

Australia's notifiable diseases status, 1998

Annual report of the National Notifiable Diseases Surveillance System

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Abstract

In 1998 there were 85,096 notifications to the National Notifiable Diseases Surveillance System; slightly lower than in 1997 (89,579). The number of measles cases remained low, and well below the number reported in the outbreak years of 1993 and 1994. Rubella notifications further decreased and remained low in 1998. The Measles Control Campaign from August to November 1998, did not impact significantly on the number of measles or rubella cases reported for 1998. Notifications of *Haemophilus influenzae* type b reached a record low since surveillance began in 1991, and appeared to have stabilised at a low rate since the introduction of the conjugated vaccine in 1992. The previously reported outbreak of pertussis in 1997 tapered off in early 1998. Food-borne disease, or detection of disease, appeared to be on the rise with an increase in notification rates of campylobacteriosis and salmonellosis. Notifications of hepatitis A decreased, correcting the previous high number of notifications in 1997. Sexually transmissible diseases (STDs) increased. Notifications for chlamydial infection were the highest for all sexually transmitted diseases and third highest for all notifiable diseases. Notifications of gonococcal infection also continued to rise and have doubled since 1991, whilst notifications for syphilis increased slightly after falling steadily over recent years. Arbovirus infections of concern in 1998 were dengue outbreaks in Far North Queensland and the first case of Japanese Encephalitis for mainland Australia, highlighting the importance of surveillance of arboviruses and vectors for their detection and management. *Commun Dis Intell* 1999;23:277-305.

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Introduction

Surveillance of communicable diseases is an important public health activity. It allows the detection of outbreaks and the appropriate investigation and control measures to be instigated. It also allows for the monitoring of baseline trends and considers the impact and effectiveness of interventions to control the spread of diseases. Surveillance systems exist at national, state and local levels. State and local surveillance systems are crucial to the timely and effective detection and management of outbreaks and in assisting in the effective implementation of national policies. The national surveillance system combines some of the data collected from State and Territory-based systems to provide an overview at a national level. Specific functions of the national surveillance system include: detection and management of outbreaks affecting more than one jurisdiction; monitoring of the need for and impact of national control programs; guidance of national policy development; and description of 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 and New Zealand; currently only Australian data are regularly published in *Communicable Diseases Intelligence (CDI)*. This is achieved through the national collation of notifications of these diseases received by health authorities in the States and Territories.

More than forty diseases or disease categories are included, largely as recommended by the National Health and Medical Research Council (NHMRC).¹ At present the list of notifiable diseases and categories is undergoing review and revision. Information collected on notifiable diseases has been published in the Annual Report of the NNDSS since 1991.^{2,3,4,5,6,7,8}

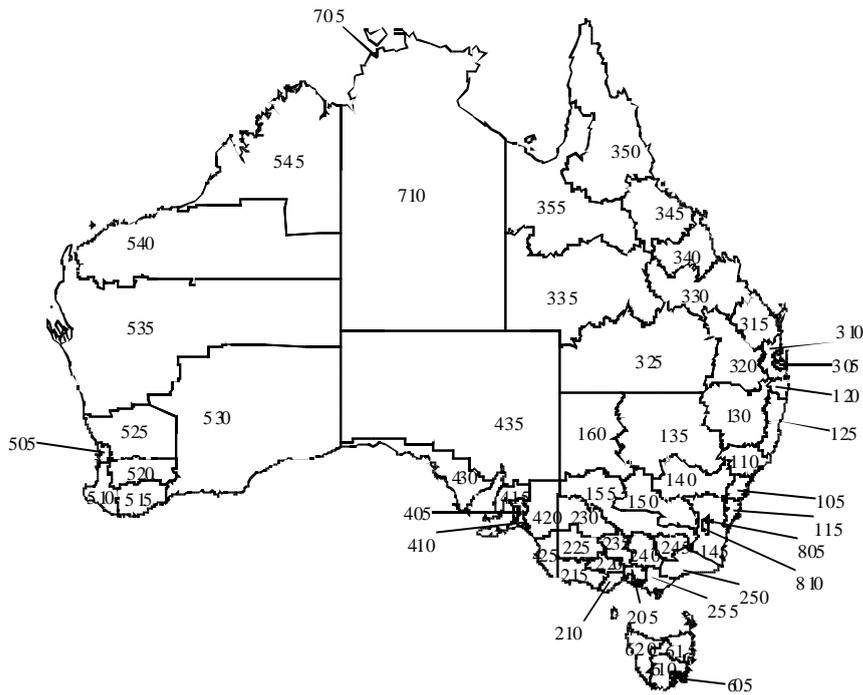
Methods

Notifications of communicable diseases were collected by the States and Territories under their current public health legislations. These were collated and analysed fortnightly by the Department of Health and Aged Care and published on the Internet Website fortnightly and in *CDI* every four weeks. Final data sets for cases reported in 1998 were provided by the States and Territories by September 1999. 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.

An established national data set included fields for: a unique record reference number; the disease; age, sex, Aboriginality; 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.

Data are also collected and reported separately by organisations/groups on *Haemophilus influenzae* type b infection,⁹ tuberculosis^{10,11} and non-tuberculosis mycobacterial infection, and HIV and AIDS surveillance.¹²

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	308,086	320 Darling Downs	200,758	205 Melbourne	3,371,308
810 ACT - balance	325	325 South West	25,919	210 Barwon	242,796
<i>New South Wales</i>		330 Fitzroy	180,474	215 Western District	99,477
105 Sydney	3,986,723	335 Central West	12,347	220 Central Highlands	136,446
110 Hunter	567,302	340 Mackay	124,309	225 Wimmera	51,689
115 Illawarra	380,660	345 Northern	194,958	230 Mallee	87,977
120 Richmond-Tweed	206,753	350 Far North	219,277	235 Loddon-Campaspe	160,190
125 Mid-North Coast	268,697	355 North West	35,782	240 Goulburn	185,643
130 Northern	175,883	<i>South Australia</i>		245 Ovens-Murray	90,102
135 North Western	117,144	405 Adelaide	1,088,349	250 East Gippsland	81,146
140 Central West	172,790	410 Outer Adelaide	107,729	255 Gippsland	154,111
145 South Eastern	180,594	415 Yorke & Lower North	44,103	<i>Western Australia</i>	
150 Murrumbidgee	149,039	420 Murray Lands	68,450	505 Perth	1,341,914
155 Murray	111,406	425 South East	62,776	510 South West	177,801
160 Far West	24,603	430 Eyre	32,968	515 Lower Great Southern	51,359
<i>Northern Territory</i>		435 Northern	82,919	520 Upper Great Southern	19,841
705 Darwin	86,576	<i>Tasmania</i>		525 Midlands	52,304
710 NT - balance	103,415	605 Greater Hobart	194,974	530 South Eastern	58,391
<i>Queensland</i>		610 Southern	34,619	535 Central	60,300
305 Brisbane	1,574,615	615 Northern	133,229	540 Pilbara	41,773
310 Moreton	657,264	620 Mersey-Lyell	109,063	545 Kimberley	27,716
315 Wide Bay-Burnett	230,642			TOTAL AUSTRALIA	18,747,804

Table 1. National Notifiable Diseases Surveillance System notifications, 1998, by State or Territory and disease

Disease ¹	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
Arbovirus infection (NEC)	0	0	1	42	0	0	35	3	81
Barmah Forest virus infection	1	138	21	354	1	0	17	26	558
Botulism	0	0	0	0	1	0	0	NN	1
Brucellosis	2	2	0	36	0	0	5	0	45
Campylobacterosis ²	390	-	196	4,454	2,284	341	4,083	1,691	13,439
Chancroid	0	0	0	0	0	0	0	1	1
Chlamydial infection (NEC) ³	190	523	783	4,146	1,022	194	2,499	2,048	11,405
Cholera	0	1	0	1	0	0	2	0	4
Dengue	7	58	8	449	4	2	8	21	557
Diphtheria	0	0	0	0	0	0	0	0	0
Donovanosis ³	0	0	21	3	NN	0	0	7	31
Gonococcal infection ⁴	29	1,033	1,199	1,124	213	12	603	1,215	5,428
<i>Haemophilus influenzae</i> type b	0	11	0	11	1	2	5	5	35
Hepatitis A	49	945	47	1,042	99	8	172	141	2,503
Hepatitis B - incident	1	52	18	48	18	5	88	31	261
Hepatitis B - unspecified ⁵	82	3,266	0	999	0	33	2,092	210	6,682
Hepatitis C - incident ⁶	8	107	0	-	66	17	21	124	343
Hepatitis C - unspecified ^{5,6}	290	7,609	280	3,139	860	265	5,681	1,137	19,261
Hepatitis (NEC) ⁷	0	7	0	8	0	2	2	NN	19
Hydatid infection	0	NN	0	12	4	1	27	2	46
Legionellosis	2	47	3	40	74	4	64	37	271
Leprosy	0	1	0	0	1	0	0	1	3
Leptospirosis	0	48	3	109	1	1	25	10	197
Listeriosis	1	30	0	4	2	2	15	4	58
Malaria	24	164	27	335	22	5	86	42	705
Measles	10	124	1	44	5	36	36	50	306
Meningococcal infection	3	184	17	94	26	14	60	57	455
Mumps	4	39	5	33	8	3	54	37	183
Ornithosis	2	NN	0	NN	0	2	50	2	56
Pertussis	87	2,569	23	1,465	701	56	1,151	380	6,432
Q fever	2	236	0	258	24	0	34	17	571
Ross River virus infection	6	508	121	1,950	61	9	112	327	3,094
Rubella	22	81	4	381	17	15	185	67	772
Salmonellosis (NEC)	75	1,828	410	2,941	521	110	1,146	669	7,700
Shigellosis ²	11	-	98	163	65	3	120	155	615
Syphilis	17	623	339	577	18	8	8	99	1,689
Tetanus	0	3	0	1	0	1	1	1	7
Tuberculosis	17	408	27	121	55	9	269	76	982
Typhoid ⁸	0	32	2	7	3	1	12	12	69
<i>Yersinia</i> (NEC) ²	1	-	3	141	35	2	24	1	207
TOTAL	1,333	20,683	3,657	24,533	6,227	1,163	18,792	8,708	85,096

NN Not notifiable.

NEC Not elsewhere classified.

- Elsewhere classified.

1. No notifications have been received during 1998 for the following rare diseases: lymphogranuloma venereum, plague, rabies, yellow fever, or other viral haemorrhagic fevers.

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

3. Notifiable in New South Wales from September 1998.

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

5. Unspecified numbers should be interpreted with some caution as the magnitude may be the reflection of the numbers of testing being carried out.

6. Victoria only. These figures are currently being reviewed by the State health authority.

7. Includes Hepatitis D and E.

8. Includes paratyphoid in New South Wales and Victoria, and Queensland.

Table 2. National Notifiable Diseases Surveillance System notification rates per 100,000 population, 1998, by State or Territory and disease

Disease ¹	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
Arbovirus infection (NEC)	0.0	0.0	0.5	1.2	0.0	0.0	0.8	0.2	0.4
Barmah Forest virus infection	0.3	2.2	11.1	10.2	0.1	0.0	0.4	1.4	3.0
Botulism	0.0	0.0	0.0	0.0	0.1	0.0	0.0	NN	0.0
Brucellosis	0.6	0.0	0.0	1.0	0.0	0.0	0.1	0.0	0.2
Campylobacterosis ²	126.5	-	103.2	128.9	153.6	72.3	87.6	92.3	108.3
Chancroid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Chlamydial infection (NEC) ³	61.6	NPR	412.1	120.0	68.7	41.1	53.6	111.8	87.7
Cholera	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dengue	2.3	0.9	4.2	13.0	0.3	0.4	0.2	1.1	3.0
Diphtheria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Donovanosis ³	0.0	NPR	11.1	0.1	NN	0.0	0.0	0.4	0.3
Gonococcal infection ⁴	9.4	16.3	631.1	32.5	14.3	2.5	12.9	66.3	29.0
Haemophilus influenzae type b	0.0	0.2	0.0	0.3	0.1	0.4	0.1	0.3	0.2
Hepatitis A	15.9	14.9	24.7	30.1	6.7	1.7	3.7	7.7	13.4
Hepatitis B - incident	0.3	0.8	9.5	1.4	1.2	1.1	1.9	1.7	1.4
Hepatitis B - unspecified ⁵	26.6	51.5	0.0	28.9	0.0	7.0	44.9	11.5	35.6
Hepatitis C - incident	2.6	1.7	0.0	-	4.4	3.6	0.5	6.8	2.2
Hepatitis C - unspecified ⁵	94.0	120.0	147.4	90.8	57.8	56.2	121.9	62.1	102.7
Hepatitis (NEC) ⁶	0.0	0.1	0.0	0.2	0.0	0.4	0.0	NN	0.1
Hydatid infection	0.0	NN	0.0	0.3	0.3	0.2	0.6	0.1	0.4
Legionellosis	0.6	0.7	1.6	1.2	5.0	0.8	1.4	2.0	1.4
Leprosy	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0
Leptospirosis	0.0	0.8	1.6	3.2	0.1	0.2	0.5	0.5	1.1
Listeriosis	0.3	0.5	0.0	0.1	0.1	0.4	0.3	0.2	0.3
Malaria	7.8	2.6	14.2	9.7	1.5	1.1	1.8	2.3	3.8
Measles	3.2	2.0	0.5	1.3	0.3	7.6	0.8	2.7	1.6
Meningococcal infection	1.0	2.9	8.9	2.7	1.7	3.0	1.3	3.1	2.4
Mumps	1.3	0.6	2.6	1.0	0.5	0.6	1.2	2.0	1.0
Ornithosis	0.6	NN	0.0	NN	0.0	0.4	1.1	0.1	0.6
Pertussis	28.2	40.5	12.1	42.4	47.1	11.9	24.7	20.7	34.3
Q fever	0.6	3.7	0.0	7.5	1.6	0.0	0.7	0.9	3.0
Ross River virus infection	1.9	8.0	63.7	56.4	4.1	1.9	2.4	17.9	16.5
Rubella	7.1	1.3	2.1	11.0	1.1	3.2	4.0	3.7	4.1
Salmonellosis (NEC)	24.3	28.8	215.8	85.1	35.0	23.3	24.6	36.5	41.1
Shigellosis ²	3.6	-	51.6	4.7	4.4	0.6	2.6	8.5	5.0
Syphilis	5.5	9.8	178.4	16.7	1.2	1.7	0.2	5.4	9.0
Tetanus	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0
Tuberculosis	5.5	6.4	14.2	3.5	3.7	1.9	5.8	4.1	5.2
Typhoid ⁷	0.0	0.5	1.1	0.2	0.2	0.2	0.3	0.7	0.4
Yersiniosis (NEC) ²	0.3	-	1.6	4.1	2.4	0.4	0.5	0.1	1.7

NN Not notifiable.

