C - incident	10	22	3	-	31	6	-	-	72
Hepatitis C - unspecified	270	-	217	2,884	-	291	4,597	1,230	9,489
Hepatitis (NEC) ⁴	0	15	0	9	2	0	10	NN	36
Hydatid infection	4	14	0	10	0	2	14	1	45
Legionellosis	2	67	2	19	25	2	36	39	192
Leprosy	0	1	6	0	0	0	0	3	10
Leptospirosis	0	31	0	109	1	8	75	3	227
Listeriosis	3	20	0	8	15	1	19	4	70
Lymphogranuloma venereum	0	NN	0	0	NN	0	0	NN	0
Malaria	27	215	26	389	21	5	110	56	849
Measles	10	204	26	93	13	23	96	33	498
Meningococcal infection	8	164	9	92	18	12	93	30	426
Mumps	7	29	5	NN ⁶	14	3	51	19	128
Ornithosis	0	NN	0	14	3	1	63	4	85
Pertussis	33	1,112	16	766	690	30	1,201	183	4,031
Plague	0	0	0	0	0	0	0	0	0
Poliomyelitis	0	0	0	0	0	0	0	0	0
Q fever	0	284	0	177	5	0	61	28	555
Rabies	0	NN	0	0	0	0	0	0	0
Ross River virus infection	1	1,041	131	4,935	25	74	138	1,478	7,823
Rubella	85	369	7	948	373	35	856	172	2,845
Salmonellosis (NEC)	60	1,244	422	2,009	377	129	939	639	5,819
Shigellosis ²	3	-	149	242	57	2	73	150	676
Syphilis	14	751	291	301	39	13	20	94	1,523
Tetanus	0	0	0	0	0	0	1	1	2
Tuberculosis	17	438	31	145	41	11	302	82	1,067
Typhoid ⁵	2	42	0	9	4	0	23	4	84
Viral haemorrhagic fever (NEC)	0	0	0	0	0	0	0	0	0
Yellow fever	0	0	0	0	0	0	0	0	0
Yersiniosis (NEC) ²	0	-	2	192	53	0	15	6	268
TOTAL	1,019	7,843	3,178	21,754	5,913	1,402	14,949	8,966	65,024

NN Not notifiable

NEC Not elsewhere classified

- Elsewhere classified

1. Northern Territory: includes Barmah Forest virus infection

2. New South Wales: only as 'foodborne disease' or 'gastroenteritis in an institution'.

3. Northern Territory, Queensland, South Australia and Victoria includes gonococcal neonatal ophthalmia.

4. Includes Hepatitis D and E

5. Includes paratyphoid in New South Wales and Victoria, and from July 1996 in Queensland.

6. Mumps became notifiable in Queensland from July 1996; one case was reported during the remainder of the year.

Table 2. National Notifiable Diseases Surveillance System notification rates per 100,000 population, 1996, by State or Territory and disease

Disease	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
Arbovirus infection NEC ¹	0	0.2	15.4	0.1	0	0	0.1	0	0.3
Barmah Forest virus infection	0.3	2.7	-	17.3	0.1	0	0.9	2.7	4.6
Botulism ²	0	0	0	NN	0	0	0	NN	0
Brucellosis	0	0	0	1.0	0	0	0.1	0.1	0.2
Campylobacteriosis ²	83.1	0	144.0	90.7	178.9	96.1	77.9	111.1	100.4
Chancroid	0	0	0	0	NN	0.2	0	0	0
Chlamydial infection (NEC)	38.6	NN	354.5	97.	74.2	58.4	35.4	80.2	69.6
Cholera	0	0	0	0	0.1	0	0	0	0
Dengue	0.3	0.3	3.3	0.3	0.2	0	0	0.3	0.2
Diphtheria	0	0	0	0	0	0	0	0	0
Donovanosis	0	NN	11.5	0.1	NN	0	0	1.4	0.5
Gonococcal infection ³	5.8	8.7	432.6	30.8	20.7	0.4	8.0	63.9	22.8
<i>Haemophilus influenzae</i> type b	0.6	0.2	2.7	0.3	0.5	0.2	0.2	0	0.3
Hepatitis A	20.1	15.8	41.8	12.4	2.6	1.9	10.1	6.2	11.7
Hepatitis B - incident	1.3	0.8	2.8	1.0	1.2	1.7	2.1	0.6	1.2
Hepatitis C - incident	3.2	0.4	1.6	-	2.1	1.3	-	-	0.8
Hepatitis C - unspecified	87.7	-	119.3	86.4	-	61.3	100.8	69.7	89.3
Hepatitis (NEC) ⁴	0	0.2	0	0.3	0.1	0	0.2	NN	0.2
Hydatid infection	1.3	0.2	0	0.3	0	0.4	0.3	0	0.2
Legionellosis	0.6	1.1	1.1	0.6	1.7	0.4	0.8	2.2	1.0
Leprosy	0	0	3.3	0	0	0	0	0.2	0.1
Leptospirosis	0	0.5	0	3.3	0.1	1.7	1.6	0.2	1.2
Listeriosis	1.0	0.3	0	0.2	1.0	0.2	0.4	0.2	0.4
Lymphogranuloma venereum	0	NN	0	0	NN	0	0	NN	0
Malaria	8.8	3.5	14.3	11.6	1.4	1.1	2.4	3.2	4.6
Measles	3.2	3.3	14.3	2.8	0.9	4.8	2.1	1.9	2.7
Meningococcal infection	2.6	2.6	4.9	2.8	1.2	2.5	2.0	1.7	2.3
Mumps	2.3	0.5	2.7	NN ⁶	0.9	0.6	1.1	1.1	0.9
Ornithosis	0	NN	0	0.4	0.2	0.2	1.4	0.2	0.7
Pertussis	10.7	17.9	8.8	22.9	46.8	6.3	26.3	10.4	22.0
Plague	0	0	0	0	0	0	0	0	0
Poliomyelitis	0	0	0	0	0	0	0	0	0
Q fever	0	4.6	0	5.3	0.3	0	1.3	1.6	3.0
Rabies	0	NN	0	0	0	0	0	0	0
Ross River virus infection	0.3	16.8	72.0	147.8	1.7	15.6	3.0	83.7	42.7
Rubella	27.6	5.9	3.8	28.4	25.3	7.4	18.8	9.7	15.5
Salmonellosis (NEC)	19.5	20.1	232.0	60.2	25.6	27.2	20.6	36.2	31.8
Shigellosis ²	1.0	-	81.9	7.2	3.9	0.4	1.6	8.5	5.6
Syphilis	4.5	12.1	160.0	9.0	2.6	2.7	0.4	5.3	8.3
Tetanus	0	0	0	0	0	0	0	0.1	0
Tuberculosis	5.5	7.0	17.0	4.3	2.8	2.3	6.6	4.6	5.8
Typhoid ⁵	0.6	0.7	0	0.3	0.3	0	0.5	0.2	0.5
Viral haemorrhagic fever (NEC)	0	0	0	0	0	0	0	0	0
Yellow fever	0	0	0	0	0	0	0	0	0
Yersiniosis (NEC) ²	0	-	1.1	5.8	3.6	0	0.3	0.3	2.2

NN Not notifiable

NEC Not elsewhere classified

- Elsewhere classified

1. Northern Territory and Western Australia: Includes Barmah Forest virus infection

2. New South Wales: only as 'foodborne disease' or 'gastroenteritis in an institution'.

3. Northern Territory, Queensland, South Australia and Victoria includes gonococcal neonatal ophthalmia.

4. Includes Hepatitis D and E

5. Includes paratyphoid in New South Wales and Victoria, and from July 1996 in Queensland.

6. Mumps became notifiable in Queensland from July 1996; one case was reported during the remainder of the year.

Table 3. National Notifiable Diseases Surveillance System reports and notification rates, 1992 to 1996, by year¹ and disease

Disease	Notifications					Rate per 100,000 population				
	1992	1993	1994	1995	1996	1992	1993	1994	1995	1996
Arbovirus infection (NEC)	303	578	587	67	52	1.8	3.3	3.3	0.4	0.3
Barmah Forest virus infection	-	-	-	756	837	-	-	-	4.7	4.6
Botulism	0	0	0	0	0	0	0	0	0	0
Brucellosis	29	20	34	29	38	0.2	0.1	0.2	0.2	0.2
Campylobacteriosis	9,135	8,111	10,117	10,933	12,158	54.2	69.6	85.8	91.6	100.4
Chancroid	5	1	0	2	3	0.1	0	0	0	0
Chlamydial infection (NEC)	6,293	6,500	6,159	6,411	8,420	56.6	55.8	55.3	53.7	69.6
Cholera	3	6	3	5	4	0	0	0	0	0
Dengue	366	690	17	34	43	2.2	4.5	0.1	0.2	0.2
Diphtheria	14	1	0	0	0	0.1	0	0	0	0
Donovanosis	78	67	117	85	50	1.0	0.7	1.1	0.8	0.5
Gonococcal infection	2,908	2,811	2,971	3,259	4,173	17.3	15.9	16.7	18.1	22.8
<i>Haemophilus influenzae</i> type b	501	396	169	74	51	3.0	2.2	1.0	0.4	0.3
Hepatitis A	2,109	2,006	1,894	1,601	2,150	12.5	11.4	10.6	8.9	11.7
Hepatitis B - incident	133	278	327	321	225	2.3	2.2	1.9	1.8	1.2
Hepatitis C - incident	-	30	43	69	72	-	0.4	0.6	0.8	0.8
Hepatitis C - unspecified	8,812	7,542	8,898	9,601	9,489	63.6	73.9	86.2	91.8	89.3
Hepatitis (NEC)	70	72	42	55	36	0.5	0.5	0.3	0.3	0.2
Hydatid infection	38	32	56	46	45	0.2	0.2	0.3	0.3	0.2
Legionellosis	185	178	179	160	192	1.1	1.0	1.0	0.9	1.0
Leprosy	16	15	11	7	10	0.1	0.1	0.1	0	0.1
Leptospirosis	159	178	123	148	227	0.9	1.0	0.7	0.8	1.2
Listeriosis	38	53	34	58	70	0.3	0.3	0.2	0.3	0.4
Lymphogranuloma venereum	3	1	2	1	0	0	0	0	0	0
Malaria	712	688	703	625	849	4.2	3.9	3.9	3.5	4.6
Measles	1,425	4,536	4,895	1,324	498	8.5	25.7	27.4	7.3	2.7
Meningococcal infection	292	378	383	382	426	1.7	2.1	2.2	2.1	2.3
Mumps	23	28	94	153	128	0.2	0.2	0.5	1.0	0.9
Ornithosis	94	98	85	176	85	0.9	0.8	0.7	1.5	0.7
Pertussis	739	3,990	5,633	4,297	4,031	4.4	22.6	31.6	23.8	22.0
Plague	0	0	0	0	0	0	0	0	0	0
Poliomyelitis	0	0	0	0	0	0	0	0	0	0
Q fever	543	889	667	473	555	3.2	5.0	3.7	2.6	3.0
Rabies	0	0	0	0	0	0	0	0	0	0
Ross River virus infection	5,630	5,428	3,974	2,602	7,823	36.5	31.6	22.9	14.4	42.7
Rubella	3,810	3,812	3,315	4,380	2,845	22.6	21.6	18.6	24.3	15.5
Salmonellosis (NEC)	4,614	4,731	5,283	5,895	5,819	27.4	26.8	29.6	32.7	31.8
Shigellosis	694	708	724	734	676	6.2	6.1	6.1	6.1	5.6
Syphilis	2,695	2,305	2,324	1,854	1,523	16.0	13.1	13.0	10.3	8.3
Tetanus	14	10	15	7	2	0.1	0.1	0.1	0	0
Tuberculosis	970	1,071	1,024	1,073	1,067	5.8	6.1	5.7	5.9	5.8
Typhoid	50	72	50	69	84	0.3	0.4	0.3	0.4	0.5
Viral haemorrhagic fever (NEC)	0	0	0	0	0	0	0	0	0	0
Yellow fever	0	0	0	0	0	0	0	0	0	0
Yersiniosis (NEC)	567	459	414	306	268	3.4	3.9	3.5	2.6	2.2
TOTAL	59,156	60,745	61,726	5,8074	65,382	351.1	344.0	345.9	321.7	357.1

NEC Not Elsewhere Classified.

NN Not notifiable.

- Elsewhere classified.

1. Not all diseases were notifiable in every State and Territory every year.

National case definitions include a category 'Hepatitis (not otherwise specified)', in which cases reported to the NNDSS as hepatitis D, hepatitis E or hepatitis (not elsewhere classified) are aggregated (Table 1). For these three categories, reporting practices vary between States and Territories.

National data on HIV infection and AIDS are separately reported by the National Centre in HIV Epidemiology and Clinical Research¹⁰.

Hepatitis B

There were 225 cases of hepatitis B (incident) reported in 1996. This corresponds to a notification rate of 1.2 per 100,000 population. This is less than the rates of 1.9 and 1.8 reported for 1994 and 1995 respectively (Table 3).

The 225 notifications included 160 reports (71%) from the six metropolitan Statistical Divisions which represent the State capital cities. Eighty-five cases were reported for Melbourne; the corresponding rate of 2.6 per 100,000 population being the highest rate for any Statistical Division except for a small number of slightly higher rates which were based on very low numbers of cases.

The male:female ratio was 1.9:1. The highest age group specific notification rates were seen in the age range 15 - 34 years (Figure 1).

Hepatitis C

There were 72 reports of incident hepatitis C received from the Australian Capital Territory, New South Wales, the Northern Territory, South Australia and Tasmania. The male:female ratio was 2.3:1, and 90% of the cases were aged between 20 and 39 years.

Almost 9,500 cases of hepatitis C (unspecified) were notified to the NNDSS for 1996 (Table 1) by all States and Territories except South Australia and New South Wales; the corresponding notification rates ranged from 61 to 119 cases per 100,000 population. Many, if not most, of these cases represent past or continuing chronic infection. Nearly 83% of the notified cases of hepatitis C (unspecified) were aged in the range 20 - 44 years; the male:female ratio was 1.7:1. However, it is likely that these figures reflect patterns of testing rather than the true age and sex specific prevalence of present or past infection.

Hepatitis D

There were 19 reports of hepatitis D received in 1996 from New South Wales and Queensland; 18 of these were for males, and all were aged between 20 and 59 years.

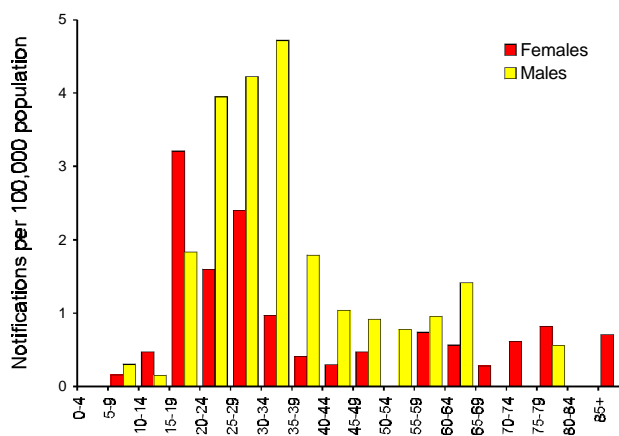
Hepatitis - not elsewhere classified

In addition, 16 reports of hepatitis (not elsewhere classified) were received from New South Wales, Queensland, South Australia and Victoria.

Discussion

Although notification data on incident cases of hepatitis B have been received from all States and Territories only since 1994, rates calculated from the available data suggest that the incidence of new infection has been declining for several years (Table 3). This may reflect increasing awareness of the mechanisms of transmission, and the prevention of infection through education and immunisation. The implementation of recent national recommendations on

Figure 1. Notifications of Hepatitis B, 1992-1996, by age group and sex



hepatitis B immunisation should help to further reduce the incidence of new infection.

The number of reports of incident hepatitis C seriously underestimates the true incidence of new infection with this virus. A 1995 trial of enhanced surveillance, conducted in most States and Territories, estimated the incidence at 7.8 per 100,000 population (not taking into account asymptomatic infections)¹³. This rate corresponds to approximately 1,400 new infections annually for Australia.

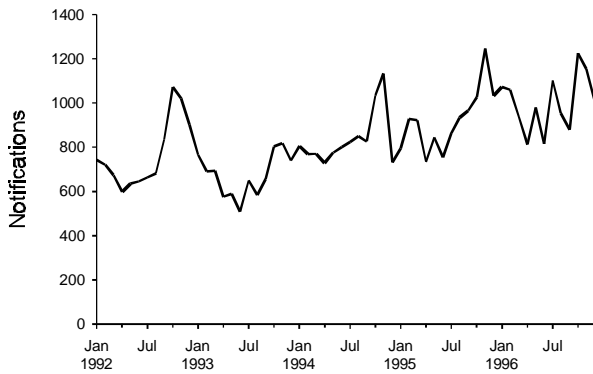
However, this and other estimates of hepatitis C incidence are subject to biases including: presence of subclinical infection, self-selection for testing, limitations of available laboratory procedures and the survey methods used¹⁴. Further studies are needed to gain a better understanding of past and present rates of transmission.

Gastrointestinal diseases

Gastrointestinal diseases are an important cause of illness in Australia. However, data from the NNDSS are likely to underestimate the incidence of disease due to gastrointestinal pathogens. A number of diseases such as enterohaemorrhagic *E. coli* infection and cryptosporidiosis, are not nationally notifiable. In addition, only a small proportion of cases come to the attention of physicians, and diagnostic tests to establish an aetiology are only used in a small proportion of these. Moreover, current laboratory testing protocols may not include tests for all significant gastrointestinal pathogens (for example not all laboratories routinely test for *Yersinia* species) or the tests may not have sufficient sensitivity.

A 1994 survey of New Zealand laboratories showed that the only organisms tested for in all stool specimens by all laboratories were *Salmonella* and *Shigella* species, although there was only one laboratory that did not test for *Campylobacter* species. Other organisms were selectively tested for depending on the clinical request, the clinical data, the age of the patient, and the appearance of the specimen¹⁵. Australian surveys are required, firstly to determine the extent of reporting barriers, and secondly, to measure the incidence of community acquired gastrointestinal pathogens. These surveys would enable better interpretation of NNDSS data; determination of the relative importance of specific pathogens; and help inform clinicians and laboratories of the circumstances under which

Figure 2. Notifications of campylobacteriosis, 1992-1996, by month of onset



they should suspect and test for various gastrointestinal pathogens.

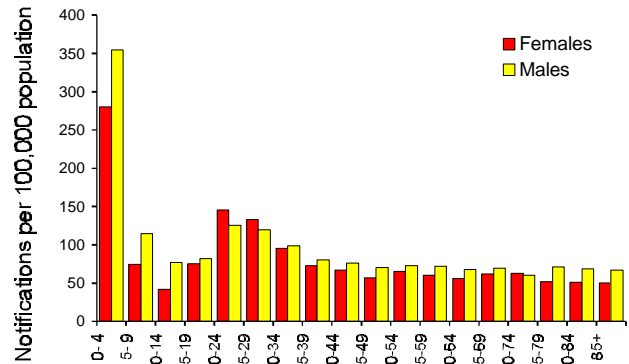
Botulism

There were no cases of botulism reported in 1996. There have been no notifications of this disease reported since the NNDSS began in its present form in 1991.

Campylobacteriosis

There were 12,158 cases of campylobacteriosis reported in 1996, an 11.2% increase over the number reported for 1995. The rate of notification of campylobacteriosis has continued to rise since 1992 (Table 3); in 1996, it had the highest annual adjusted rate of notification (100.4 per 100,000 population) for any notified disease. In New South

Figure 3. Adjusted notification rate of campylobacteriosis, 1996, by age group and sex



Wales, campylobacteriosis was only notifiable as 'foodborne disease in two or more related cases' or 'gastroenteritis in an institution' and therefore was not included for this State.

Campylobacteriosis was reported from all jurisdictions where it was notifiable, with notifications peaking in the latter part of the year (Figure 2). The highest rate was reported in South Australia, 179 cases per 100,000 population (Map 2). Overall the male:female ratio was 1.2:1. The highest rates of notification were seen in the 0 - 4 years age group (males 355 and females 281 per 100,000 population respectively). A second smaller peak in notifications was seen in the 20 - 29 years age range (Figure 3).

Hepatitis A

There were 2,150 notifications of hepatitis A infection during 1996. The notification rate was 11.7 per 100,000 population;

Map 2. Notification rate of campylobacteriosis, 1996, by Statistical Division of residence

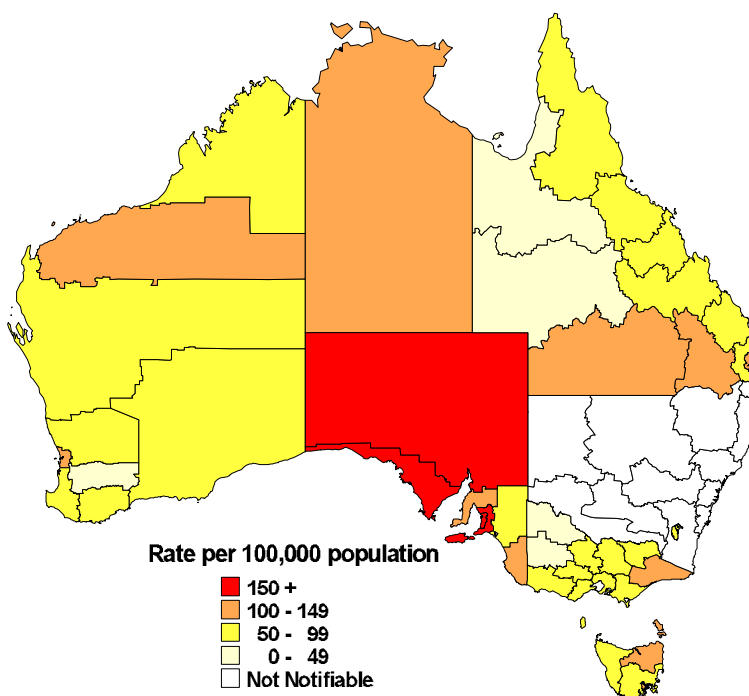
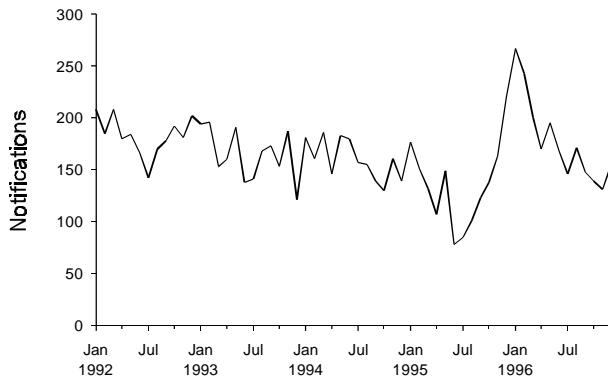


Figure 4. Notifications of hepatitis A infection, 1992-1996, by month of onset



this being the highest rate recorded since 1992, and against the trend of a decreasing rate observed in recent years (Table 3). Although the highest number of reports was from New South Wales (980), the highest notification rates were seen in the Northern Territory (42 per 100,000 population) and the Australian Capital Territory (20 per 100,000).

There has been no apparent seasonal distribution for hepatitis A infection notifications in recent years, although in 1996, a relatively high number were reported in January and February (Figure 4). The male:female ratio was 2.0:1. Age group specific notification rates were highest for males aged 20 - 34 years (Figure 5).

Listeriosis

Listeriosis was notified for 70 persons in 1996, from all States and Territories except the Northern Territory. The notification rate was 0.4 per 100,000 population which is consistent with the rates for the period 1992-1995. Fifty-three per cent of cases were in the 55 - 74 years age range.

Salmonellosis - not elsewhere classified

A total of 5,819 cases of salmonellosis (not elsewhere classified) was reported in 1996, the annual notification rate

Figure 6. Notifications of salmonellosis, 1992-1996, by month of onset

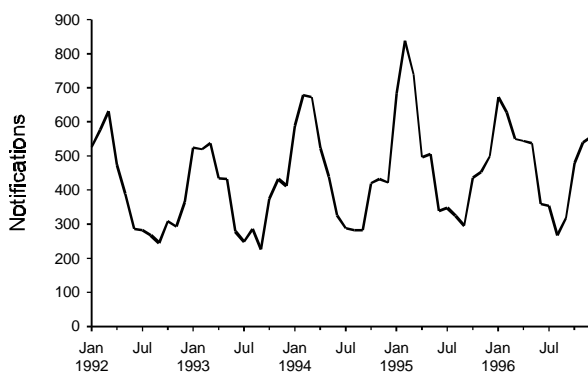
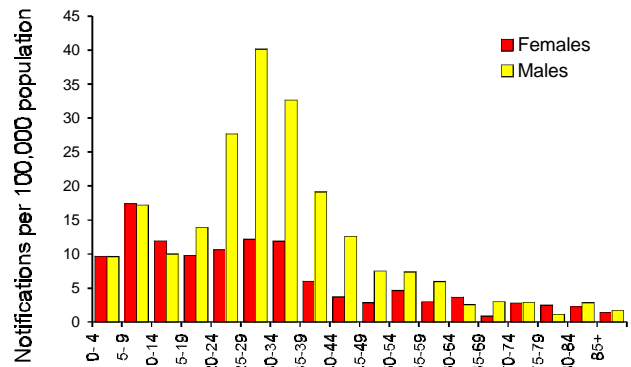


Figure 5. Notification rate of hepatitis A infection, 1996, by age group and sex



of 31.8 per 100,000 population being slightly lower than that seen in 1995 (Table 3). Disproportionately high rates, over 150 cases per 100,000 population, were reported for residents of the Northern Territory and parts of Western Australia and Queensland (Map 3).