NE (N)ot elsewhere classified.

NPR (N)ot previously reported

- Elsewhere classified.

1. No notifications have been received during 1998 for the following rare diseases: lymphogranuloma venereum, plague, rabies, yellow fever, or other viral haemorrhagic fevers.

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

3. Notifiable in New South Wales only from September 1998. Rates have not been calculated.

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

5. Unspecified numbers should be interpreted with some caution as the magnitude may be the reflection of the numbers of testing being carried out.

6. Includes Hepatitis D and E.

7. Includes paratyphoid in New South Wales and Victoria, and Queensland.

Table 3. National Notifiable Diseases Surveillance System notifications and rates, 1994 to 1998, by year¹ and disease

Disease ^{1,2}	Notifications					Rate per 100,000 population				
	1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
Arbovirus infection (NEC)	587	67	52	18	81	3.3	0.4	0.3	0.1	0.4
Barmah Forest virus infection	-	756	837	704	558	-	4.7	4.6	3.8	3.0
Botulism	0	0	0	0	1	0.0	0.0	0.0	0.0	
Brucellosis	34	29	38	41	45	0.2	0.2	0.2	0.2	0.2
Campylobacteriosis	10,117	10,933	12,158	11,848	13,439	85.8	91.6	100.4	96.7	108.3
Chancroid	0	2	3	1	1	0.0	0.0	0.0	0.0	0.0
Chlamydial infection (NEC) ³	6,159	6,411	8,420	9,126	11,405	55.3	53.7	69.6	74.5	87.7
Cholera	3	5	4	3	4	0.0	0.0	0.0	0.0	0.0
Dengue	17	34	43	210	557	0.1	0.2	0.2	1.1	3.0
Diphtheria	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Donovanosis ³	117	85	50	45	31	1.1	0.8	0.5	0.4	0.3
Gonococcal infection	2,971	3,259	4,173	4,689	5,428	16.7	18.1	22.8	25.3	29.0
<i>Haemophilus influenzae</i> type b	169	74	51	53	35	1.0	0.4	0.3	0.3	0.2
Hepatitis A	1,894	1,601	2,150	3,076	2,503	10.6	8.9	11.7	16.6	13.4
Hepatitis B - incident	327	321	225	247	261	1.9	1.8	1.2	1.3	1.4
Hepatitis B - unspecified	NPR	NPR	NPR	7,114	6,682	NPR	NPR	NPR	38.4	35.6
Hepatitis C - incident	43	69	72	81	343	0.6	0.8	0.8	0.5	2.2
Hepatitis C - unspecified ⁴	8,898	9,601	9,489	19,689	19,261	86.2	91.8	89.3	106.3	102.7
Hepatitis (NEC)	42	55	36	29	19	0.3	0.3	0.2	0.2	0.1
Hydatid infection	56	46	45	61	46	0.3	0.3	0.2	0.3	0.4
Legionellosis	179	160	192	161	271	1.0	0.9	1.0	0.9	1.4
Leprosy	11	7	10	14	3	0.1	0.0	0.1	0.1	0.0
Leptospirosis	123	148	227	126	197	0.7	0.8	1.2	0.7	1.1
Listeriosis	34	58	70	71	58	0.2	0.3	0.4	0.4	0.3
Lymphogranuloma venereum	2	1	0	0		0.0	0.0	0.0	0.0	
Malaria	703	625	849	746	705	3.9	3.5	4.6	4.0	3.8
Measles	4,895	1,324	498	852	306	27.4	7.3	2.7	4.6	1.6
Meningococcal infection	383	382	426	499	455	2.2	2.1	2.3	2.7	2.4
Mumps	94	153	128	191	183	0.5	1.0	0.9	1.0	1.0
Ornithosis	85	176	85	46	56	0.7	1.5	0.7	0.4	0.6
Pertussis	5,633	4,297	4,031	10,668	6,432	31.6	23.8	22.0	57.6	34.3
Q fever	667	473	555	593	571	3.7	2.6	3.0	3.2	3.0
Ross River virus infection	3,974	2,602	7,823	6,683	3,094	22.9	14.4	42.7	36.1	16.5
Rubella	3,315	4,380	2,845	1,446	772	18.6	24.3	15.5	7.8	4.1
Salmonellosis (NEC)	5,283	5,895	5,819	7,004	7,700	29.6	32.7	31.8	37.8	41.1
Shigellosis	724	734	676	799	615	6.1	6.1	5.6	6.5	5.0
Syphilis	2,324	1,854	1,523	1,304	1,689	13.0	10.3	8.3	7.0	9.0
Tetanus	15	7	2	8	7	0.1	0.0	0.0	0.0	0.0
Tuberculosis	1,024	1,073	1,067	1,008	982	5.7	5.9	5.8	5.4	5.2
Typhoid ⁵	50	69	84	77	69	0.3	0.4	0.5	0.4	0.4
<i>Yersinia</i> (NEC)	414	306	268	245	207	3.5	2.6	2.2	2.0	1.7
TOTAL	61,726	58,074	65,382	89,576	85,096					

NEQ Not Elsewhere Classified.

NN Not notifiable.

- Elsewhere classified.

1. No notifications have been received during 1994 to 1998 for the following rare diseases: plague, rabies, yellow fever, or other viral haemorrhagic fevers.

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

3. New South Wales not included in the calculation rates for 1998 as only notifiable since September 1998.

4. Data from SA and NSW included for the first time in 1997.

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

NPR Not previously reported.

Surveillance of gonococcal and meningococcal infections, typing of the organisms and antimicrobial susceptibility is co-ordinated by national programs.^{13,14} National HIV and AIDS surveillance is conducted by the National Centre in HIV Epidemiology and Clinical Research.¹² Data from the Australian Childhood Immunisation Register (ACIR) were used to calculate vaccination coverage estimates for children aged 12 months and for children aged 24 months using a method described previously.¹⁵

Analyses were based on date of notification in 1998. The data included some notifications with onset dates before 1998, and excluded notifications with report dates in 1999 (even if the onset date was in 1998). For analysis of seasonal trends, notifications were reported by month of onset. Population notification rates were calculated using 1998 mid-year estimates of the resident population supplied by the Australian Bureau of Statistics. An adjusted rate was calculated where a disease was not notifiable in a State or Territory using a denominator which excluded that population. The data were analysed in Excel.

Maps were generated using Map Info based on the postcode of residence of the case and allocated to Australian Bureau of Statistics Statistical Divisions (Map 1). The two Statistical Divisions that 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 that should be considered when interpreting the data. Due to under-reporting, notified cases are likely to only represent 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 usually reflects the postcode of residence. However, the postcode of residence 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.

Duplication in reporting may occur if patients moved from one jurisdiction to another and were notified in both because checking between the State data sets was not possible. Data from those Statistical Divisions with small populations (Map 1) may result in high notification rates even with small numbers of cases.

Limitations of the currently collected data include the absence of risk factor information other than age, sex, and

postcode of residence. Some additional risk factor information may be found from supplementary data sets reported separately such as for *Haemophilus influenzae* type b infection,⁹ tuberculosis and non-tuberculosis mycobacterial infection,^{10,11} and HIV and AIDS.¹²

Results - Surveillance notifications and reports

There was a total of 85,096 communicable disease notifications for 1998 (Table 1). The number of notifications was similar (slightly lower) compared with 1997 (89,576). Notification rates per 100,000 population for each disease by State or Territory are described in Table 2. Comparative data for 1998 and the preceding four years are shown in Table 3.

Data were missing in the field for sex for 0.9% notifications (775), age for 0.9% (807), and postcode of residence for 6.4% (5,445). The proportion of reports with missing data in these fields varied by State or Territory, and also by disease.

Bloodborne diseases

The bloodborne viruses notified to the NNDSS are hepatitis B, C and D. Notification of new HIV diagnoses is made through the National Centre in HIV Epidemiology and Clinical Research (NCHECR), which reports separately in its Annual Surveillance Report.¹² Information on the HIV data collection can be obtained through the NCHECR Website at:

<http://www.med.unsw.edu.au/nchechr>.

National case definitions for incident hepatitis B and hepatitis C require the presence of current illness together with serological evidence of infection, or alternatively specific serological evidence of recent infection or seroconversion. Notifications of hepatitis B and hepatitis C that do not meet the incidence case definition are recorded as 'unspecified.' Collectively, these hepatitis cases represented 31% of all notifications to the NNDSS in 1998; similar to 1997.

Hepatitis B

Incident cases of hepatitis B have been notified nationally since 1994. In 1998, 261 incident cases were reported to the NNDSS with a national notification rate of 1.4 per 100,000; consistent with the rates of 1997 (1.3 per 100,000) and 1996 (1.2 per 100,000). The highest rates were reported from the Northern Territory (9.5 per 100,000), Victoria (1.9 per 100,000) and Western Australia (1.7 per 100,000). The majority of notifications were in the 15-34 years age groups (Figure 1). Incident infections in males exceeded females with a male to female ratio of 1.8:1.

Unspecified hepatitis B has been notified to the NNDSS by all jurisdictions since 1997. In 1998, 6,682 unspecified cases were notified at a rate of 35.6 per 100,000 (Tables 1 and 2), slightly lower than the rate of 38.4 per 100,000 in 1997. The male to female ratio for unspecified cases was 1.2:1 (Figure 1). The highest rates of notification were in New South Wales (51.5 per 100,000), Victoria (44.9 per 100,000) and Queensland (28.9 per 100,000).

Figure 1. Notification rate of hepatitis B (incident), 1998, by age group and sex

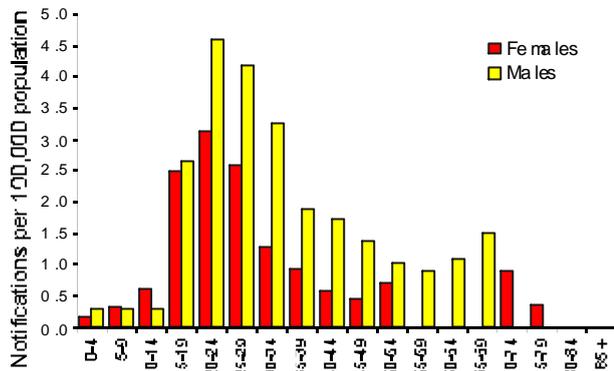
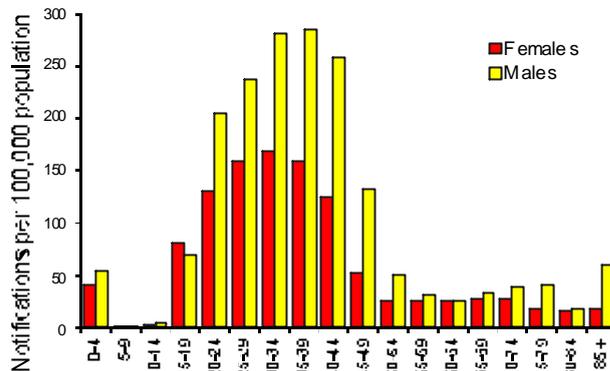


Figure 2. Notification rate of hepatitis C (unspecified), 1998, by age group and sex



Hepatitis C

In 1998, all States and Territories reported unspecified cases of hepatitis C. Incident cases were reported by all jurisdictions with the exception of Queensland and Northern Territory.

There were 343 incident cases of hepatitis C reported in 1998, with a rate of 2.2 per 100,000. The total number of hepatitis C notifications (incident and unspecified) was similar in 1998 and 1997. However, the proportion of all notifications that are known incident cases increased from 0.1% (81/19,700) in 1997 to 1.7% (343/19,604) in 1998. The highest rates of incident hepatitis C infection were reported from Western Australia (6.8 per 100,000) and South Australia (4.4 per 100,000). The majority of notifications were in the 15-29 years age groups (Figure 2).

Unspecified hepatitis C accounted for 19,261 notifications; a notification rate of 102.7 per 100,000, similar to 106.3 per 100,00 in 1997. Thirty-nine per cent of notifications came from New South Wales. The highest notification rates were in the Northern Territory (147.4 per 100,000), Victoria (121.9 per 100,000), New South Wales (120.0 per 100,000) and the Australian Capital Territory (94.0 per 100,000). The male to female ratio was 1.6:1. Most notifications were between the ages of 20 and 49 years, for both males (84%) and females (79%).

Hepatitis D

There were 14 notifications of hepatitis D to the NNDSS for 1998, at a notification rate of 0.07 per 100,000. All cases were males aged from 20 to 59 years.

Discussion

Surveillance efforts to identify which notified cases are incident cases of hepatitis C are evident in the increased proportion of incident cases of hepatitis C in 1998. However, under-reporting remains an important issue.

The age distributions for incident hepatitis C and incident hepatitis B notifications were similar, being most prevalent in the 15-34 years age groups. For incident hepatitis C there was a male predominance in the 20-29 year age

group but a predominance of females in the 15-19 years age group. For incident hepatitis B there was a male predominance in the 20-29 years age groups and similar levels for males and females in the 15-19 years age group. For both incident hepatitis B and C notification rates were relatively constant for females in the 15-29 years age groups. In contrast, for males the notification rates were higher in the 20-29 years age groups than the 15-19 years age group. Overall the 15-34 years age groups in particular those with higher notification rates, are at risk of transmission and are appropriate targets for public health interventions. As the main route of transmission of hepatitis B and C is via intravenous drug use in Australia,¹⁶ appropriate public health interventions are based around this route of transmission.

Gastrointestinal diseases

Enteric infections are a major cause of illness in Australia. Surveillance of enteric infections in Australia is likely to underestimate the incidence of enteric infections for several reasons. Some diseases are not nationally notifiable, such as cryptosporidiosis, or did not become nationally notifiable until late 1998, such as haemolytic uraemic syndrome (HUS) and infections with Shiga-like toxin (verotoxin) producing *E. coli* (SLTEC/VTEC). Only a small proportion of cases present to physicians, and diagnostic tests are only conducted on a proportion of cases. Furthermore, current routine laboratory testing protocols may not include tests for all significant enteric pathogens (for example not all laboratories routinely test for *Yersinia* species). Together these factors impinge on the sensitivity of the existing surveillance system for enteric pathogens.

Botulism

There was one case of botulism reported in 1998 in South Australia (Table 1). This represents the first notification of this disease reported since the NNDSS began in its present form in 1991.

Campylobacteriosis

There were 13,439 cases of campylobacteriosis reported in 1998 (Table 1), continuing the previous trend of a steady increase in the number of notifications of

Figure 3. Notifications of campylobacteriosis, 1991-1998, by month of onset

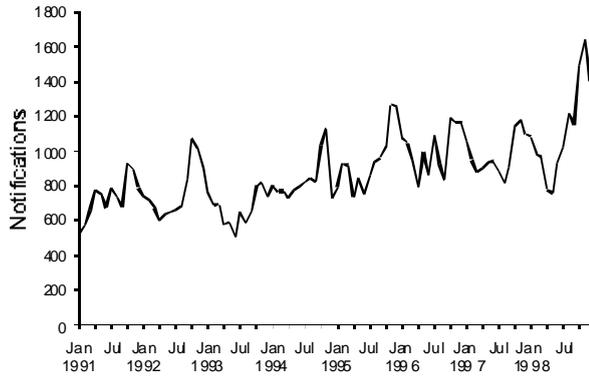
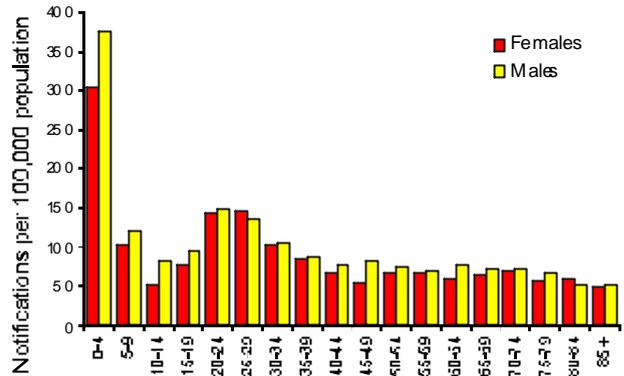


Figure 4. Notification rate of campylobacteriosis, 1998, by age group and sex



campylobacteriosis from 1992 to 1997. The rate of notification in 1998 was 108.3 per 100,000 population, the highest rate for all notifiable infections in 1998. The highest rate by State/Territory continued to be reported in South Australia, with 153.6 cases per 100,000 population (Table 2). New South Wales was excluded from the analysis as campylobacteriosis was reported as 'foodborne disease in two or more related cases' or 'gastroenteritis in an institution'.

Campylobacteriosis was reported from all jurisdictions where it was notifiable. The highest notification rates (160+ per 100,000 population) were seen in the Statistical Divisions of South West in Queensland, Kimberley in West

Australia, and Eyre and Yorke and Lower North in South Australia (Map 2).

The number of notifications remained high throughout the year and was highest in the warmer months (January, February and October to December) with a large peak at the end of 1998 (Figure 3). Overall the male to female ratio was 1.1:1. The distribution of notifications was bimodal with a high peak in the 0-4 years age group and a rise in the 20-29 years age groups. The highest rate of notification was seen in the 0-4 year age group (males 377 per 100,000 and females 304 per 100,000 population) (Figure 4).

Map 2. Notification rate of campylobacteriosis, 1998, by Statistical Division of residence

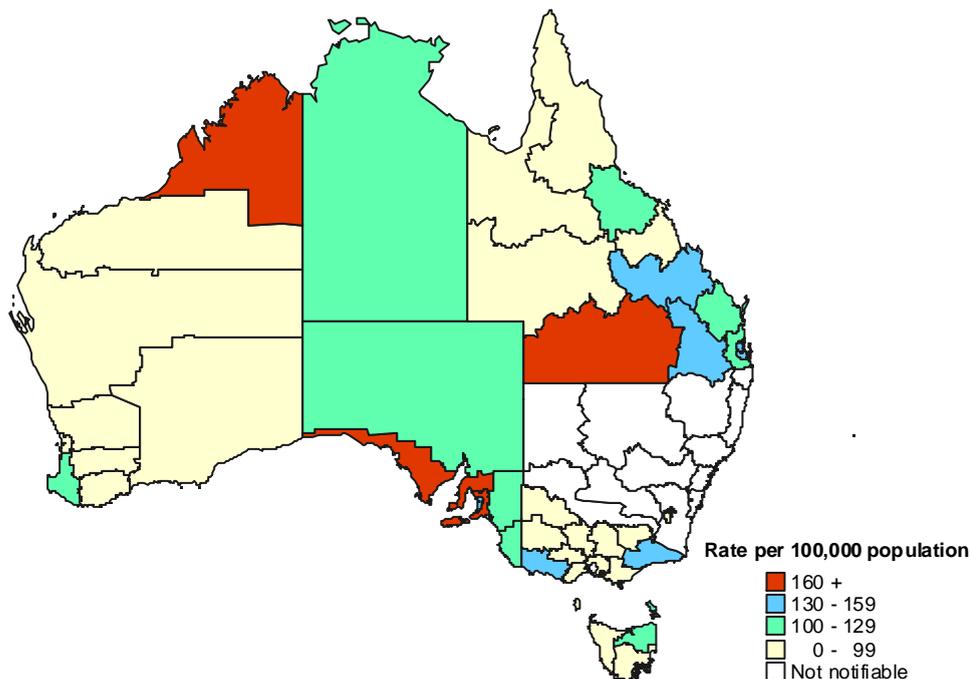


Figure 5. Notifications of hepatitis A, 1991-1998, by month of onset

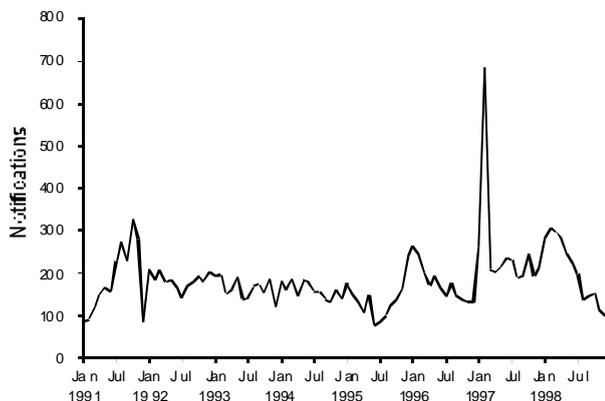
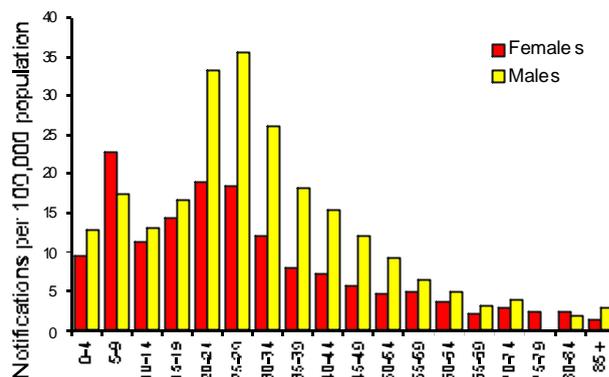


Figure 6. Notification rate of hepatitis A, 1998, by age group and sex



Hepatitis A

There were 2,503 notifications of hepatitis A infection during 1998 (Table 1); a 19% decrease from 1997, and a rate of 13.4 per 100,000 population. The largest number of reports were from Queensland (1042) and NSW (945) (Table 1). The highest notification rates were from Queensland (30.1 per 100,000 population) and the Northern Territory (24.7 per 100,000 population) (Table 2). The notification rate for the Northern Territory had decreased compared with 49.2 per 100,000 population reported in 1997.

Hepatitis A was notifiable and reported in all jurisdictions. By Statistical Divisions the highest rate of notifications (70+ per 100,000 population) was in Far North and Fitzroy in Queensland (Map 3).

No apparent seasonal distribution for hepatitis A infection notifications has been reported in recent years, although in 1998 a higher number of reports were received early in the year (Figure 5). The male to female ratio was 1.6:1; similar to the previous years. Age group specific notification rates were bimodal with peaks in the 5-9 years and 20-29 years age groups; the highest notification rate for males was for those aged 25-29 years and for females was for those aged 5-9 years (Figure 6).

Map 3. Notifications of hepatitis A, 1998, by Statistical Division of residence

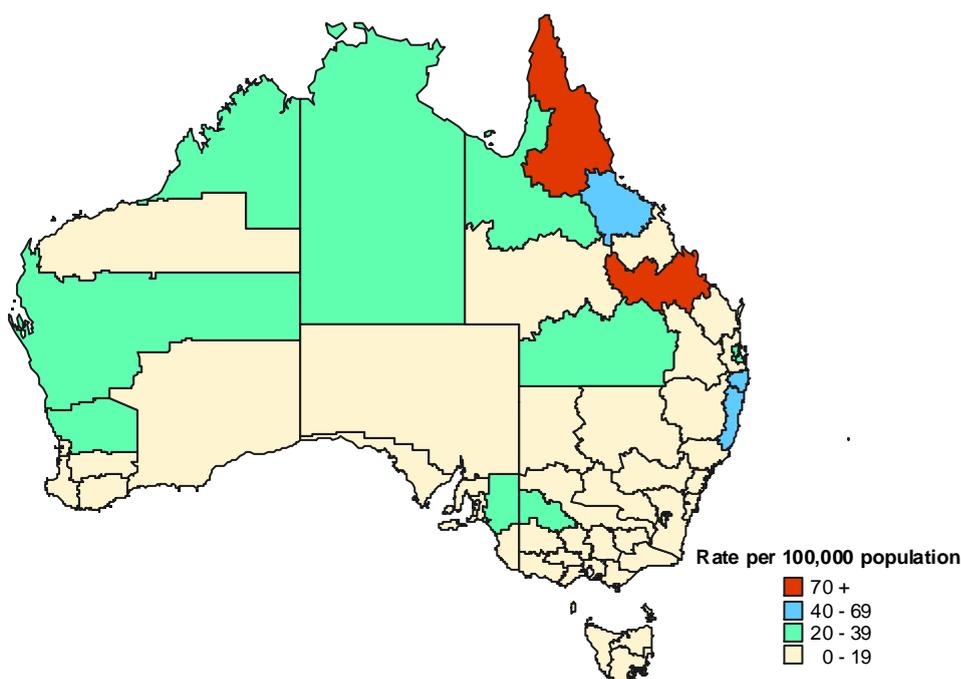


Figure 7. Notifications of salmonellosis, 1991-1998, by month of onset

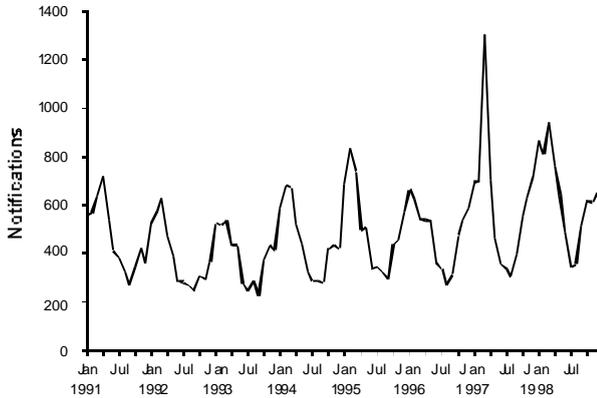
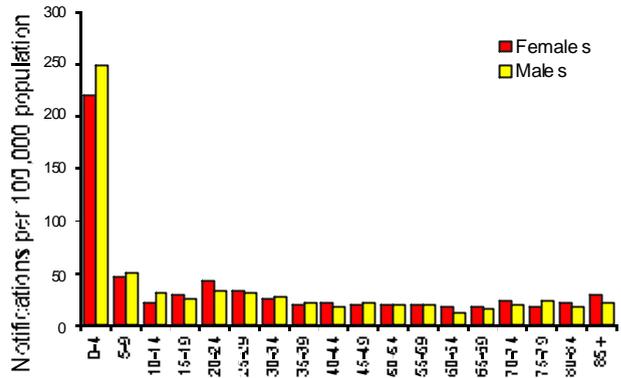


Figure 8. Notification rate of salmonellosis, 1998, by age group and sex



Listeriosis

There were 58 notifications for listeriosis in 1998 (Table 1), similar to previous years. The Northern Territory was the only State or Territory with no reports. The notification rate was 0.3 per 100,000 population (Table 2), lower than 1997 but consistent with the rates for the period 1992 to 1997.