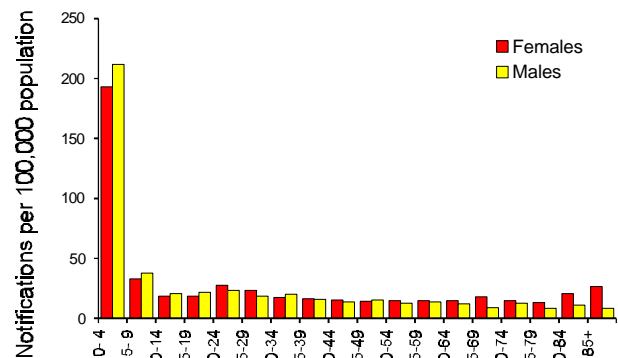
As in previous years, a seasonal trend was noted, with a higher number of notifications reported with month of onset in the warmer months (Figure 6). The highest rates of notification were seen in the 0 - 4 years age group (males 21.2 and females 19.3 per 100,000 population, respectively) (Figure 7).

Shigellosis

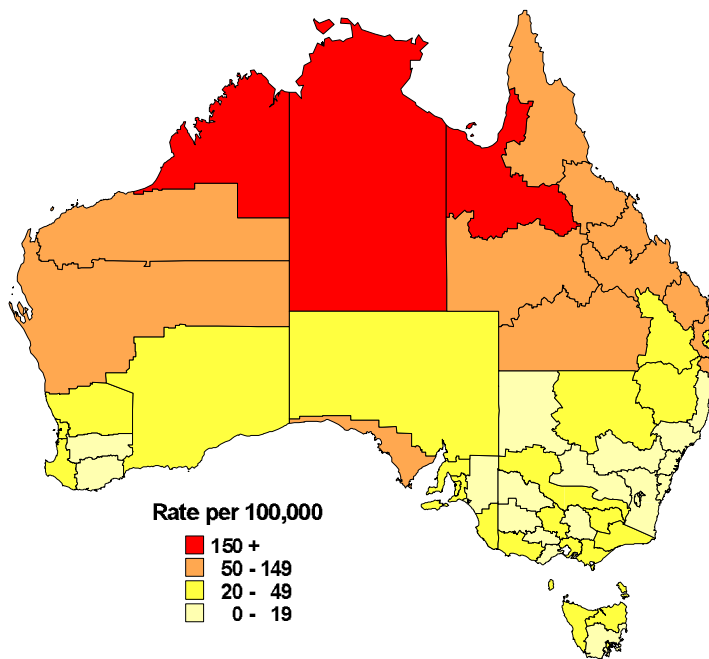
Shigellosis was notified for 676 persons in 1996, from all States and Territories except New South Wales, where it was only notifiable as 'foodborne disease in two or more related cases' or 'gastroenteritis in an institution'. The notification rate, 5.6 per 100,000 population, was less than the rates for each of the years 1992 to 1995. The highest rate was seen for residents of the Northern Territory (82 per 100,000 population).

No clear seasonal trend was seen in 1996, although cases usually occur more frequently in the warmer months of the

Figure 7. Notification rate of salmonellosis, 1996, by age group and sex



Map 3. Notification rate of salmonellosis, 1996, by Statistical Division of residence



year (Figure 8). The male:female ratio was 1:1.2. The highest age group specific numbers and rates occurred in the 0 - 4 years age group for both males and females (Figure 9).

Typhoid and paratyphoid

There were 84 cases of typhoid and paratyphoid notified in 1996, the notification rate being 0.5 per 100,000 population. There were 43 cases in males and 41 in females, with a male:female ratio of 1.0:1. The highest notification rates were in the 15 - 29 years age range. There was no apparent seasonal trend.

Yersiniosis

Yersiniosis was notified for 268 persons in 1996, from all States and Territories except New South Wales, where it

was only notifiable as 'foodborne disease in two or more related cases' or 'gastroenteritis in an institution'. Reports of yersiniosis have gradually decreased since 1992. The majority of reports were received from Queensland and South Australia (Table 1).

The male:female ratio was 1.2:1. The highest age group specific numbers and rates occurred in the 0 - 4 years age group for both males and females (Figure 10) with 33% of all cases notified being in this age group. Cases were most frequently reported for January, February and October (Figure 11).

Discussion

Campylobacteriosis and non-typhoidal salmonellosis are the predominant enteric pathogens reported to the NNDSS. These trends are similar to those recorded in other

Figure 8. Notifications of shigellosis, 1992-1996, by month of onset

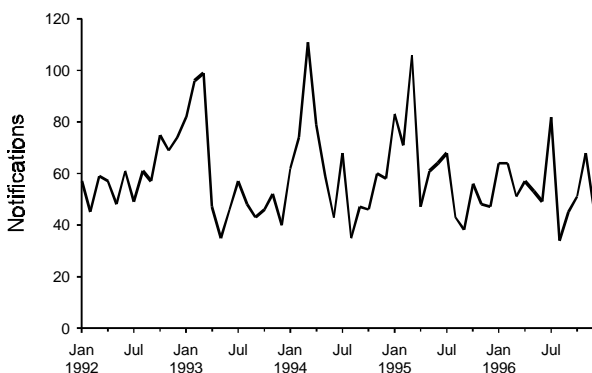


Figure 9. Adjusted notification rate of shigellosis, 1996, by age group and sex

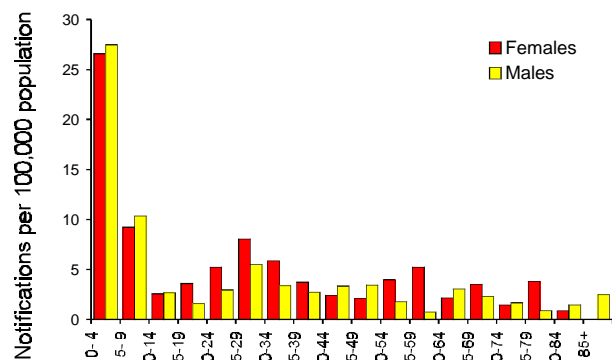
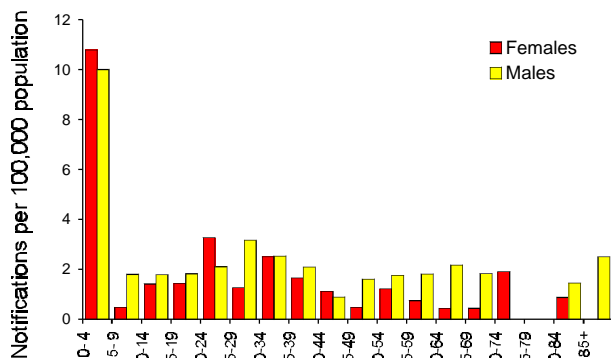


Figure 10. Adjusted notification rate of yersiniosis, 1996, by age group and sex



developed countries such as the United States of America and the United Kingdom¹⁶. In the case of salmonellosis, however, Australia differs, as we have not yet seen widespread disease due to *Salmonella enteritidis*. This pathogen is the main cause of foodborne disease in North America and parts of Europe, with hens' eggs the main source of human infection.

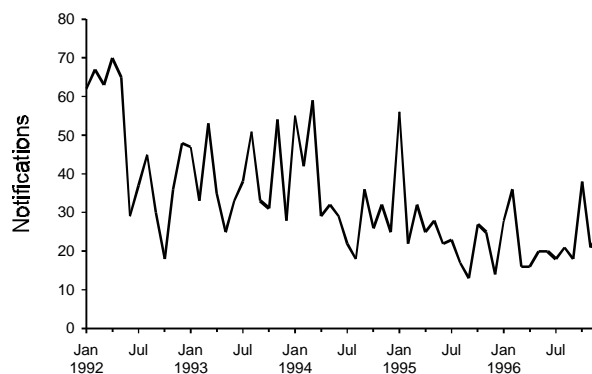
The continued rise in notifications of campylobacteriosis is of considerable public health concern. More knowledge is needed on the epidemiology of this disease to help determine the major sources of, and risk factors for, the transmission of *Campylobacter* species. Public health interventions may then be developed to reduce the incidence of disease. Although thought to be mainly transmitted by food, recent evidence suggests that drinking untreated or poorly treated water may be an important route of transmission for *Campylobacter* species. (Dr J Wright, Institute of Environmental Science and Research Limited (ESR), New Zealand; personal communication).

Of the remaining enteric pathogens described in this report, transmission is thought to be mainly via food for *Salmonella*, *Listeria* and *Yersinia* species. However, hepatitis A virus and *Shigella* species are mostly spread from one person to another¹⁷. With the exception of hepatitis A infection, notifications have either remained steady (salmonellosis and listeriosis) or have decreased (yersiniosis and shigellosis) in recent years. Outbreaks of hepatitis A in young homosexual men due to person-to-person transmission frequently occur, and the age and sex distribution of the reported cases during 1996 suggest that such outbreaks occurred during 1996. The oyster-associated outbreak of hepatitis A infection centred in the Wallis Lake region of New South Wales in 1997¹⁸ however, is a reminder that this and other potential foodborne pathogens may cause large and widespread disease outbreaks if food safety measures are inadequate.

Quarantinable diseases

In Australia, the diseases which are currently considered to be of human quarantine importance are cholera, plague, rabies, yellow fever and a group of viral haemorrhagic fevers (VHFs). The VHFs include disease due to Ebola, Marburg, Lassa fever, and Crimean-Congo haemorrhagic fever

Figure 11. Notifications of yersiniosis, 1992-1996, by month of onset



viruses. Cholera, plague and yellow fever are defined as quarantinable in the current World Health Organization (WHO) International Health Regulations (IHRs)¹⁹. Although not a signatory to the IHRs, Australia complies with the WHO requirements for reporting these diseases. The VHFs were not recognised at the time that the current IHRs were developed, but are considered to be quarantinable in many countries, and generally reported to the WHO. Rabies is a disease of both human and animal quarantine importance in Australia, which has status with WHO as a rabies-free country.

The diseases are notified to the NNDSS by all States and Territories except for rabies which is not notifiable in New South Wales. However, all cases of quarantinable diseases are formally notified to the National Centre for Disease Control by all States and Territories as they occur, regardless of whether they are notified to the NNDSS.

Cholera

Four reports of cholera were received in 1996, two from New South Wales and one each from Queensland and South Australia. All were due to *Vibrio cholerae* serogroup O1, biotyp El Tor. There were two females and two males, all in the age range 35 - 54 years. Three cases were imported, two from Thailand and one from Malaysia. The fourth case was laboratory acquired.

Plague, rabies, yellow fever and other viral haemorrhagic fevers

There were no cases of these diseases notified in 1996. There was one case of infection (leading to death) with a new lyssavirus, Australian bat lyssavirus. This virus is related to rabies and has been found in several species of bat in New South Wales, Queensland and the Northern Territory²⁰⁻²³.

Discussion

Cases of cholera in Australia usually occur in individuals who have been infected whilst travelling overseas, often in Asia. Travellers are advised to take appropriate precautions when travelling to endemic areas²⁴.

The WHO is drafting new International Health Regulations, which are expected to be released in the near future for comment. In Australia, a review of the human quarantine aspects of the *Quarantine Act 1908* is underway. Changes to the list of quarantinable diseases may result from these processes.

Sexually transmissible diseases

Diseases generally classified as sexually transmissible under surveillance in the NNDSS are chancroid, chlamydial infection, donovanosis, gonococcal infection, lymphogranuloma venereum and syphilis¹. An additional national laboratory based surveillance system, the Australian Gonococcal Surveillance Programme (AGSP), documents the antibiotic sensitivity of gonococcal isolates, together with some clinical and demographic data²⁵.

National data on HIV and AIDS are collected and reported separately by the National Centre in HIV Epidemiology and Clinical Research¹⁰. This centre has also recently begun to report on trends in sexually transmissible diseases. Several other important diseases are commonly or usually spread by sexual contact, but are not subject to national surveillance through the NNDSS. These include genital herpes (herpes simplex virus types I and II), genital warts (human papilloma virus, several types), trichomoniasis, cytomegalovirus, and parasitic infestations such as pubic lice and scabies^{11,26}.

Chancroid

Only one case of chancroid was reported in 1996, from Tasmania. The case was a male in the 25 - 29 years age group, who acquired the infection in West Africa.

Chlamydial infection

Chlamydial infection was not notifiable in New South Wales in 1996. Presumably most of the 8,420 cases reported from

the other seven States and Territories in 1996 were genital infections classified in accordance with the NHMRC case definition. However, it is likely that many of the cases reported in young children, particularly among the 52 cases reported in children less than 1 year of age, were cases of chlamydial conjunctivitis.