Salmonellosis - not elsewhere classified

A total of 7,700 cases of salmonellosis (not elsewhere classified) were reported in 1998 (Table 1). The annual notification rate of 41.1 per 100,000 population (Table 2) was the highest level for the NNDSS since 1991. The highest rate was reported in the Northern Territory,

215.8 per 100,000 more than twice the notification rates for the States and other Territory (Table 2).

Salmonellosis was notifiable and reported from all jurisdictions. By Statistical Division the highest rate of notification (300+ per 100,000 population) was in Kimberley in Western Australia (Map 4).

As in previous years, a seasonal trend was noted, with a higher number of notifications reported in the warmer months, January through April and November and December (Figure 7). The highest rates of notification were seen in the 0-4 years age group for both males and females (males 249.9 and females 221.2 per 100,000 population respectively) (Figure 8). The overall ratio of males to females was 1.1:1.

Map 4. Notification rate of salmonellosis, 1998, by Statistical Division of residence

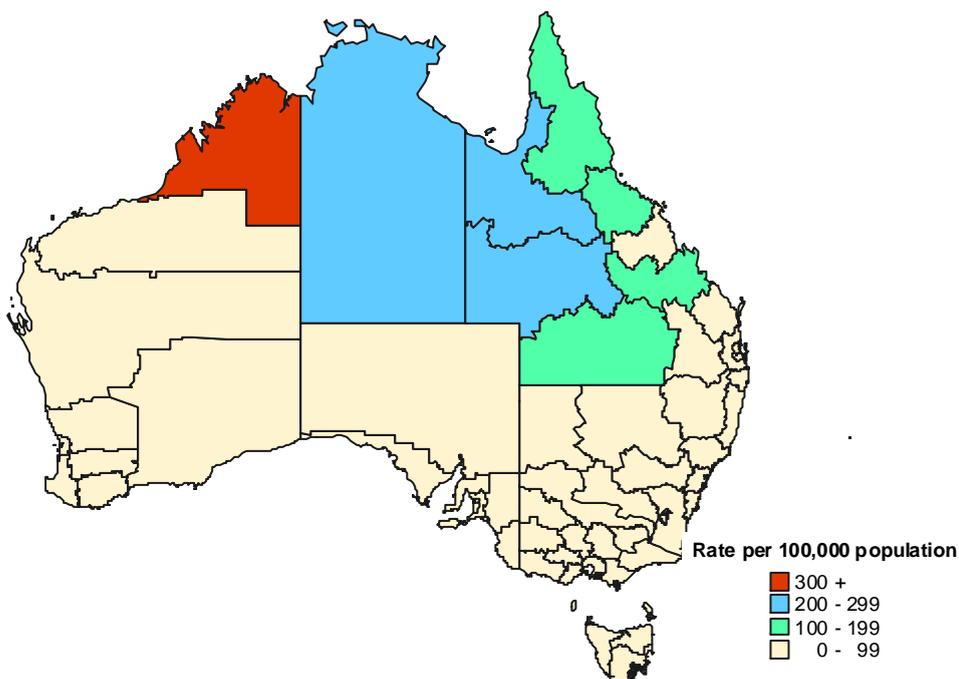


Figure 9. Notifications of shigellosis, 1991-1998, by month of onset

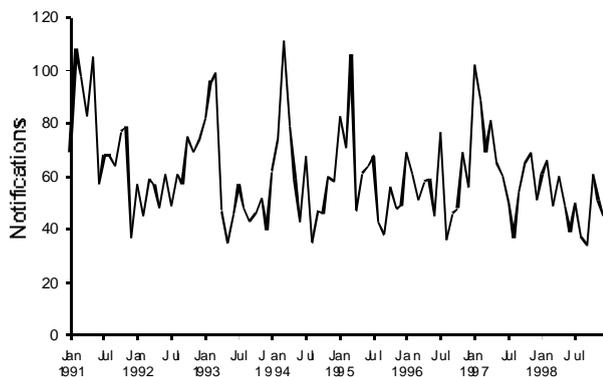
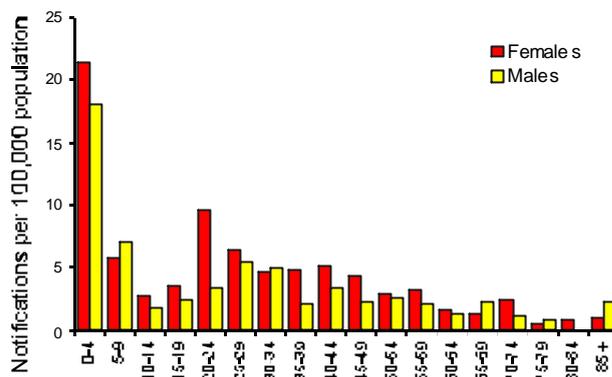


Figure 10. Notification rate of shigellosis, 1998, by age group and sex



Shigellosis

Shigellosis was notified for 615 cases in 1998 (Table 1), 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 per 100,000 population, was greater than the rate in 1997 (Table 2). The highest rate was seen in the Northern Territory (51.6 per 100,000 population) (Table 2).

Notifications did not show the same peak in the first four months of the year, that was noted in previous years (Figure 9). There was a bimodal distribution of notifications with peaks in the 0-4 years and 20-24 years age groups. The highest age group specific rates occurred in the 0-4 years age group for both males and females (males 18.1 and females 21.3 per 100,000 population, respectively) (Figure 10). The overall male to female ratio was 1.1:1.

Typhoid and paratyphoid

There were 69 cases of typhoid and paratyphoid notified in 1998 (Table 1), and the notification rate was 0.4 per 100,000 population; unchanged from 1997 (Table 3). The Australian Capital Territory was the only State or Territory with no reports (Table 1). The highest rate was in the Northern Territory (Table 2). There was a peak early in the year as in previous years (Figure 11). The highest rates of notification were for males in the 15-29 years age groups and another peak in those aged 85+ years (1.4 per 100,000 population) and for females aged 20-24 years (0.7 per 100,000 population respectively) (Figure 12). The overall male to female ratio was 2:1.

Yersiniosis

There were 207 notifications of yersiniosis in 1998 (Table 1), 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 number of reports of yersiniosis has continued to decrease. The greatest number of reports

Figure 11. Notifications of typhoid, 1991-1998, by month of onset

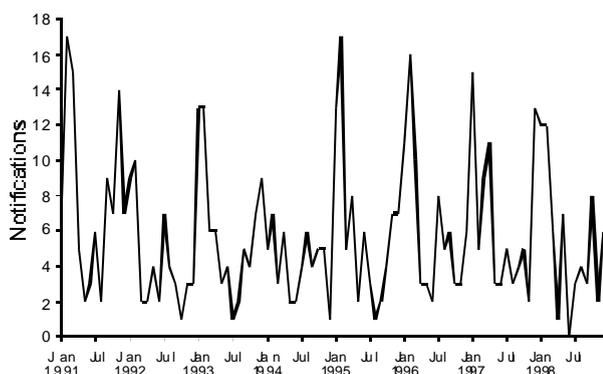


Figure 12. Notification rate of typhoid, 1998, by age group and sex

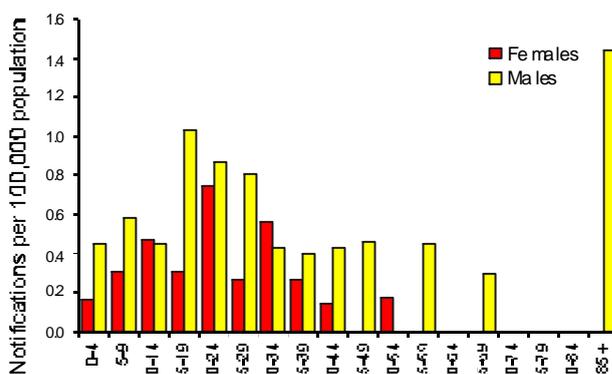
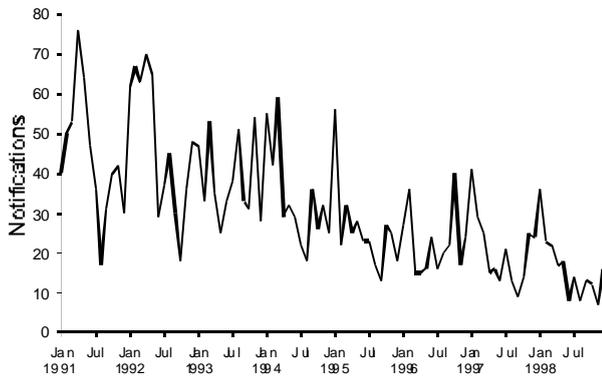


Figure 13. Notifications of yersiniosis, 1991-1998, by month of onset



and the highest notification rate were both from Queensland (Table 1 and Table 2).

Slightly higher numbers were reported early in the year following the same pattern of previous years (Figure 13). The overall male to female ratio was 1.7:1. The highest age group specific rates occurred in the 0-4 years age group for both males and females (Figure 14).

Discussion

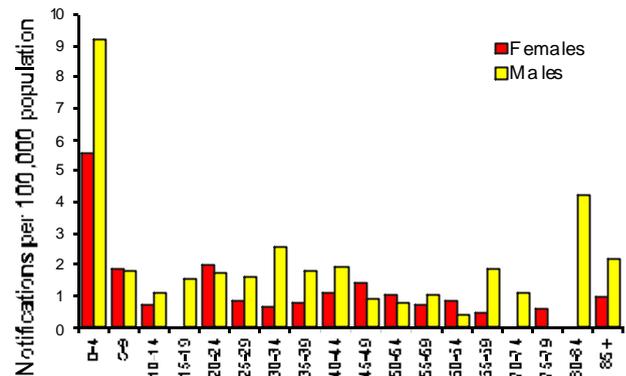
Campylobacteriosis and non-typhoidal salmonellosis continued to be the predominant enteric pathogens reported to the NNDSS, similar to the pattern reported in the United States of America and the United Kingdom.¹⁷

Unlike salmonellosis the high rates of campylobacteriosis are not limited to northern Australia. Notifications of campylobacteriosis increased in 1998 compared with 1997. One outbreak of campylobacteriosis was confirmed to be a water-borne infection (CDNANZ personal communication). The increase in campylobacteriosis in Australia was also seen in New Zealand late in 1998, where the rates increased by 30% from the previous year (CDNANZ personal communication). Investigations of outbreaks of campylobacteriosis and identification of risk factors for acquisition of infection remain important if the burden of disease is to decrease.

The incidence of salmonellosis also increased in 1998; a steady rise has been occurring since 1994. Some of the increase may be the result of improved surveillance. Outbreaks of *Salmonella* oranienburg from contaminated gelati and *Salmonella* RDNC A045 in a wedding party were reported in *CDI*.^{18,19} Other outbreaks in 1998 included *Salmonella* chester, *Salmonella* typhimurium PT 64 associated with spiced sausages, and *Salmonella* virchow (CDNANZ personal communication).

The number of notifications of listeriosis was similar and the number of notifications of hepatitis A and yersiniosis decreased in 1998. The decrease in hepatitis A notifications may reflect a correction to the 1997 figures that included the Wallis Lake outbreak. Small outbreaks of hepatitis A in 1998 were reported in select population groups; intravenous drug users, homosexual men, indigenous communities and people linked to child-care centres. These identified subgroups may be associated

Figure 14. Notification rate of yersiniosis, 1998, by age group and sex



with some factors that can be addressed to further reduce morbidity.^{20,21} (CDNANZ personal communication; March, April, June, October & November 1998)

The peak in notifications for typhoid in males aged more than 85 years was due to one case occurring in a small population.

Quarantinable diseases

In Australia, the diseases proclaimed under the *Quarantine Act 1908* to be quarantinable are cholera, plague, rabies, yellow fever and four viral haemorrhagic fevers (Ebola, Marburg, Lassa and Crimean-Congo). Cholera, plague, yellow fever and the viral haemorrhagic fevers are of international public health significance and are reported to the World Health Organization. Rabies is a disease of both human and animal quarantine importance in Australia, which has status as a rabies-free country.

These 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 1998, similar to 1997. There was one from New South Wales, one from Queensland and two from Victoria. All cases were acquired overseas.

Plague, rabies, yellow fever and viral haemorrhagic fevers

There were no cases of these diseases notified in 1998.

Discussion

Cases of cholera continue to be reported in travellers returning from foreign countries, particularly from Asia. These cases demonstrate the importance of travellers consuming safe food and drink in areas where cholera is known to occur. In general, travellers should be aware of how to avoid the diseases which are commonly reported in many Asian and South Pacific countries.

Although no cases of rabies or yellow fever were reported in Australia, worldwide these two diseases continue to cause fatalities and travellers should be aware of measures that they can take to prevent infection with these viruses. Travellers intending to visit central Africa or central South America are encouraged to receive the yellow fever vaccine from an approved Australian vaccination centre. Information on the quarantinable diseases can be found on the Department of Health and Aged Care Website at: <http://www.health.gov.au/pubhlth/consumer/index.htm>.

Sexually transmissible diseases (STDs)

Based on NHMRC surveillance case definitions,¹ the diseases classified as sexually transmissible for surveillance in the NNDSS are chancroid, chlamydial infection, donovanosis, gonococcal infection, lymphogranuloma venereum and syphilis.

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, and parasitic infestations such as pubic lice and scabies.²²

In addition to the STD surveillance by NNDSS the Australian Gonococcal Surveillance Programme (AGSP), a national laboratory based surveillance system, documents the antibiotic sensitivity of gonococcal isolates. The AGSP includes some clinical and demographic data.¹³ National data on HIV and AIDS are collected and reported separately by the National Centre in HIV Epidemiology and Clinical Research. This Centre also reports on trends in sexually transmissible diseases.¹²

Chancroid

Only one case of chancroid, from Western Australia, was reported in 1998. The case was a female in the 35-39 year age group.

Chlamydial infection (NEC)

In 1998, 11,405 notifications were received for chlamydial infection (NEC) (Table 1). There has been a steady increase in the number of notifications since 1994. In New South Wales, reporting of genital chlamydial infection commenced in September 1998. It can be assumed that most of the reported cases from the other seven States and Territories in 1998 were genital infections, classified in accordance with the NHMRC case definition. Ninety-six per cent of reported cases were in the 15-39 years age groups. It is likely that many of the cases reported in young children were cases of chlamydial conjunctivitis.

The rate for 1998 was 87.7 cases per 100,000 population higher than the rate of 74.5 per 100,000 in 1997. This was the third highest rate reported for any notifiable disease and the highest among the STD's (Table 2). There is an apparent trend for the number of notifications of chlamydial infection to increase over the past decade (Figure 15). There has been an 80% increase in the rate per 100,000 population between 1991 and 1998. Among notified cases the male: female ratio was 1:1.6. For both males and females, the highest rates of disease were recorded for the 20-24 years age group. Thirty-five per cent of cases in females and 32% of cases in males were in this age group (Figure 16). High notification rates were reported across northern Australia, including rates over 400 per 100,000 in the Statistical Divisions of Kimberley and the Pilbara in Western Australia, the Statistical Division of Far North Queensland, and in the Northern Territory (Map 5).

Map 5. Notification rate of chlamydial infection, 1998, by Statistical Division of residence

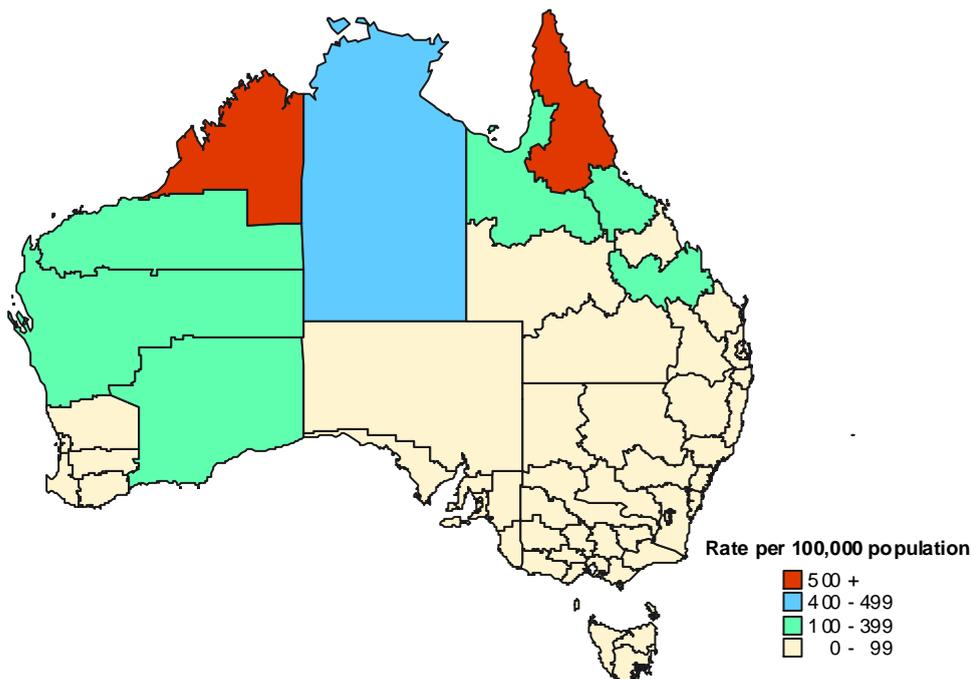


Figure 15. Notifications of chlamydial infection, 1991-1998, by month of onset

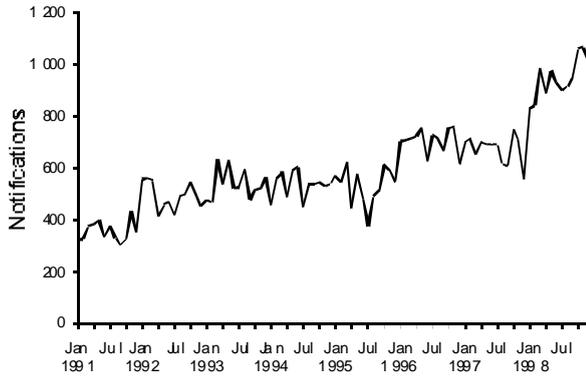
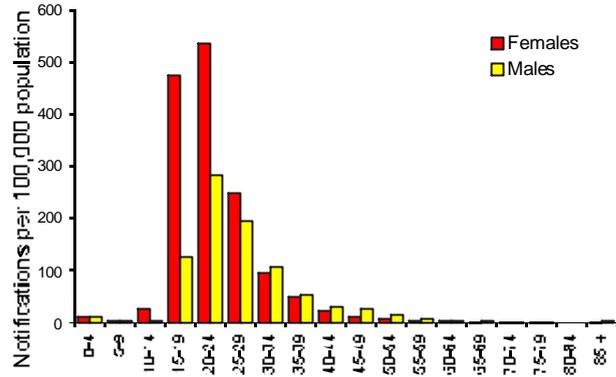


Figure 16. Notification rate of chlamydial infection, 1998, by age group and sex



Donovanosis

Donovanosis was not notifiable in South Australia in 1998, and only became notifiable in New South Wales in September 1998. A total of 31 notifications were received from Northern Territory, Queensland and Western Australia (Table 1). Reported cases from Queensland and Western Australia were from the tropical north regions of those States. The male to female ratio was 1:6.8 with a noted increase in female cases. Fifty-four per cent of the cases were in the 15-29 years age groups.

Gonococcal infection

In 1998, a total of 5,428 notifications of gonococcal infection were received nationally (Table 1). The

notification rate of 29.0 cases per 100,000 was higher than in recent years (Table 3). 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 1982.²³ There is an apparent trend for the number of notifications of gonococcal infection to increase over the past decade (Figure 17). There has been a 98% increase in the rate per 100,000 between 1991 and 1998.

There was a wide geographical variation in the rate of notification of gonococcal infection (Table 2, Map 6). The highest rate, 2,193.7 per 100,000, was reported from the Statistical Division of Kimberley. Rates above 50 per 100,000 population were reported from the Statistical Divisions of the Pilbara and South Eastern in Western

Map 6. Notification rate of gonococcal infection, 1998, by Statistical Division of residence

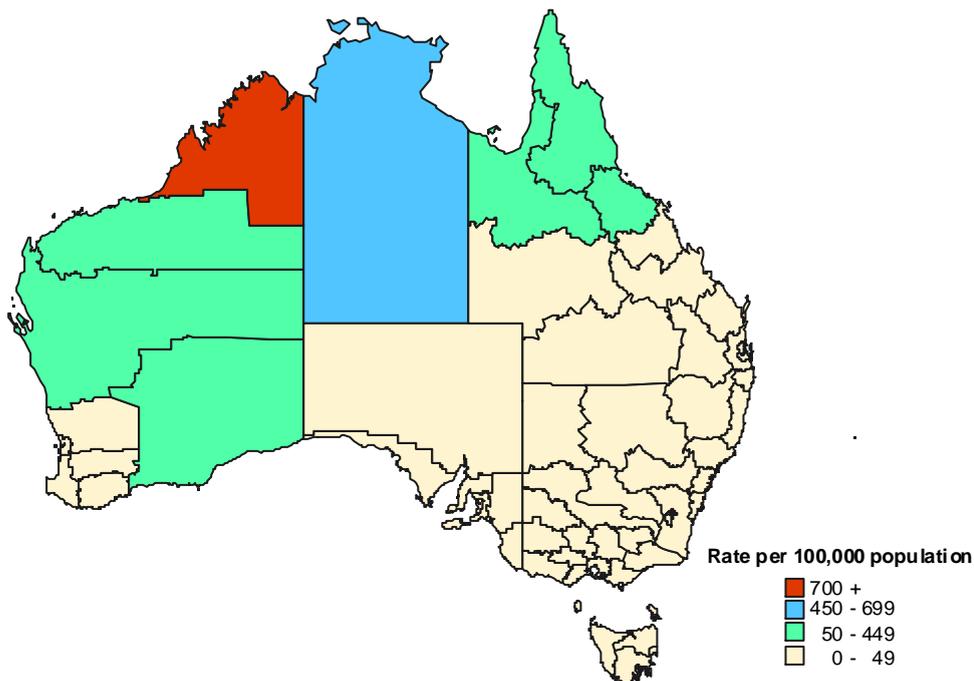
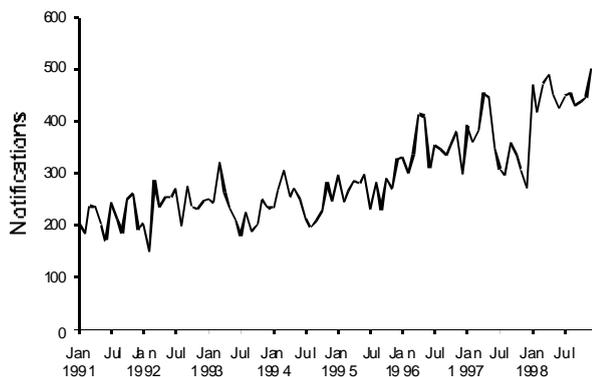


Figure 17. Notifications of gonococcal infection, 1991-1998, by month of onset



Australia, the Statistical Divisions of Far North and North West in Queensland and the Northern Territory.

The male to female ratio of 1.5:1 was similar to 1997. As in 1997 the rate for females in the 15-19 years age group was higher than for males in the same age group (Figure 18). A similar pattern was seen for the number of notifications in the Northern Territory.

Lymphogranuloma venereum

No cases were reported from any State or Territory in 1998. Lymphogranuloma venereum was not notifiable in Western Australia or South Australia. In New South Wales the disease became notifiable in September.

Syphilis

A total of 1,689 notifications of syphilis were received (Table 1), with a rate of 9.0 per 100,000 population in 1998, representing a 28.6% increase in the rate compared to the previous year (1,304 notifications and a rate of 7.0 per 100,000). This increase is a reversal of the trends since 1992.⁴ However, the rate remains lower than those seen in the 1980's.²³ Specifically rates of syphilis

Figure 19. Notification rate of syphilis, 1998, by age group and sex

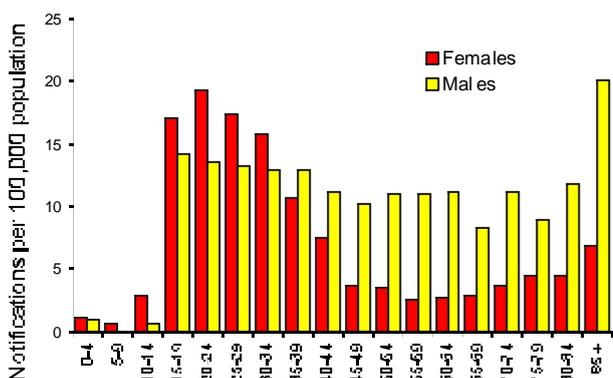
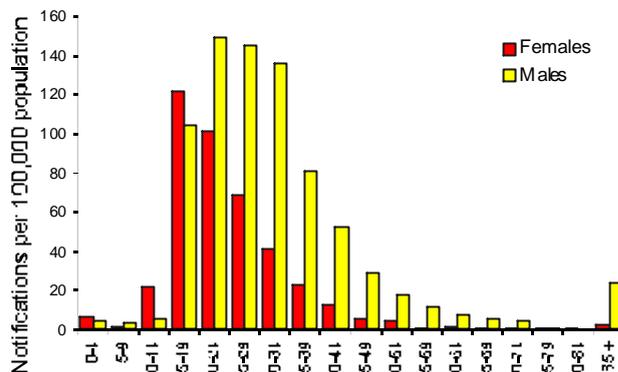


Figure 18. Notification rate of gonococcal infection, 1998, by age group and sex



increased in the Northern Territory, Queensland and the Australian Capital Territory.