The adjusted rate for 1996 (69.6 per 100,000 population) was one of the highest reported for a notifiable disease. This rate was 30% higher than the rate reported for 1995 (Table 3). The increase occurred in all States and Territories for which data were available except Tasmania⁶. No seasonal trend was apparent.

Among notified cases the male:female ratio was 1:2.0. For both females and males, the highest rates of disease were recorded for the 20 - 24 years age group; 38% of cases in females and 36% of cases in males, were in this age group (Figure 12).

High notification rates were reported across northern Australia, including rates over 300 per 100,000 in the Statistical Division of Kimberley in Western Australia, the Northern Territory, and the Statistical Division of Far North Queensland (Map 4).

Donovanosis

Donovanosis was not notifiable in New South Wales or South Australia in 1996. A total of 50 notifications was received from Queensland, Western Australia and the Northern Territory (Table 1); none were received from the other States and Territories. Those cases reported from Queensland and Western Australia were from Statistical Divisions in the tropical north of those States.

The male:female ratio was 1:1.9. Eighty-four per cent of cases were reported in persons in the 15 - 44 years age range.

Map 4. Notification rate of chlamydial infection, 1996, by Statistical Division of residence

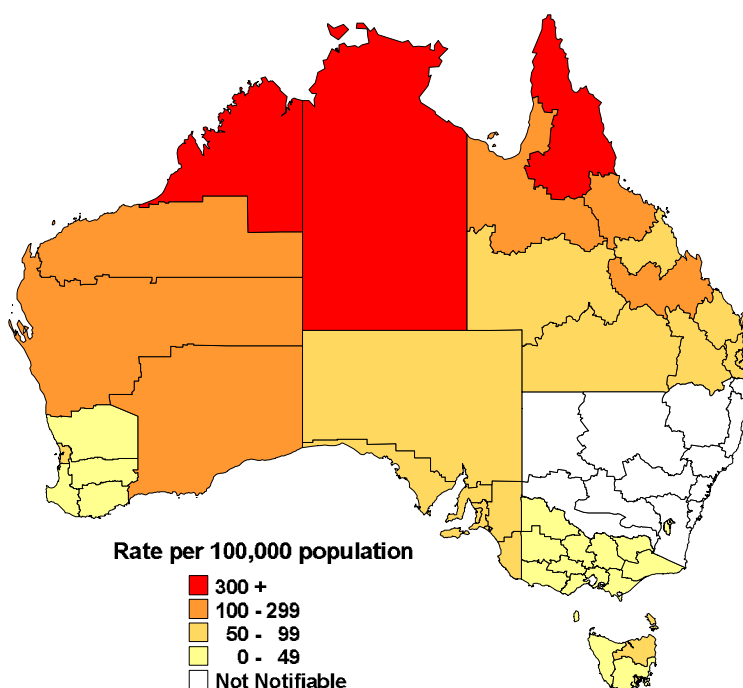


Figure 12. Notification rate of chlamydial infection, 1996, by age group and sex

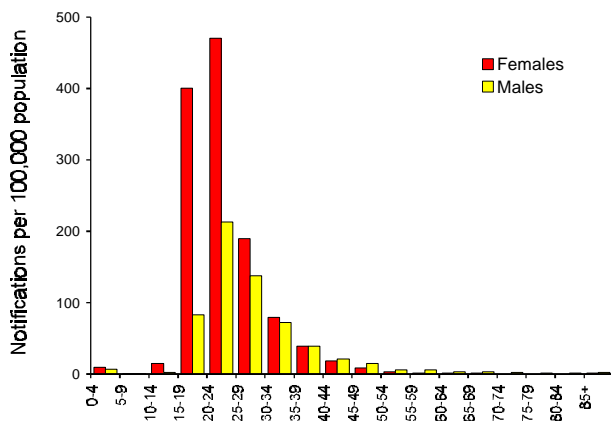
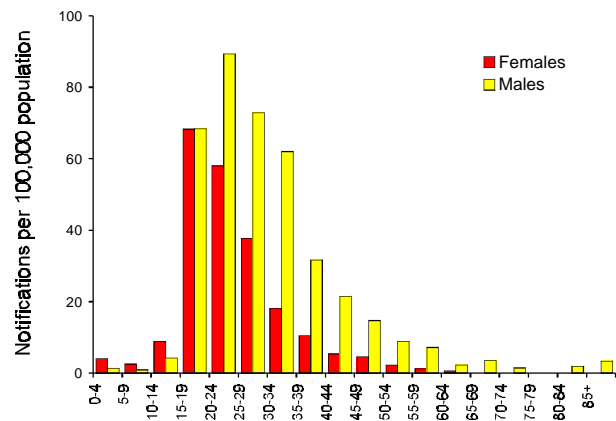


Figure 13. Notification rate of gonococcal infection, 1996, by age group and sex



Gonococcal infection

In 1996, a total of 4,173 notifications of gonococcal infection were received from all States and Territories (Table 1). The notification rate of 22.8 per 100,000 population was higher than in recent years (Table 3). However, this rate remains far below the very high rates recorded in the 1970s and early 1980s, which peaked at 84.4 per 100,000 population in 1982. No seasonal trend was apparent in 1996.

There was wide geographical variation in the rate of notification of gonococcal infection (Table 2, Map 5). The highest rate (above 2,000 per 100,000) was reported from the Statistical Division of Kimberley. Rates above 150 per 100,000 population were reported from the Statistical Divisions of the Pilbara and South Eastern in Western Australia, the Northern Territory, and the Statistical Division of Far North in Queensland.

The male:female ratio of 1.8:1 was lower than those reported in recent years. This change, together with the increase in the number of notifications, may reflect increased levels of diagnosis rather than increased incidence of infection. However, notification rates remain higher in males than females in all adult age groups (Figure 13). Of 34 notifications in children under 5 years, 13 (38%) were in infants under 1 year of age; 25 of the 34 cases (74%) were females.

Lymphogranuloma venereum

Lymphogranuloma venereum was not notifiable in New South Wales, Western Australia and South Australia in 1996. No cases were reported from the remaining States and Territories.

Map 5. Notification rate of gonococcal infection, 1996, by Statistical Division of residence

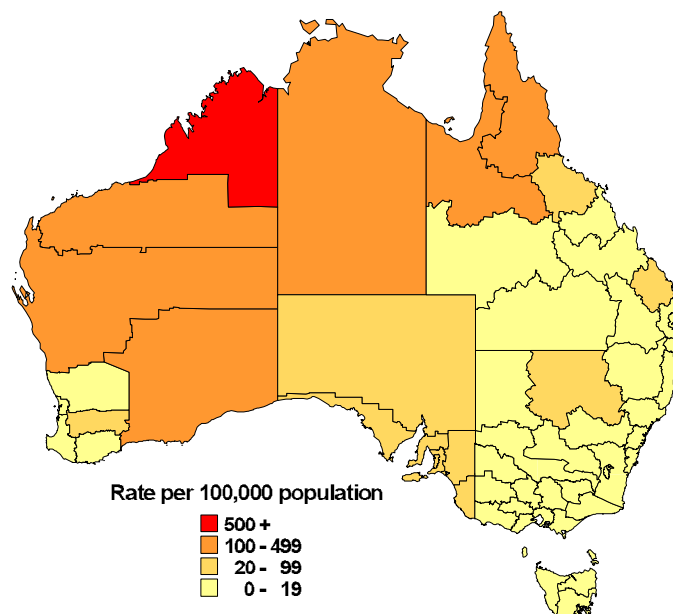
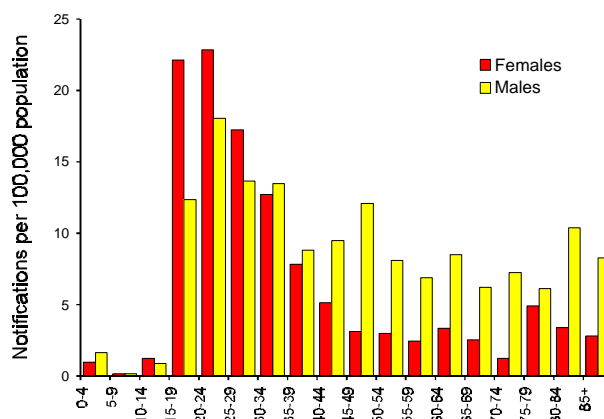


Figure 14. Notification rate of syphilis, 1970-1996, by year of report



Figure 15. Notification rate of syphilis, 1996, by age group and sex



Syphilis

A total of 1,523 notifications of syphilis was received in 1996 (Table 1), a rate of 8.3 per 100,000 population. This was the lowest rate observed in Australia for over 20 years (Figure 14).

There was wide geographical variation in the notification rate (Table 2, Map 6). High notification rates were reported for the Western Australian Statistical Division of Kimberley, the Northern Territory, and the Queensland Statistical Division of Far North.

The male:female ratio was 1.1:1. Among younger persons, notification rates were higher in females, and among older persons rates were higher in males (Figure 15).

In 1996, nine cases of congenital syphilis were reported including six infants under 1 year of age, and three adults over 35 years of age. There were 13 further cases of syphilis

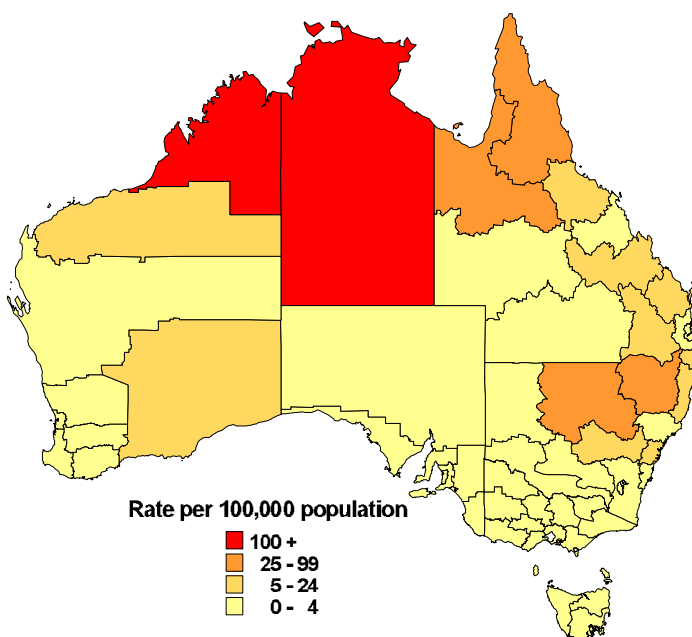
reported in children under 10 years of age, of which seven were infants under 1 year of age, and four were children aged 2 or 3 years of age; the remaining two cases were in children aged 6 and 9 years.

Caution should be exercised in interpreting syphilis surveillance data. Notifications from some jurisdictions may include reports of cases other than recent infections.

Discussion

The number of notifications of syphilis in Australia has continued to decline in recent years. However, the notifications for chlamydial and gonococcal infection were considerably higher in 1996 than recent years. Notification procedures, completeness of notifications and changing diagnostic tests can influence these numbers. Further discussion of HIV, AIDS and other sexually transmissible diseases is presented separately¹⁰.

Map 6. Figure 20. Notification rate of syphilis, 1996, by Statistical Division of residence



Vaccine preventable diseases

In Australia, vaccination against measles, diphtheria, tetanus, pertussis, rubella, poliomyelitis, mumps and *Haemophilus influenzae* type b (Hib) infection is part of the routine childhood immunisation schedule. Meningococcal disease can be prevented through vaccination, depending on the serogroup. However, routine vaccination is not recommended because the risk of meningococcal disease is relatively low in Australia and most disease is due to serogroup B²⁷ (for which no effective vaccine is available) or occurs in children too young to be adequately protected.

Diphtheria

There were no cases of diphtheria reported in 1996. The last notification of this disease in Australia was in 1993.

Haemophilus influenzae type b infection

Notifications of *Haemophilus influenzae* type b infection (Hib) have remained low since 1995 (Figure 16). There were 51 cases of Hib infection notified in 1996, an annual rate of 0.3 per 100,000 population. Since the introduction of conjugate Hib vaccines in 1992, the notification rate for children under the age of 5 years has dropped from 33.6 per 100,000 population in 1992 to 2.2 per 100,000 in 1996.

The male:female ratio for 1996 was 1.3:1. There were 13 notifications for children under the age of 1 year, at a rate of 5.1 per 100,000 population (Table 4).

Measles

Notifications of measles have remained low since the epidemic years of 1993 and 1994 (Figure 17). There were 498 cases reported to the NNDSS in 1996, with an annual notification rate of 2.7 per 100,000 population. Notifications were highest in the months from August to October. The highest notification rate was for children aged 0 - 4 years; 19.3 per 100,000 population (Figure 18). Within this age group, the highest notification rates were for children aged 1 year or less (Table 4). Caution needs to be exercised in interpreting the data for the under 1 year age group due to the difficulty in diagnosing measles in children of this age. Seventy-seven per cent of all cases were aged less than 20 years. Overall, the male to female ratio was 1.1:1.

Figure 16. Notifications of *Haemophilus influenzae* type b infection, 1992 to 1996, by month of onset

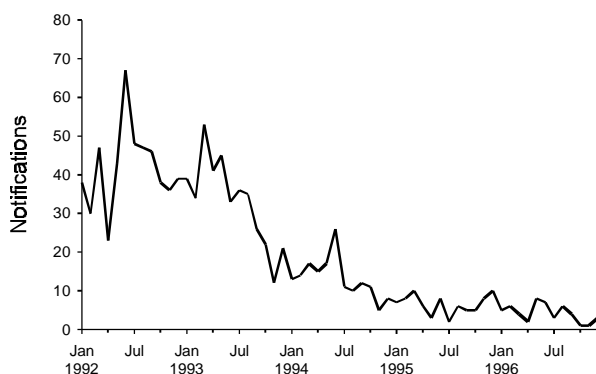


Table 4. Notification rates of vaccine preventable diseases for children under 5 years of age, 1996, by age

Age (years)	Notifications per 100,000 population				
	Hib	Measles	Meningococcal infection	Pertussis	Rubella
<1	5.1	35.2	24.2	74.7	36.0
1	1.9	35.8	15.0	29.7	34.7
2	1.2	9.2	10.0	26.1	12.3
3	1.9	6.1	8.0	29.1	9.2
4	0.8	10.6	5.8	35.3	6.5
5	1.9	6.0	2.3	36.2	8.3

Meningococcal infection

There were 426 notifications of meningococcal infection in 1996, a rate of 2.3 per 100,000 population. This is similar to previous years (Table 3). Serogroup identification undertaken by the Australian Meningococcal Surveillance Programme (AMSP) showed the overall pattern was one of sporadic endemic disease with occasional localised clusters. There were 296 isolates of *Neisseria meningitidis* examined by the AMSP in 1996. Sixty-three per cent of these were serogroup B and 29% serogroup C²⁷.

The NNDSS data demonstrated a marked seasonal pattern with 56% of cases reported as having onset between September and December (Figure 19). The male:female ratio was 1.2:1. The highest rates were for the 0 - 4 years age group, with a smaller secondary peak in the 15 - 19 year age group (Figure 20). There were 62 cases of meningococcal disease reported for children under 1 year of age, with a notification rate of 24.2 per 100,000 population.

Mumps

In all States and Territories other than Queensland, mumps has been a notifiable disease for some years. Mumps became notifiable in Queensland in July 1996. There were 128 cases reported, with an annual adjusted rate of 0.86 per 100,000 population (excluding Queensland). Forty per cent

Figure 17. Notifications of measles, 1992 to 1996, by month of onset

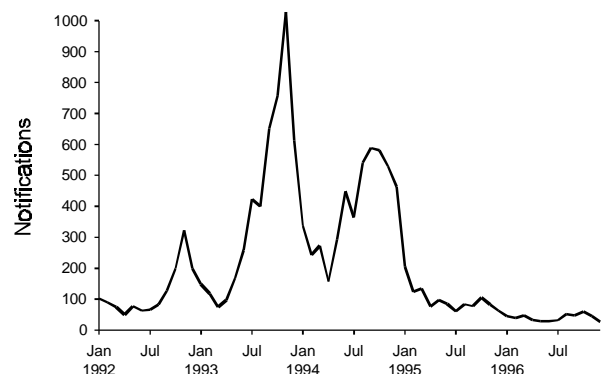


Figure 18. Notification rate of measles, 1996, by age group and sex

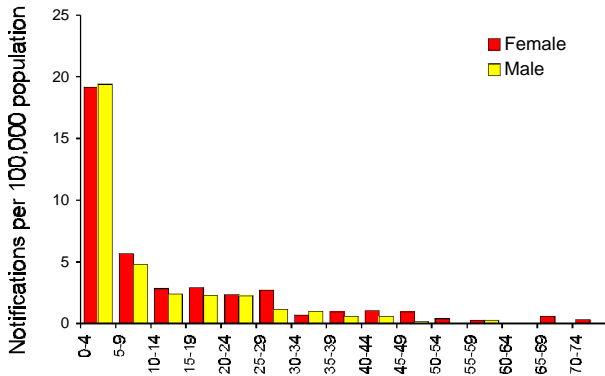


Figure 19. Notifications of meningococcal infection, 1992 to 1996, by month of onset

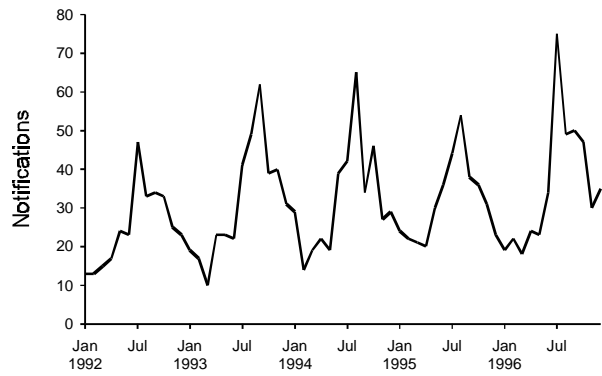


Figure 20. Notification rate of meningococcal infection, 1996, by age group and sex

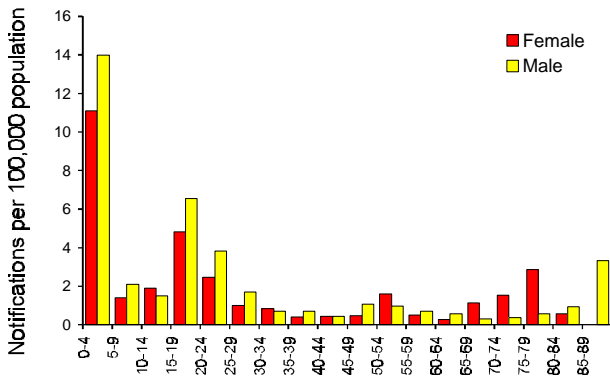


Figure 21. Notification rate of mumps, 1996, by age group and sex

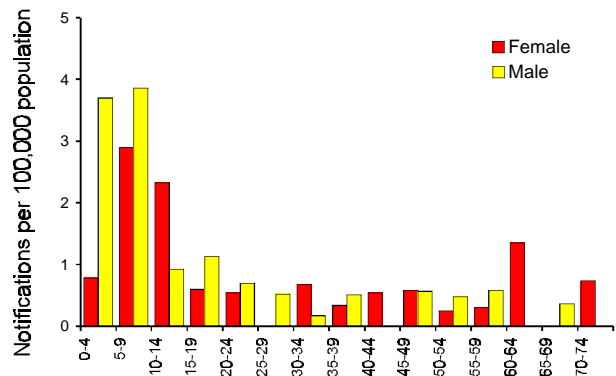


Figure 22. Notifications of pertussis, 1992 to 1996, by month of onset

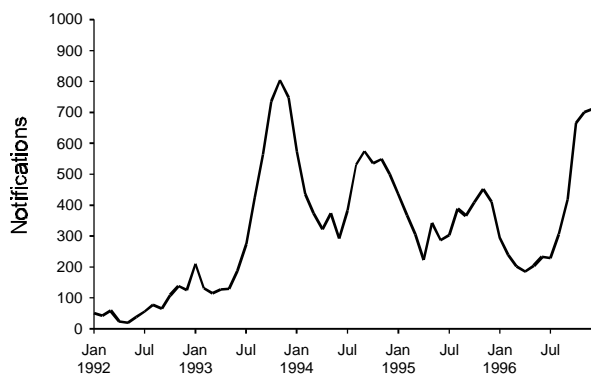
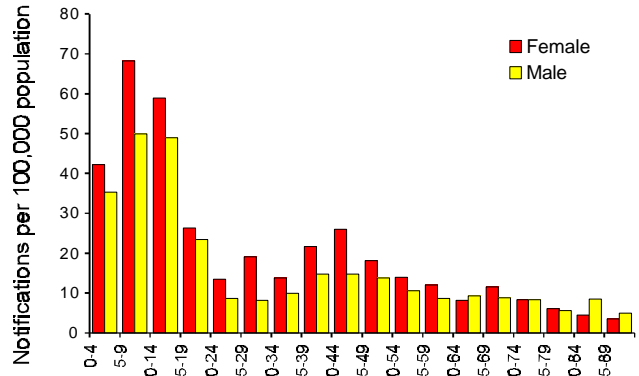


Figure 23. Notification rate of pertussis, 1996, by age group and sex



of the cases were reported from Victoria. There was no seasonal pattern observed.

The male:female ratio was 1.3:1. The notification rate was highest for children under 10 years of age (Figure 21), this group accounting for 47% of all cases. Whilst most reports were for males in the under 10 years age range, more females were reported in the 10 - 14 years age group.

Pertussis

There has been an increase in the number of pertussis notifications since 1993, with over 4,000 notifications each year (Figure 22). A peak late in 1996 marked a resurgence in the epidemic which continued into 1997²⁸. There were 4,031 cases reported in 1996 at an annual notification rate of 22.0 per 100,000 population. The highest number of cases of pertussis came from Victoria, followed by New South Wales. South Australia originally reported 1,048 cases, but has subsequently advised that only 690 of these cases were confirmed as fulfilling the NHMRC case definition.

The male:female ratio was 1:1.3. The notification rates were highest for all age groups under 15 years, with a smaller secondary peak among adults aged 35 - 44 years (Figure 23). While there was a substantial peak among school aged children, the highest notification rates were for children aged less than 1 year (202 cases), a rate of 79 per 100,000 population (Table 4). Analysis of the available data suggests that the introduction of the diphtheria-tetanus-pertussis (DTP) booster for 4 - 5 year old children in August 1994 may have prevented a large number of cases in the current epidemic²⁸.

The highest rate of notification was 146 per 100,000 population from the Mallee region in Victoria. Areas in South Australia and along the Murray River had rates ranging from 49.7 to 63.1 per 100,000 population (Map 7).

Poliomyelitis

No cases of poliomyelitis were notified in Australia in 1996. There have been no cases of disease due to the wild type virus since 1978, although vaccine associated cases were reported in 1986 and 1995²⁹.

Rubella

There were 2,845 cases of rubella notified in 1996. These included four cases of congenital rubella syndrome reported from New South Wales. There was a marked seasonal pattern, with most cases having onset during the months of September and October which is consistent with previous years (Figure 24).

The male:female ratio was 2.2:1. The highest notification rate was for the 15 - 19 years age group at 56.7 per 100,000 population. However, there was a marked predominance of males in this age group (94.5 per 100,000 population) compared to females (17.0 per 100,000 population) (Figure 25). There were 425 cases (15% of total) reported in females aged 15 - 44 years.

Tetanus

There were 2 notifications of tetanus in 1996, one each from Victoria and Western Australia. Both cases were aged over 54 years.

Discussion

There are gaps in the NNDSS which are particularly important to the surveillance of vaccine preventable diseases. The NNDSS does not collect information on the method of diagnosis or the date of birth of the cases (the data include age in years only)²⁸. Information on vaccination status is incomplete and therefore it is not possible to establish whether cases were not immunised, incompletely immunised or could be considered vaccine failures. Knowing the method of diagnosis, would enable the use of varying

Map 7. Notification rate of pertussis, 1996, by Statistical Division of residence

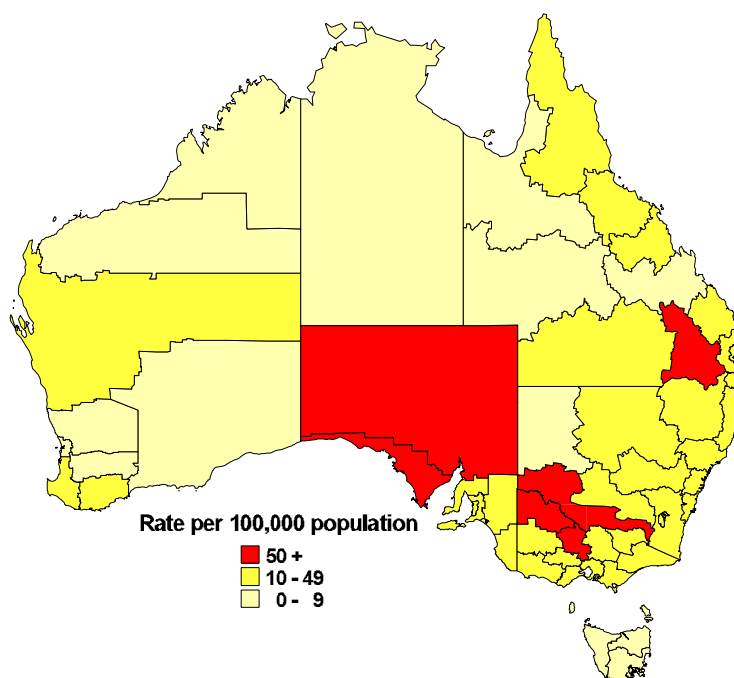
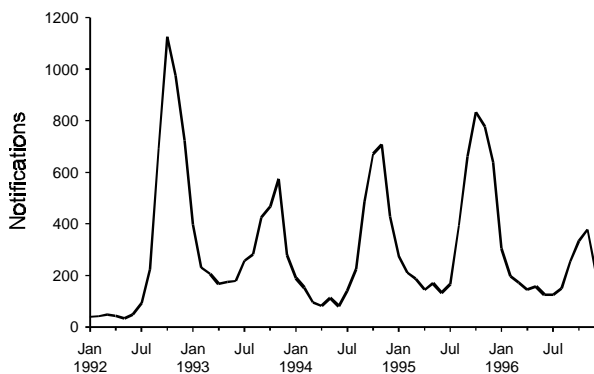


Figure 24. Notifications of rubella, 1992 to 1996, by month of onset



case definitions to assess the severity of disease and would enable sensitivity analyses to assess the effect of changing patterns of diagnosis on notification rates. The lack of information on date of birth prevents calculation of disease specific incidence rates for children under 1 year of age. This information is currently collected through a separate surveillance scheme for Hib⁷ and has been proposed as part of pertussis surveillance³⁰.