There was wide geographical variation in the notification rate (Table 2, Map 7). High notification rates were reported for the Western Australian Statistical Division of Kimberley and the Northern Territory.

The male to 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 19).

In 1998, there were two reported cases of congenital syphilis.

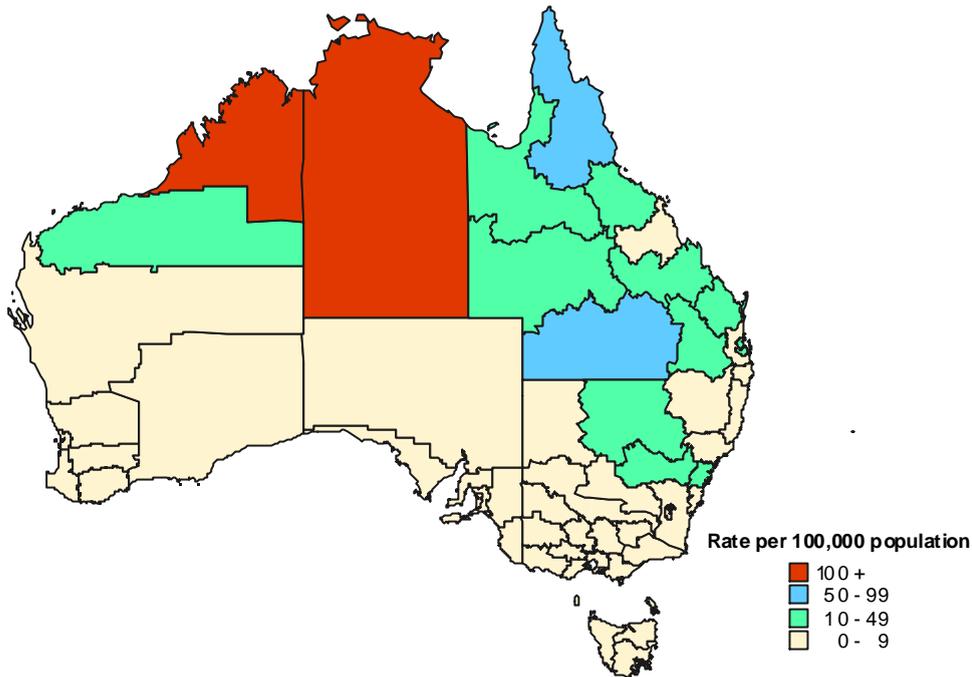
Discussion

Transmission of sexually transmitted infections appears to be on the rise. There is an apparent trend in the rates of gonococcal infection to increase over the past decade.²⁴ In general males predominated except for in the 15-19 years age group. Of concern is the accompanying reported increase in antibiotic resistance.²⁵ A rise in chlamydial infection and syphilis notifications was also seen. There is no reason to believe that these increases were due to any changes in surveillance, reaffirming the need for ongoing surveillance and management strategies. The syphilis surveillance raised issues around case definitions that may include a mixture of new infections, old infections and treated cases depending on the reporting jurisdiction.

Vaccine preventable diseases

This section summarises the national notification data for diseases targeted by the current standard childhood vaccination schedule. The only change to the schedule since 1994 (when the fifth dose of DTP for children aged 4-5 years was introduced) occurred in the final quarter of 1998. At this time the second dose of MMR was moved from 10-16 years of age to 4-5 years of age as part of the Measles Control Campaign. Other notifiable diseases for which vaccines are available but which are not incorporated in the standard childhood schedule (hepatitis A, hepatitis B, and some serotypes of meningococcal disease) are not described here. The 1998 influenza surveillance data, and investigations for polio and acute

Map 7. Notification rate of syphilis, 1998, by Statistical Division of residence



flaccid paralysis have been published in earlier editions of *CDI*.^{26,27,28} Congenital rubella notifications have not been included in this report. Identified cases for 1998 are reported in the Sixth Annual Report of the Australian Paediatric Surveillance Unit.²⁹

Diphtheria

There were no cases of diphtheria notified in 1998. The last known case occurred in 1992 and was notified in 1993.

***Haemophilus influenzae* type b infection**

There were 35 notifications of *Haemophilus influenzae* type b (Hib) infection in 1998. This is the lowest annual number of notifications recorded since national surveillance began in 1991 (Figure 20). As in previous years, most notified cases were aged less than 5 years (71.4%)(Figure 21). The notification rate for this age group was 1.9 per 100,000 compared to a rate of 0.2 per 100,000 overall. The highest notification rates were for children aged less than 2 years. The male to female ratio for all ages was 1:1.3.

Figure 20. Notifications of *Haemophilus influenzae* type b, 1991-1998, by month of onset and less than 5 years and all ages

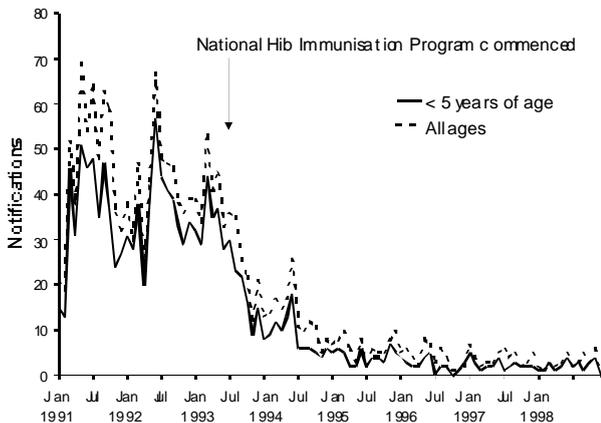


Figure 21. Notification rate of *Haemophilus influenzae* type b, 1998, by age group and sex

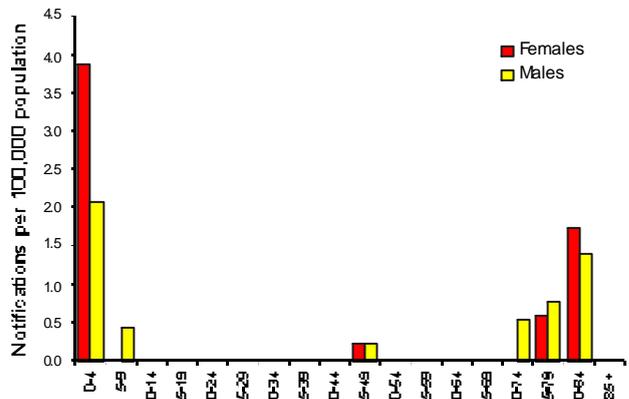


Figure 22. Notifications of measles, 1991-1998, by month of onset

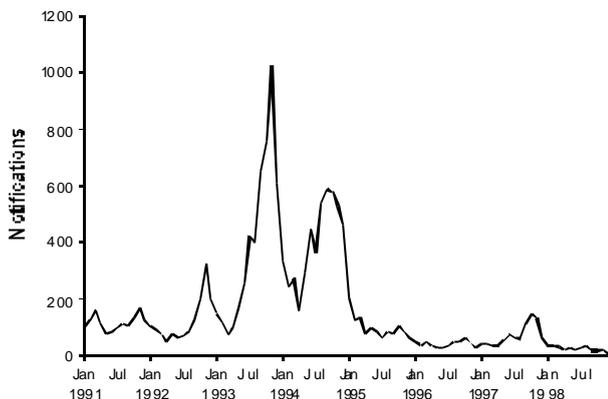
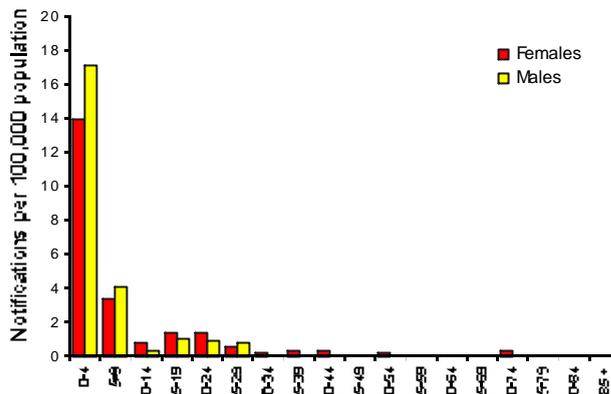


Figure 23. Notification rate of measles, 1998, by age group and sex



Measles

There were 306 measles notifications in 1998, a rate of 1.6 per 100,000 (Tables 1 and 2). This is the lowest annual rate since national surveillance began in 1991 (Figure 22). As in recent years, the highest notification rate was in the 0-4 years age group (15.6 per 100,000) (Figure 23). Within this age group, notification rates were highest for infants aged less than 1 year (32.1 per 100,000). There were slightly more notifications for males than females (male to female ratio 1.1:1). The notification rate for Tasmania (7.6 per 100,000) was more than double the rate for any other State/Territory.

Mumps

In 1998 there were 183 notifications of mumps, a rate of 1.0 per 100,000. Annual numbers of notifications have remained relatively constant since mumps became notifiable in all States and Territories (July 1996) (Figure 24). Notifications were spread across most age groups, but as in previous years, most (41.0%) were aged less than 10 years. The highest notification rates were in the 5-9 years age group (3.1 per 100,000) followed by the

0-4 years age group (2.6 per 100,000). Overall, numbers of notifications were evenly divided between males and females (male to female ratio 1:1.0) (Figure 25). However, there were more notifications for males than females in the 5-9 years age group (male to female ratio 2.2:1).

Pertussis

There were 40% fewer pertussis notifications in 1998 than in 1997 (Figure 26). In 1998, there were 6,432 notifications, a notification rate of 34.3 per 100,000. As expected, numbers of notifications peaked in the spring and summer months. There were slightly more notifications for females than males (male to female ratio 1:1.1). As in recent years, the highest notification rate was for children aged less than 1 year (113.5 per 100,000). Rates were also high in the 5-9 years (91.2 per 100,000) and 10-14 years age groups (89.2 per 100,000) (Figure 27).

Notification rates varied by geographic location (Map 8). At the State/Territory level, rates were highest for South Australia (47.1 per 100,000), Queensland (42.4 per 100,000), and New South Wales (40.5 per 100,000). The Statistical Division of Far West in New South Wales had by

Figure 24. Notifications of mumps, 1992-1998, by month of onset

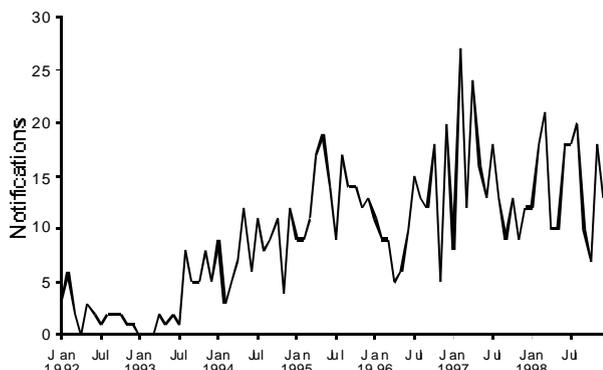
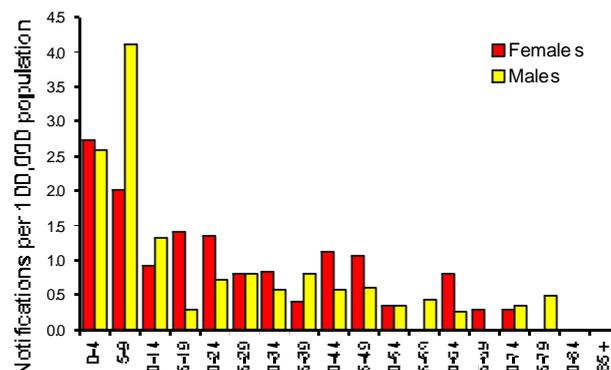
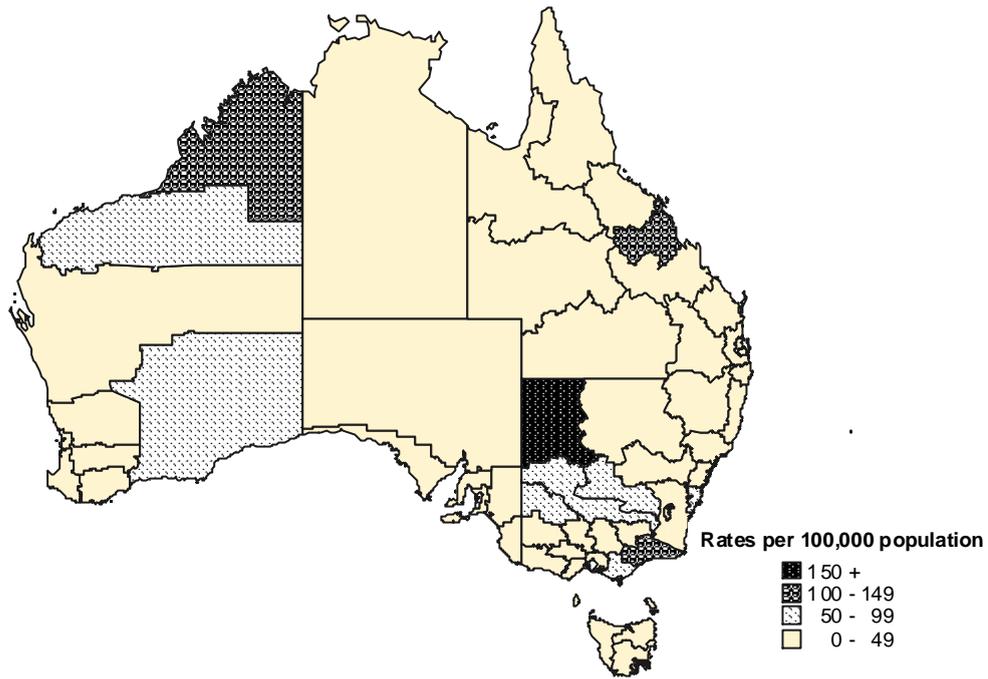