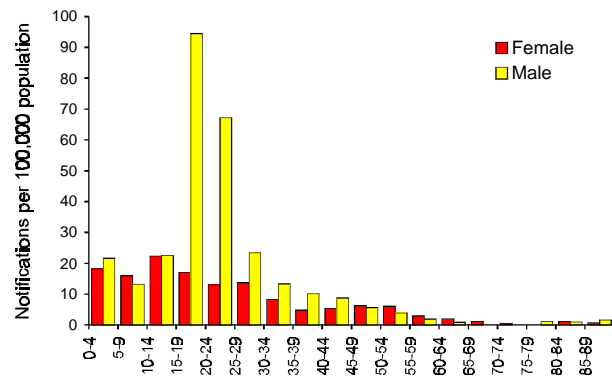
Poliomyelitis has been eliminated from Australia. With the Western Pacific countries, we are currently working to fulfill the criteria for certification of polio eradication. Invasive Hib disease could, with improved vaccination coverage, also be eliminated from Australia. Hib was the most frequent cause of bacterial meningitis among children before the introduction of the Hib vaccine in 1992. Since then there has been a 94% reduction in the number of cases of Hib in children under 5 years of age. While some of the cases notified to the NNDSS may be due to vaccine failure, the Hib Case Surveillance Scheme has shown that many cases are due to failure to vaccinate⁷.

While notifications of measles have remained low in 1996, it is likely that we are in an inter-epidemic period. Given the substantial epidemic in New Zealand which began in late February 1997³¹, the next epidemic in Australia may not be far away.

The increase in pertussis notifications observed at the end of 1993 and 1996 appear to be consistent with a typical pertussis cycle. Epidemics of pertussis usually occur every 3 to 4 years. Since 1993, there has been a sustained higher level of reporting, compared to previous years. This overall increase may be due to a number of factors including: poor vaccination coverage, waning immunity, the introduction of laboratory reporting in some States and Territories, increased awareness of pertussis and the requirement to notify, and/or increased testing, particularly serologic testing. The possibility that the introduction of the DTP booster for 4 - 5 year old children may have prevented a number of cases in the current outbreak is encouraging. However, the high rates among infants under 1 year of age continues to be of concern.

The problems that can arise from increased serologic testing are illustrated by the pertussis data provided to the NNDSS

Figure 25. Notification rate of rubella, 1996, by age group and sex



by South Australia. Following a review of their 1996 pertussis cases, South Australia advised that, of the originally reported cases (1,048), only 690 met the agreed case definition. These included 21 culture confirmed cases, 7 that met the clinical case definition, 4 that had a proven epidemiological link to a confirmed case and 658 that were IgA positive. The remaining 357 cases included 24 that were PCR positive, 170 that were IgM positive and 163 that were unvalidated. The inclusion of IgM and PCR positive cases would have resulted in a spuriously higher rate in South Australia than other States. The issue of diagnostic criteria for pertussis has been considered by the Communicable Diseases Network Australia New Zealand Expert Working Group on Pertussis, whose report is due to be published shortly. The recommendation from the Group is that the case definition of pertussis should include PCR positivity, but not IgM.

Recently, there have been a number of initiatives that could contribute to a reduction in the burden of vaccine-preventable diseases in Australia. In February 1997, a major initiative ('Immunise Australia: The Seven Point Plan') was launched, with the aim of raising the level of immunisation in Australia. In June 1996, the NHMRC recommended the use of diphtheria-tetanus-acellular pertussis (DTPa) vaccine in the primary vaccination schedule (2, 4 and 6 months of age) in addition to its use as a booster. In August 1997, the National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases (NCIRS) was established under the auspices of the National Centre for Disease Control. The NCIRS aims to provide policy and planning information for immunisation services in Australia, by improving the understanding of factors contributing to compliance with immunisation programs and devising interventions to increase compliance.

Vectorborne diseases

The nationally notifiable vectorborne diseases include several arboviruses and malaria. The arboviruses are arthropod-borne viruses which are able to replicate both in arthropod vectors and vertebrate hosts. The NNDSS collects data on Barmah Forest virus and Ross River virus (alphaviruses,) and dengue (a flavivirus). Murray Valley encephalitis, Kunjin, Japanese encephalitis virus

Figure 26. Notifications of Barmah Forest virus infection, 1995 to 1996, by month of onset

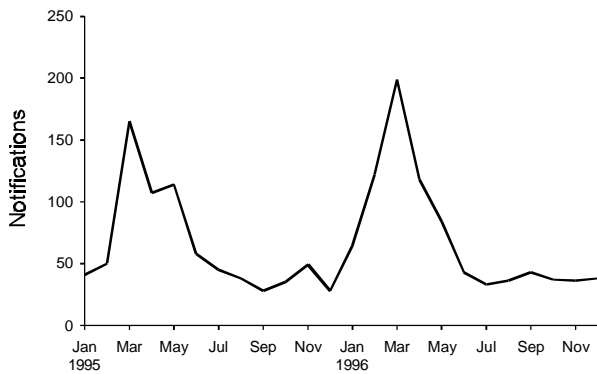
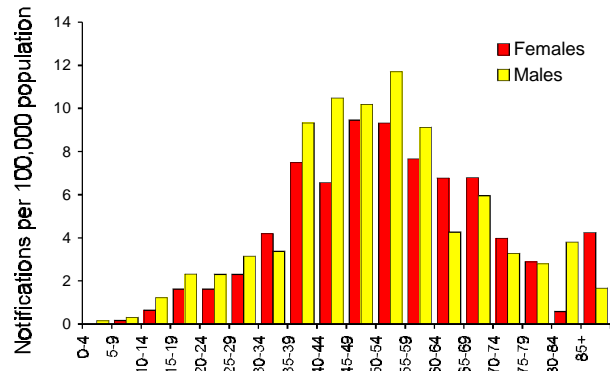


Figure 27. Adjusted notification rate of Barmah Forest virus infection, 1996, by age group and sex



(flaviviruses) and others are included in the category 'arbovirus not elsewhere classified'. Barmah Forest virus and Ross River virus, the agents of epidemic polyarthritis, are enzootic in Australia, as are Murray Valley encephalitis and Kunjin, the aetiological agents of Australian encephalitis. Dengue can occur in those who have recently returned from overseas travel (imported cases) or as a result of local transmission from an imported case³².

Australia has been certified malaria-free since 1981. The majority of cases are imported, occurring in travellers returning from endemic areas. There are four species of human malarial parasite: *Plasmodium vivax*, *P. falciparum*, *P. ovale* and *P. malariae*. Of these *P. vivax* is the species most commonly reported in Australia³³. Most Australian cases are acquired in Papua New Guinea.

Barmah Forest virus infection

In 1996 Barmah Forest virus infection was notified separately in all jurisdictions other than the Northern Territory, where it was reported as 'arbovirus - not elsewhere classified'.

There were 837 notifications of Barmah Forest virus infection in 1996, an adjusted notification rate of 4.6 per 100,000 population. As in 1995, there was a marked seasonal distribution, with most cases having onset in the month of March (Figure 26). The highest age group specific notification rates were for the 35 - 59 years age range (Figure 27), representing 69% of cases. Overall, similar numbers of males and females were reported, with a male:female ratio of 1.1:1. However, there were higher age group specific notification rates for males than for females in

Map 8. Notification rate of Barmah Forest virus infection, 1996, by Statistical Division of residence

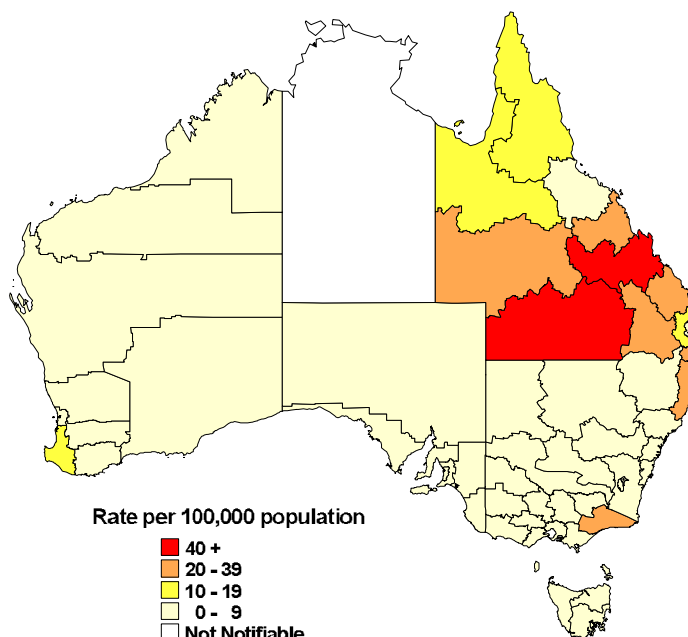


Figure 28. Notifications of Ross River virus infection, 1992 to 1996, by month of onset

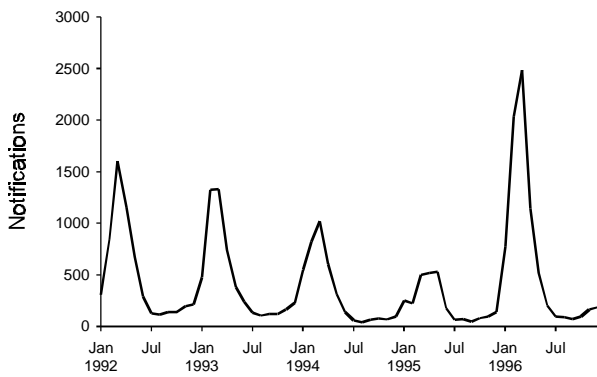
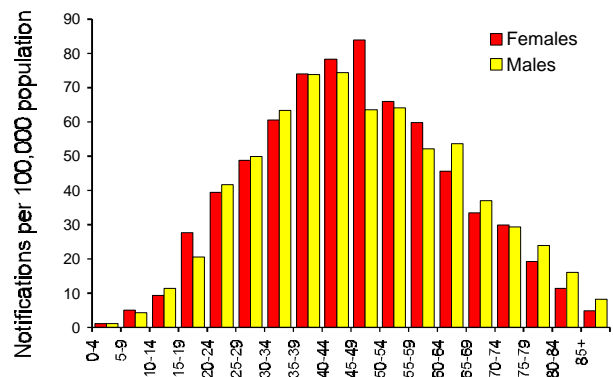


Figure 29. Notification rate of Ross River virus infection, 1996, by age group and sex



the 35 - 59 years age range. Notifications were received from all States and Territories except Tasmania where none were reported. The highest notification rates were recorded in the Queensland Statistical Divisions of South West and Fitzroy (67.9 and 52.2 per 100,000 population respectively) (Map 8).

Ross River virus infection

There were 7,823 notifications of Ross River virus infection reported in 1996, a notification rate of 42.7 per 100,000 population. This is the highest ever recorded and is in marked contrast to the low number of cases reported in 1995 (Figure 28).

Most cases had onset dates during the late summer and early autumn months, as is usually the case. Similar numbers of males and females were notified, with a

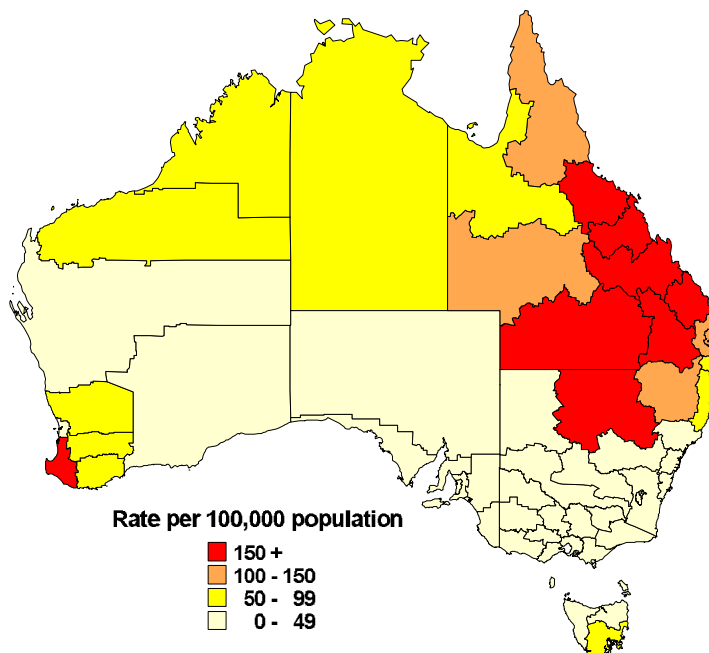
male:female ratio of 1.0:1. The highest age group specific notification rates were for the 30 - 55 years age range, accounting for 51% of all cases (Figure 29).

The highest notification rate, 472.4 per 100,000 population, was recorded for the Statistical Division of South West in Western Australia (Map 9). This reflects the outbreak which occurred in this region during the 1995-1996 summer³⁴. High rates were also recorded for the Statistical Divisions of South West, Fitzroy and Northern in Queensland with notification rates of 339.7, 253.3 and 258.4 per 100,000 population respectively.

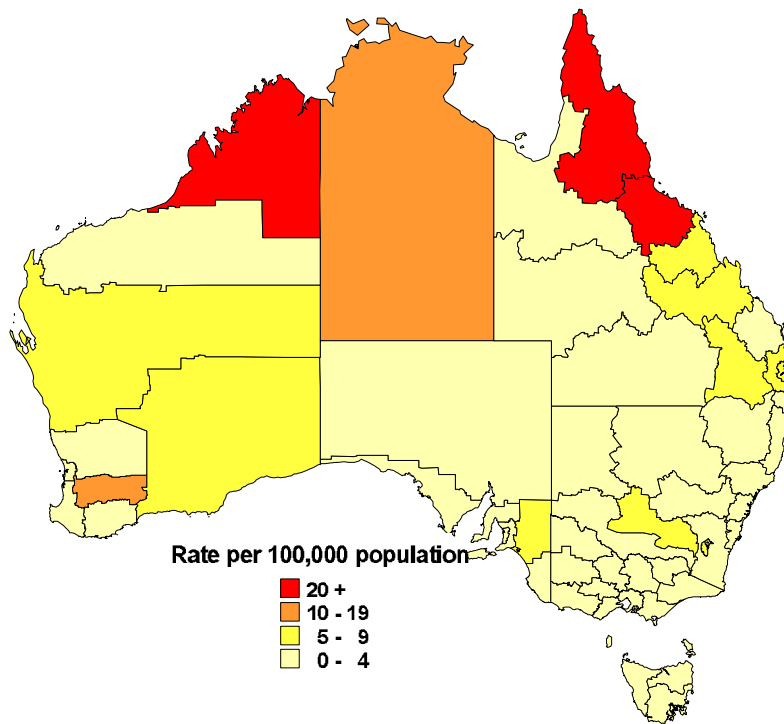
Dengue

Forty-three cases of dengue were reported in 1996, which is similar to the number received the previous year. There was no apparent seasonal trend. Cases were reported from all

Map 9. Notification rate of Ross River virus infection, 1996, by Statistical Division of residence



Map 10. Notification rate of malaria, 1996, by Statistical Division of residence



jurisdictions other than Victoria and Tasmania. The highest notification rate, 3.3 per 100,000 population, was reported for the Northern Territory.

The male:female ratio was 1:1.1. The highest age group specific notification rates (44%) were for those in the 30 - 45 years age groups, and all cases were over 15 years of age.

Arbovirus - not elsewhere classified

This classification may include infections with the alphavirus Sindbis virus, and the flaviviruses Japanese encephalitis, Murray Valley encephalitis, Kunjin, Kokobera and Stratford virus. It may also include Barmah Forest virus in the Northern Territory.

The NNDSS began collecting data on Barmah Forest virus infection separately for the first time in 1995. Prior to this

time it was included in the 'arbovirus infection not elsewhere classified' category .

There were 52 reports of arbovirus infection not elsewhere classified received in 1996. Most reports were from the Northern Territory and New South Wales. Queensland reported two cases of Kunjin virus infection. Both of these were in females in the 30 - 34 years age group.

Overall the male:female ratio was 1.8:1 and all cases were over 10 years of age.

Malaria

A total of 849 cases of malaria was reported in 1996, a rate of 4.6 per 100,000 population. This is higher than the rate recorded in recent years. There was a marked seasonal variation, most notifications having onset dates in January

Figure 30. Notifications of malaria, 1992 to 1996, by month of onset

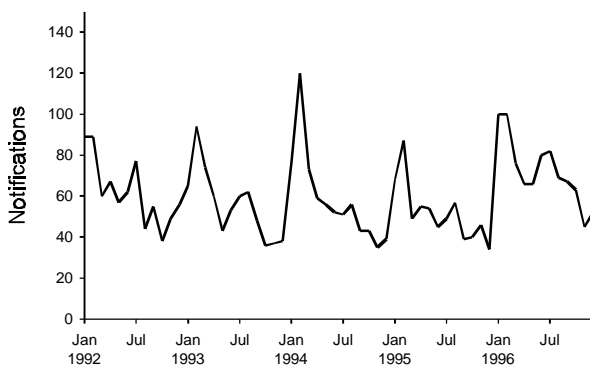
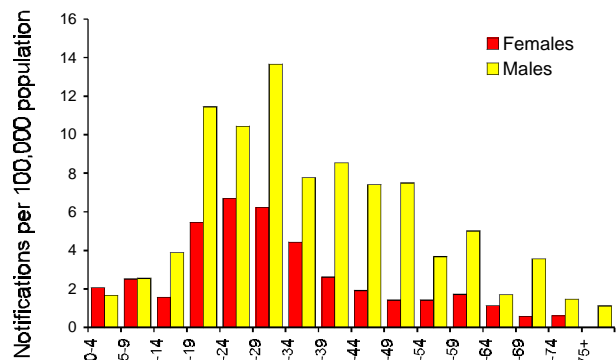


Figure 31. Notification rate of malaria, 1996, by age group and sex



and February (Figure 30). This seasonal distribution is similar to that recorded in previous years and probably reflects travel patterns.

The species of *Plasmodium* parasite was recorded in 534 cases (63%). Of these, most were due to *P. vivax* (354, 42%) followed by *P. falciparum* (164, 19%). *Plasmodium ovale* and *P. malariae* were reported in 12 and 4 cases respectively.

The highest notification rates were recorded for the Northern and Far North Statistical Divisions of Queensland, with rates of 21.8 and 61.7 per 100,000 population respectively, and Kimberley in Western Australia with a rate of 27.3 per 100,000 (Map 10).

The highest age group specific notification rates were recorded for the 15 - 30 years age range, which accounted for 43% of all notifications (Figure 31). There was a marked predominance of males, with a male:female ratio of 2.3:1.

Discussion

Ross River virus infection was the most commonly notified vectorborne disease recorded by the NNDSS in 1996. This reflects the widespread distribution of the virus and the availability of diagnostic tests. Both Ross River virus infection and Barmah Forest virus infection demonstrated similar epidemiological patterns.

The last large outbreak of Australian encephalitis due to Murray Valley encephalitis virus was recorded in 1974. Surveillance must be maintained to detect outbreaks in a timely fashion and to enable the implementation of appropriate control measures. In addition to data collected by the NNDSS, this includes mosquito surveillance and monitoring of flavivirus activity through the Sentinel Chicken Surveillance Programme³⁵.

No cases of Japanese encephalitis virus were reported in Australia in 1996, following the first recorded cases of this virus in the Torres Strait in 1995³⁶. Sentinel pigs on several of the Torres Strait islands are being used to monitor the situation³⁷. Dengue activity has been low in Australia since the dengue 2 outbreak in Queensland in 1992-1993³⁸.

In 1996 the first case of 'airport malaria' was recorded in Australia³⁹. 'Airport malaria' is acquired from an infected mosquito imported in an aircraft. Malaria surveillance is particularly important in northern Australia where environmental conditions favour transmission of malaria, were it to be re-introduced.

Zoonoses

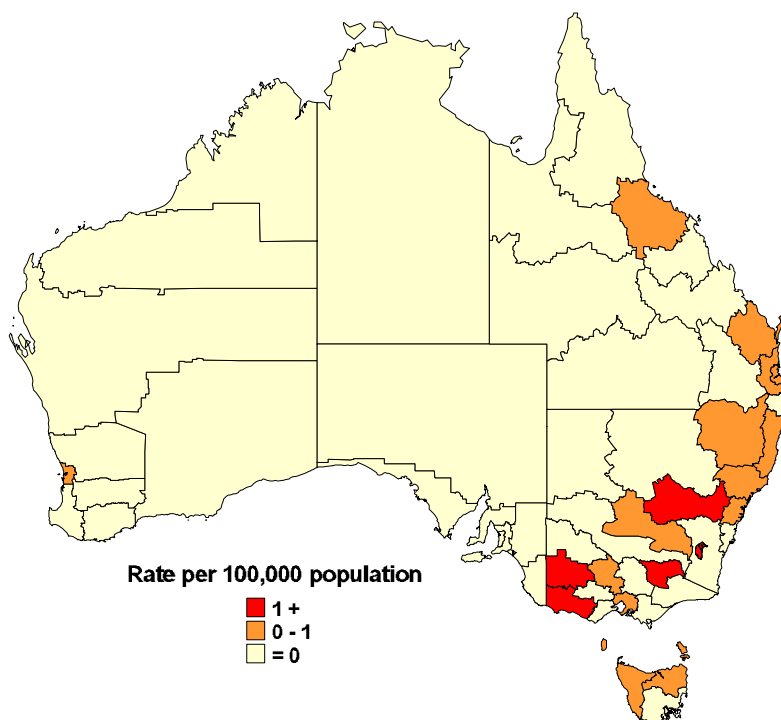
The zoonoses are defined as 'a group of infectious diseases transmissible under natural conditions from vertebrate animals to humans'. More than 60 zoonoses have been known to occur in Australia⁴⁰. A number of new zoonoses, such as bat paramyxovirus (equine morbillivirus) and bat lyssavirus, have been identified over the past two years. The long-term effect of these diseases on public health is yet to be established.

The zoonoses are, in general, of low prevalence, but the level of under-diagnosis and under-reporting is not known. The zoonoses currently under national surveillance in the NNDSS are brucellosis, hydatid infection, leptospirosis, ornithosis and Q fever. Rabies, a zoonotic disease exotic to Australia, is referred to in the section on quarantinable diseases.

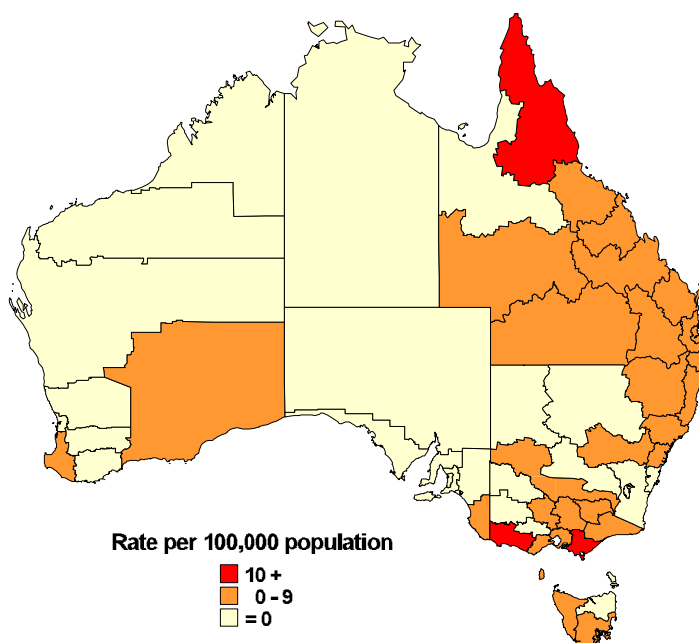
Brucellosis

There were 38 notifications of brucellosis in 1996. The rate of 0.2 per 100,000 population was similar to that observed in

Map 11. Notification rate of hydatid infection, 1996, by Statistical Division of residence



Map 12. Notification rate of leptospirosis, 1996, by Statistical Division of residence



previous years. Most notifications were from Queensland (34). As in previous years, the Statistical Division with the highest rate was Central West in Queensland. The numbers were too low to detect a seasonal pattern. The male:female ratio was 4.4:1. There were 7 notifications for females, with ages ranging from 25 to 74 years. The 31 cases for males were in the age range from 15 to 74 years. Twenty-nine (76%) of the cases were in males aged between 15 and 64 years.