Figure 25. Notification rate of mumps, 1998, by age group and sex



Map 8. Notification rate of pertussis, 1998, by Statistical Division of residence

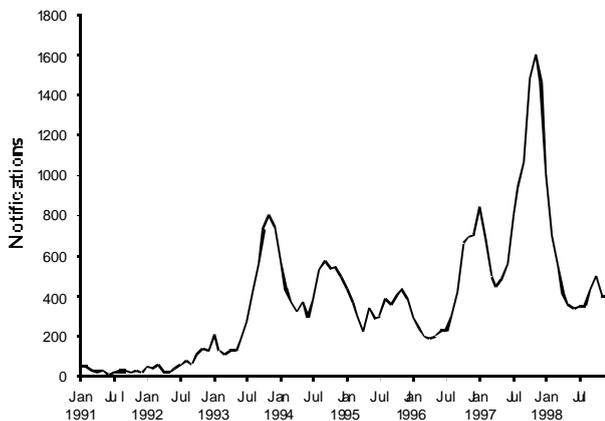


far the highest notification rate (268.3 per 100,000). Rates of over 100 per 100,000 were also recorded in the Statistical Divisions of Kimberly in Western Australia (119.1 per 100,000), East Gippsland (107.2 per 100,000) in Victoria, and Mackay (104.6 per 100,000) in Queensland.

Polio

No cases of polio were reported in 1998. Indigenous transmission of wild type polio virus is estimated to have ceased in the early to mid 1960's and the last imported case was over 20 years ago.³⁰ Laboratory investigations are currently being performed to identify the last known case of wild type polio in Australia.³¹

Figure 26. Notifications of pertussis, 1991-1998, by month of onset



Rubella

Since 1995, annual numbers of rubella notifications have been declining (Figure 28). In 1998, there were 772 notifications, a notification rate of 4.1 per 100,000. The highest number of notified cases occurred in August, slightly earlier than the expected peak in spring months. Males aged 15-19 years continued to have the highest notification rate (15.8 per 100,000) (Figure 29). However, rates for this group have declined markedly since 1994/5, the time when a second dose of MMR vaccine for both sexes aged 10-16 years replaced the school girl rubella vaccination program.³² In 1998, rates for males aged 15-19 years were comparable to those for males

Figure 27. Notification rate of pertussis, 1998, by age group and sex

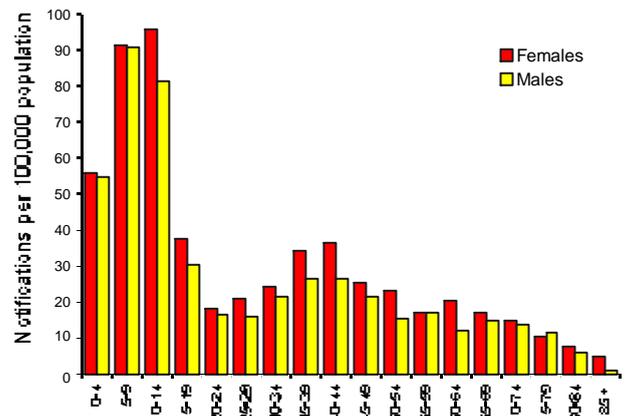
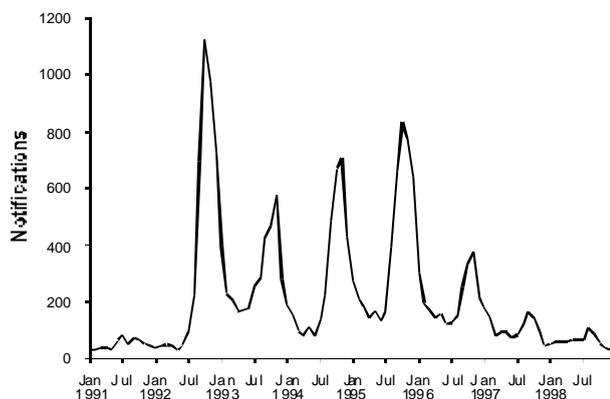


Figure 28. Notifications of rubella, 1991-1998, by month of onset



aged 20-24 years (13.1 per 100,000) and males in the 0-4 years age group (14.4 per 100,000). All States and Territories had lower notification rates than in 1997, with the greatest reduction occurring in South Australia.

Tetanus

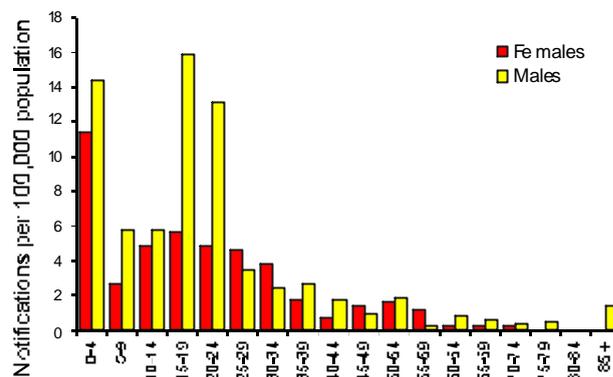
There were seven notifications of tetanus in 1998, a similar number to that reported in 1997. As in recent years, there were more notifications for females than males (male to female ratio 1:2.5) and most (6/7, 85.7%) were at least 55 years of age. For notified cases aged at least 55 years, the notification rate was 0.2 per 100,000.

Childhood immunisation coverage reports

Estimates of immunisation coverage both overall and for individual vaccines for children at 12 months of age continued to improve in 1998 (Table 4). This trend was also evident in each State and Territory. A number of factors have probably effected coverage estimates, including the linking of immunisation status as recorded on the ACIR to childcare payments and the General Practice Immunisation Incentives (GPPI) scheme, both of which commenced during 1998. Intensive efforts to improve data transfer and handling in the Northern Territory have resulted in the data more accurately reflecting immunisation coverage in that jurisdiction.

Immunisation coverage at 2 years of age was first reported in 1998. Coverage estimates for vaccines recommended at 12 months and 18 months of age improved during 1998

Figure 29. Notification rate of rubella, 1998, by age group and sex



(Table 5). 'Fully immunised' coverage levels were reported to be lower than estimates for individual vaccines. Reasons for this discrepancy are being investigated. One likely factor is poor identification of children on records of immunisation encounters, which leads to difficulties matching new and existing vaccination records on the ACIR. It is important to note that in other countries such as the United Kingdom, 3 doses of DTP and Hib vaccine constitute full immunisation with these vaccines at 2 years of age compared to 4 doses of DTP and 3 or 4 doses of Hib vaccines.

Discussion

In 1998, notification rates for most vaccine preventable diseases were lower than in recent years. Rates for measles and Hib infection were the lowest recorded since the establishment of the current notification system in 1991. The epidemic of pertussis that occurred in 1997 receded in 1998 and numbers of rubella cases have been declining since 1995. These are promising findings that are likely to reflect a true reduction in the incidence of disease.

During 1998, substantial initiatives were undertaken to eliminate measles in Australia. A major initiative was the Measles Control Campaign (MCC). The Campaign involved a one-off school based vaccination program for children aged 5-12 years. This was necessary because of the decision to change the recommended age for the second dose of MMR vaccine from 10-16 years to

Table 4. Percentage of Australian children born in 1997 immunised at 1 year of age according to data available on the Australian Childhood Immunisation Register

Vaccine group	Per cent for each birth cohort (%)			
	1/1/97-31/3/97	1/4/97-30/6/97	1/7/97-30/9/97	1/10/97-31/12/97
DTP	82.4	86.5	86.1	86.3
OPV	82.5	86.4	85.9	85.9
Hib	82.1	86.0	86.0	86.4
Fully immunised	80.2	84.3	84.5	84.9

Table 5. Percentage of Australian children born in 1996 immunised at two years of age according to data available on the Australian Childhood Immunisation Register

Vaccine	Per cent for each birth cohort (%)			
	1/1/96-31/3/96	1/4/96-30/6/96	1/7/96-30/9/96	1/10/96-31/12/96
DTP	76.0	78.0	80.2	80.9
OPV	82.7	83.8	85.0	85.6
Hib	76.5	78.4	80.4	81.0
MMR	82.5	83.2	85.0	86.4
Fully immunised	63.8	66.1	68.8	70.3

4-5 years. In addition, parents of preschool children who had no record of a first MMR vaccination according to the ACIR were sent a reminder letter. The Australian Measles Control Campaign 1998 Evaluation Report estimated that 96% of the 1.8 million school children aged 5-12 years were vaccinated during the MCC.³³ In the preschool group, the report estimated that 97.5% of those aged 12 months to 3.5 years had received a first dose of MMR vaccine. The successful implementation of the MCC means that Australia is on track to fulfil the national measles vaccination targets set for the year 2000.³⁴ Results from the campaign would not be expected to be reflected in the NNDSS figures for 1998.

To accurately monitor progress towards the elimination of measles following the MCC, high quality surveillance data are required. In 1998, the National Measles Surveillance Strategy was formulated to provide guidelines for improving surveillance data quality.³⁵ These guidelines recommend that all States/Territories implement a uniform method for recording information about measles notifications and that laboratory confirmation be sought for all sporadic cases. Laboratory confirmation is increasingly important, as the positive predictive value of a clinical diagnosis becomes poor when the number of measles cases declines. A recent review of methods of diagnosis of measles cases notified in 1992-1997 indicated less than one third had been confirmed.³³ Information reported from the Victorian enhanced surveillance system for measles emphasises the need to improve levels of confirmation, as the majority of suspected cases who had laboratory testing performed did not have measles.^{33,36} This may explain high rates in some States.

Trends in the incidence of vaccine preventable disease are shown from notification data even though NNDSS data are incomplete and underestimate the incidence of disease. Additional data about the method of diagnosis and vaccination status of cases would enhance the usefulness of notification data. Vaccination records could be used to identify vaccine failures, while information about the method of diagnosis may help to explain changes in notification rates. Efforts to incorporate this information onto the NNDSS database are currently underway. The vaccination status of Hib cases for 1998 is available in the Sixth Annual Report of the Australian Paediatric Surveillance Unit.²⁹

Vectorborne diseases

Arthropod borne viruses which are able to replicate in arthropod vectors and in vertebrate hosts are collectively referred to as arboviruses. The nationally notifiable vectorborne diseases include several arboviruses and malaria. Although there are over 70 types of arboviruses in Australia only a small proportion of these are capable of causing disease in humans.³⁷

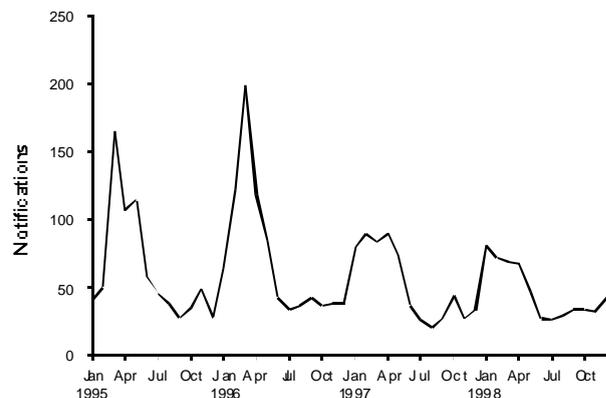
The NNDSS collects information on:

- Alphaviruses: Barmah Forest virus and Ross River virus.
- Flaviviruses: Dengue virus, and Arboviruses (not elsewhere classified) which include Murray Valley Encephalitis (MVE), Kunjin virus, Japanese Encephalitis (JE), Kokabera, and Stratford virus.
- Malaria: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae*, *Plasmodium ovale*.