Hydatid infection

There were 45 reports of hydatid infection in 1996. The notification rate of 0.2 per 100,000 is similar to that observed in recent years. There were 22 cases in females and 23 in males. The youngest age group was 10 - 14 years

(1 female) and the oldest age group was 75 - 79 years (two females and one male). Cases were reported from Victoria and New South Wales (14 cases each), Queensland (10), the Australian Capital Territory (4), Tasmania (2) and Western Australia (1). Cases were predominantly reported from rural Statistical Divisions (Map 11). It should be noted that these cases include infections acquired in the past, and do not necessarily indicate recent exposure.

Leptospirosis

A total of 227 notifications of leptospirosis were received in 1996. The rate of 1.2 per 100,000 is slightly higher than the 1995 rate of 1.0 per 100,000. There was a marked predominance of males, with 207 notifications in males and 20 in females, a male:female ratio of 10.4:1. The highest

Figure 32. Notification rate of leptospirosis, 1996, by age group and sex

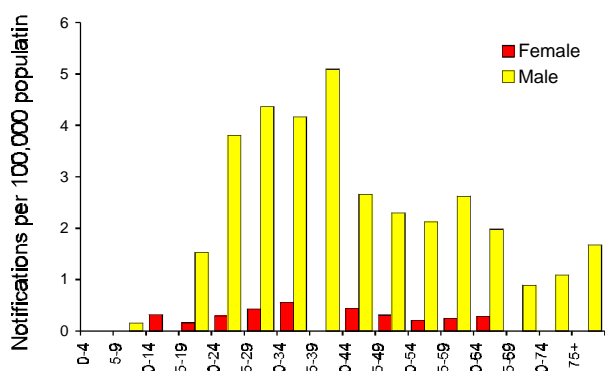
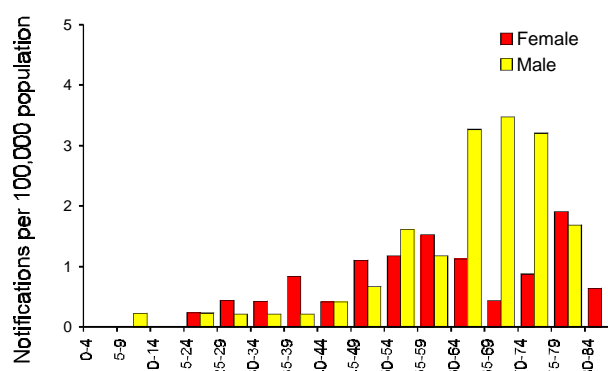
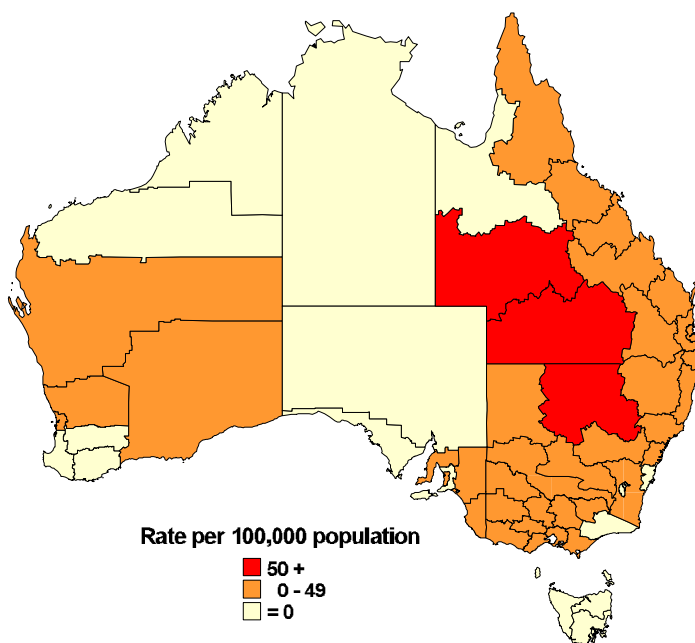


Figure 33. Adjusted notification rate of ornithosis, 1996, by age group and sex



Map 13. Notification rate of Q fever, 1996, by Statistical Division of residence



rate (5.1 per 100,000) was in males aged 35 - 39 years (Figure 32). Of the total notifications, 197 (87%) were in males aged between 15 and 64 years. The peak onset was in March (31 cases), with smaller peaks in July (22 cases) and September (26 cases).

The highest numbers of cases were recorded in Queensland (109), Victoria (75) and New South Wales (31). Queensland also had the highest rate with 3.3 notifications per 100,000 population. Tasmania with 8 cases, shared with Victoria the second highest rate of 1.7 per 100,000. The highest notification rates were reported for the Statistical Divisions of Northern in Queensland (25.2 per 100,000) and Western District and Gippsland in Victoria (23.9 and 13.7 per 100,000 respectively) (Map 12).

Ornithosis

Ornithosis was notifiable in all States and Territories except New South Wales. In 1996, a total of 85 notifications was received. The annual adjusted notification rate of 0.7 per 100,000 was lower than the 1995 rate of 1.5 per 100,000 and similar to the rates for the preceding few years.

The greatest number of cases (63) were recorded in Victoria (Table 1), and no cases were reported from either of the Territories.

Forty-eight cases were male and 37 were female; a male:female ratio of 1.3:1. Cases occurred in all age groups up to age 79 years, but were more common in the middle to older age groups. The majority of cases (79%) were older than 40 years (Figure 33).

There was no clear seasonal pattern in onset dates, with between 1 and 12 cases reported per month. Small peaks occurred in April (11 cases) and November and December (12 cases each).

Q fever

There were 555 cases of Q fever notified in 1996. The rate of 3.0 per 100,000 was higher than the 1995 rate of 2.6 per 100,000, but lower than rates in previous years. There was no seasonal pattern.

Most notifications were from New South Wales (284) and Queensland (177) which also had the highest rates of 4.6 per 100,000 and 5.3 per 100,000 respectively. No cases were recorded from the Australian Capital Territory, the Northern Territory or Tasmania. The highest rates were seen in the Statistical Divisions of South West and Central West in Queensland (109.5 and 80.0 per 100,000 respectively) and North Western in New South Wales (83.6 per 100,000) (Map 13).

Males predominated with 472 cases, compared with 83 for females. The male:female ratio was 5.7:1. Of the total notifications, 457 (82%) were in males aged between 15 and 64 years. The highest rate (8.9 notifications per 100,000) was seen in males in the 20 - 29 year age range (Figure 34).

Discussion

Brucellosis, Q fever and leptospirosis occur predominantly in males in age groups commonly employed in the workforce, reflecting the largely occupational nature of the exposure to these diseases. The continuing occurrence of Q fever despite the availability of a vaccine, indicates the need for better immunisation programs for those at occupational risk.

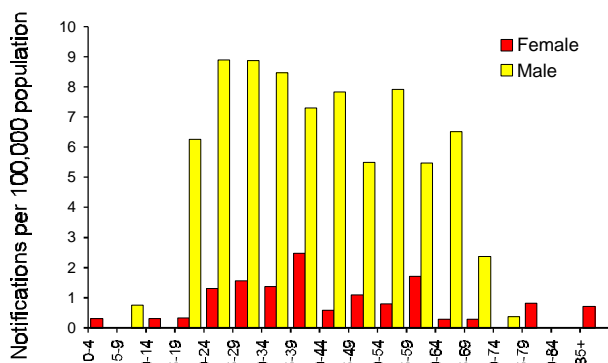
Other diseases

This group of diseases comprises the remaining notifiable diseases: legionellosis, leprosy and tuberculosis.

Legionellosis

There were 192 notifications of legionellosis in 1996. The annual rate of 1.0 per 100,000 population is slightly higher

Figure 34. Notification rate of Q fever, 1996, by age group and sex



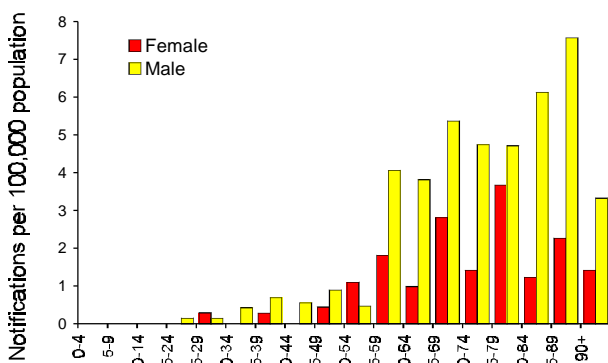
than for 1995 (0.9 per 100,000,) but the same as for the previous 2 years. The Australian Capital Territory, Northern Territory and Tasmania reported 2 cases each. New South Wales had the highest number of cases (67), followed by Western Australia (39), Victoria (36), South Australia (25) and Queensland (19).

The highest notification rate was in Western Australia (2.2 per 100,000), followed by South Australia (1.7 per 100,000), New South Wales (1.1 per 100,000), Victoria (0.8 per 100,000), and Queensland (0.6 per 100,000). The Statistical Division with the highest notification rate was South Eastern in Western Australia with 10.6 per 100,000.

Of the notified cases, 129 were male and 63 were female, giving a male:female ratio of 2.0:1. The age-sex profile (Figure 35) is similar to that observed in previous years. Of the total notifications, 155 (79%) were aged 50 years or over. The highest notification rate (7.6 per 100,000) was in males aged 80 - 84 years. For females, the highest notification rate was 3.7 per 100,000 in the 70 - 74 years age group.

The reported species were *Legionella pneumophila* (83 notifications) and *Legionella longbeachae* (51 notifications).

Figure 35. Notification rate of legionellosis, 1996, by age group and sex



Two cases were recorded as 'other species'; the remaining 56 were not stated.

Victoria had the highest number of notifications of *L. pneumophila* (32 cases), followed by New South Wales (30), Queensland and South Australia (10 each) and Tasmania (1). The profile is different for *L. longbeachae*, for which the highest number of notifications were received from New South Wales (27), followed by South Australia (15), Queensland and Victoria (4 each) and Tasmania (1).

For notifications of *L. pneumophila*, 60 were male and 23 were female, giving a male:female ratio of 2.6:1. Cases were reported for all age groups from 15 to 89 years, with 82% of cases being reported in persons over 50 years of age.

For notifications of *L. longbeachae*, 29 were male and 22 were female; a male:female ratio of 1.3:1. Cases were reported in age groups from 30 to 94 years, with 90% of cases reported in persons over 50 years of age.

Leprosy

Ten notifications of leprosy were received in 1996, for 3 females and 7 males. The notification rate of 0.05 per 100,000 was similar to that in the previous year (0.04). The cases were reported from New South Wales (1), the Northern Territory (6) and Western Australia (3).

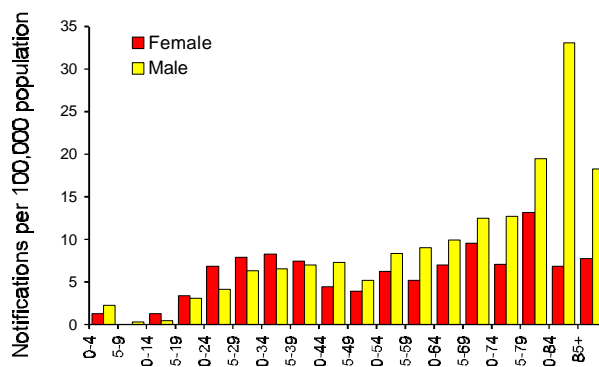
Tuberculosis

The data presented here were collected through the NNDSS. They may differ from the data collected through the specialised National Mycobacterial Surveillance System, which are published separately⁹.

A total of 1,067 notifications of tuberculosis was received in 1996. The rate of 5.8 per 100,000 population was similar to rates seen over the past few years. The States with the highest number of cases were New South Wales (438), and Victoria (302)(Table 1). The highest notification rate was in the Northern Territory (17.0 cases per 100,000), and the lowest was in Tasmania (2.3 per 100,000)(Table 2).

There were 569 notifications for males and 498 for females; a male:female ratio of 1.1:1. In most age groups under 40 years, females outnumbered males, but after age 40 years, males predominated in most age groups. There were two peaks in the age group specific rates, one in the 30 - 34 years age group (7.4 per 100,000) and the other in the

Figure 36. Notification rate of tuberculosis, 1996, by age group and sex



80 - 84 years age group (16.6 per 100,000). The highest age-sex-specific rates were found in males in the age group 80 - 84 years (33.1 per 100,000) and in females in the 75 - 79 years age group (13.1 per 100,000) (Figure 36).

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