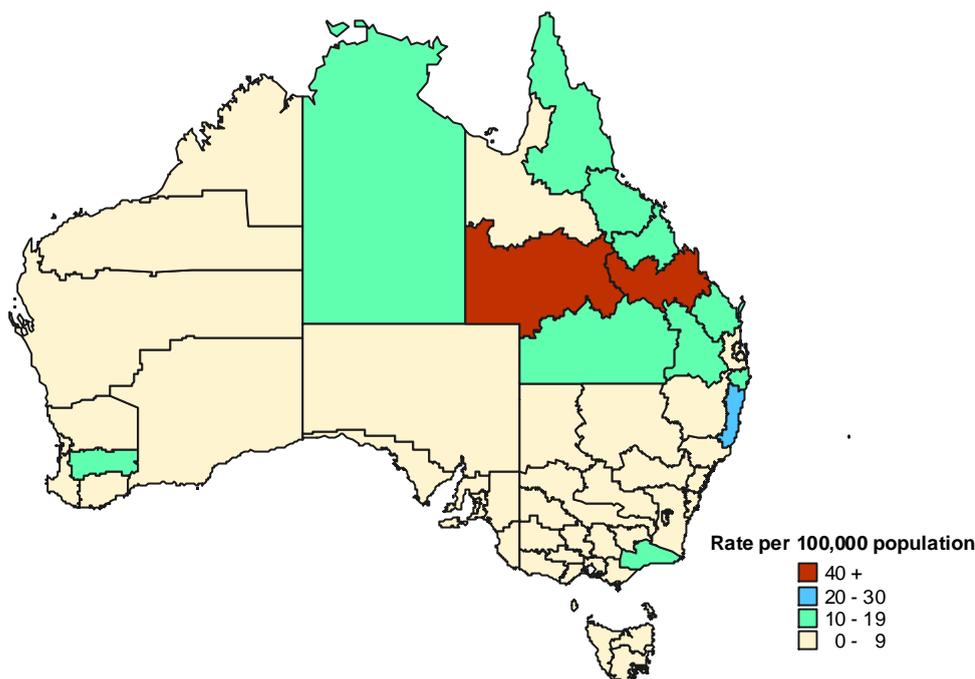
Barmah Forest virus infection

In 1998, 558 notifications of Barmah Forest virus were reported. Lower rates were reported in 1998 compared to previous years. In keeping with past years, no cases were reported from Tasmania and low rates of disease were reported in Victoria, the Australian Capital Territory and South Australia (Map 9). The Northern Territory had the

Figure 30. Notifications of Barmah Forest virus infection, 1995-1998, by month of onset



Map 9. Notification rate of Barmah Forest virus infection, 1998, by Statistical Division of residence



highest rate of 11.1 per 100,000, followed by Queensland with a rate of 10.2 per 100,000.

Males accounted for 56% of notifications. The male to female ratio was 1.3:1. The highest age-specific rate was in the 55-59 year age group. Peak activity followed previous seasonal trends and was reported from January through to April (Figure 30).

Dengue

There were 557 notifications of dengue in 1998, more than double the number notified in 1997 (210). Over 80% of these were reported from Queensland with a rate of 3.0 per 100,000. Notifications for the year peaked in February

and then again in September and December (Figure 31). More dengue cases were notified in 1998 than in any year since 1993. The male to female ratio was 1.5:1. Peak age specific rates were in the 25-29 year age group. Eighteen cases of dengue were reported in children less than 10 years of age.

Ross River virus infection

A total of 3,094 Ross River virus infection notifications were received in 1998. The Australian rate (16.5 per 100,000) was the lowest recorded since 1995. One-thousand nine-hundred and fifty notifications (63%) were reported in the State of Queensland. The areas of

Figure 31. Notifications of dengue, 1991-1998, by month of onset

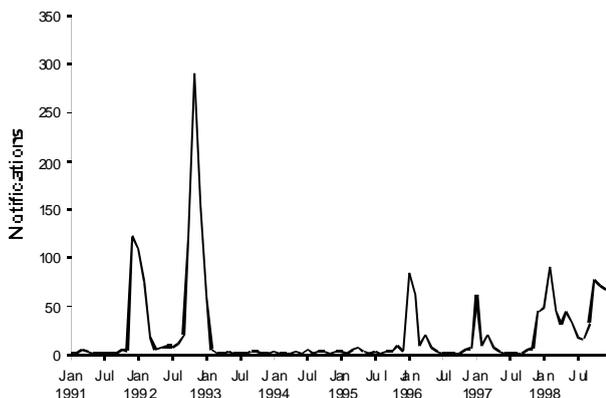


Figure 32. Notification rate of Ross River virus infection, 1998, by age group and sex

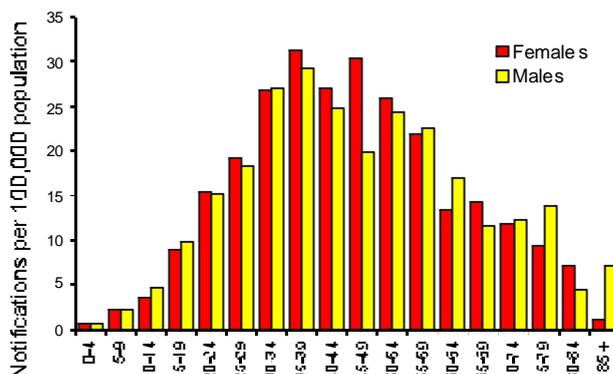
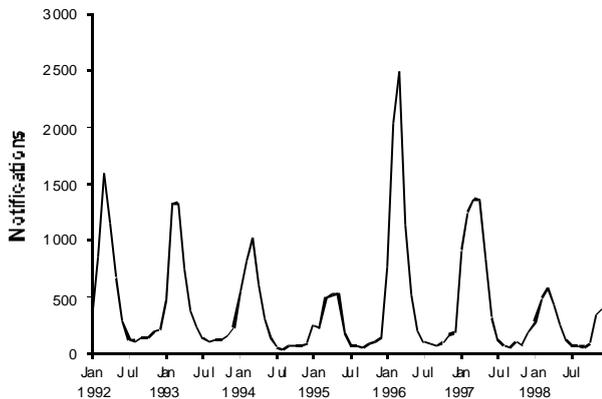


Figure 33. Notifications of Ross River virus infection, 1992-1998, by month of onset



Australia with the highest rates of disease were the Northern and Fitzroy regions in Queensland (Map 10). The male to female ratio was 1.0:1. The highest age-specific rates were reported in the 35-39 years age group. The lowest rates of disease were reported in children less than 10 years of age (Figure 32).

The most frequent months for disease onset were February, March and April. This is in keeping with seasonal trends observed in previous years (Figure 33).

Arboviruses (not elsewhere classified)

Altogether there were 81 notifications of arboviruses that were not elsewhere classified. These were predominantly reported from Queensland and Victoria.

A case of Japanese encephalitis (JE) was reported in Queensland in March 1998. This was the first case of JE to be diagnosed on the Australian mainland. It was believed that the infection was acquired while the man was working on a boat on the west coast of the Cape York Peninsula. A further case was reported in the Torres Strait in March 1998.³⁸

Malaria

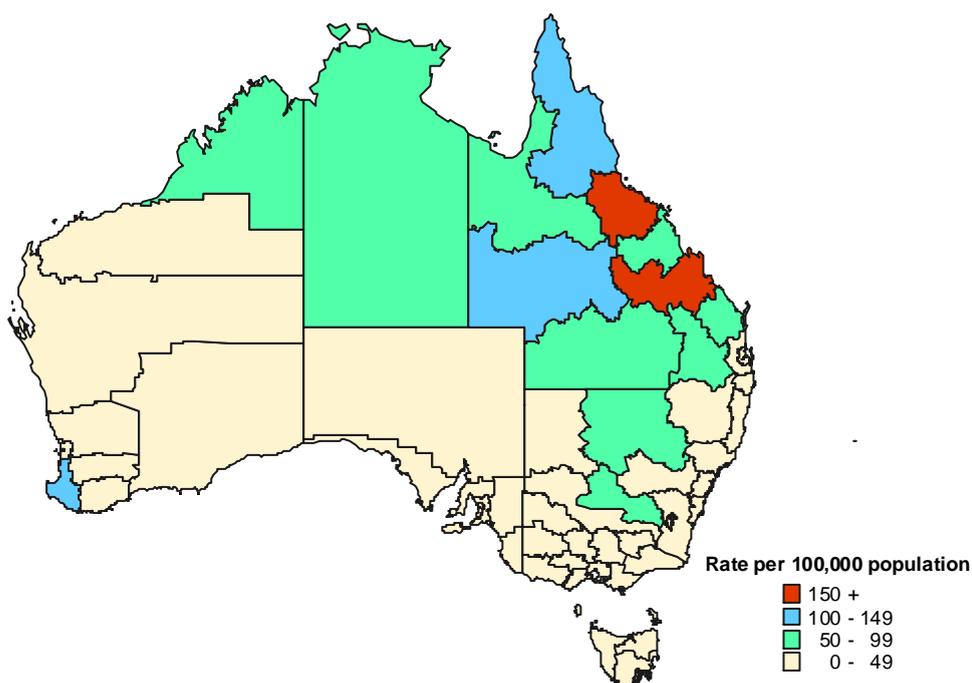
There were 705 notifications of malaria in Australia in 1998. The highest rates per 100,000 population were notified from Northern Territory (14.2), Queensland (9.7) and the Australian Capital Territory (7.8). Notification onset dates peaked in February which is characteristic of other years. Overall rates have remained fairly constant in Australia since 1993. Species notified were *Plasmodium vivax* (*P. vivax*)326 (46%), *P. falciparum* 175 (25%), *P. malariae*7 (1.0%), *P. ovale*11 (1.6%) and *P. falciparum/ P. vivax*co-infection 14 (2.0%) and other 1 (0.1%). Speciation was unknown for 171 notifications (24%). More notifications were from males, the male to female ratio being 2.3:1. Forty-seven per cent of all notifications were in people aged between 20 and 40 years. Twenty-eight cases were reported in children aged between 0 and 4 years.

Discussion

1998 was a quiet year for notifications of Ross River and Barmah Forest viruses. However, dengue and Japanese Encephalitis (JE) were of concern in 1998.

The rate of notifications of dengue (3.0 per 10,000) was three times higher than the previous year, although still lower than the peak of 4.5 per 100,000 in 1993. Epidemic activity of dengue was restricted to far north Queensland.

Map 10. Notification rate of Ross River virus infection, 1998, by Statistical Division of residence



An outbreak of dengue type 3 occurred in December 1997 in Cairns and spread to the Port Douglas and Mosman areas, and continued throughout 1998. The dengue strain identified in this outbreak was thought to have originated from South-East Asia.³⁹ To date dengue has not caused outbreaks in southern areas of Australia because of the absence of a suitable vector. The importance of ensuring that vectors that are tolerant to cold climates do not become established in Australia is highlighted by the dengue outbreak in 1998.⁴⁰

The first case of JE in the Australian mainland was identified in March 1998 in a fisherman from Mitchell River, Far North Queensland. Testing of sentinel pigs on the mainland showed sero-conversion to the disease over the same time period.³⁷ Although JE infections have occurred in recent years in the Torres Strait islands, until 1998 none had been identified on mainland Australia, raising the possibility that JE virus may have become epizootic, or even enzootic in northern Australia.³⁷ Monitoring of human and animal populations to determine the extent of JE virus activity in Queensland is continuing.

Australia remains free from endemic malaria but hundreds of imported cases occur each year. Prompt public health action is important to prevent local transmission of the disease. Malarial surveillance is particularly important in northern Australia where environmental conditions favour transmission of malaria, were it to be re-introduced.

Zoonoses

Zoonoses are diseases and infections that are naturally spread between vertebrate animals and humans. Although there are more than 60 recognised zoonoses in Australia,⁴¹ only a subset with epidemic potential and occupational risk, are reported to the NNDSS. All notifiable zoonoses can produce non-specific clinical signs and symptoms and therefore a definitive diagnosis depends on appropriate laboratory investigation.

Brucellosis

In 1998, there were 45 cases of brucellosis, with a rate of 0.2 per 100,000; which is the same rate as the previous 4 years. Ninety-one per cent of notifications were in males,

and age-specific rates were highest in the 35-39 years age group; at 1.3 per 100,000. Two reports were in children less than 5 years of age.

The majority of brucellosis cases were reported from Queensland (80%), and 5 (11%) were from Victoria. The highest rates of disease were reported in the Central West (24.3 per 100,000) and the South West (11.6 per 100,000) Statistical Divisions of Queensland. The species of *Brucella* was not indicated in any of these notifications.

Hydatid infection

A total of 46 cases of hydatid infection was reported in 1998 from all States and Territories with the exception of New South Wales where it is not notifiable. The national rate was 0.4 per 100,000, which has increased slightly from previous years.

The highest age-specific rates were in the 75-79 years age group for females (1.7 per 100,000) and in the 80-84 years age group for males (2.8 per 100,000).

Among these 46 notifications, 26 (56.5%) were male and 18 (39.1%) female, and male to female ratio was 1.4:1.

The highest rates of disease were reported in the Murray Lands Statistical Division of South Australia (2.9 per 100,000).

Leptospirosis

There were 197 notifications of leptospirosis received by the NNDSS during 1998. The notification rate rose from 0.7 per 100,000 in 1997 to 1.1 per 100,000 in 1998. The highest number of reports was late in 1998 (Figure 34). Notifications were primarily received from Queensland (109, 55.3%), then 48 (24.3%) cases from New South Wales and 25 (12.7%) cases from Victoria.

Males accounted for over 90% of notifications, with the most frequent age for disease onset in the 20-44 years age group; the age specific rates ranged from 3.0 to 3.4 per 100,000 (Figure 35).

The highest rates were localised to the Far North (19.2 per 100,000) and the South West (11.6 per 100,000) Statistical

Figure 34. Notifications of leptospirosis, 1991-1998, by month of onset

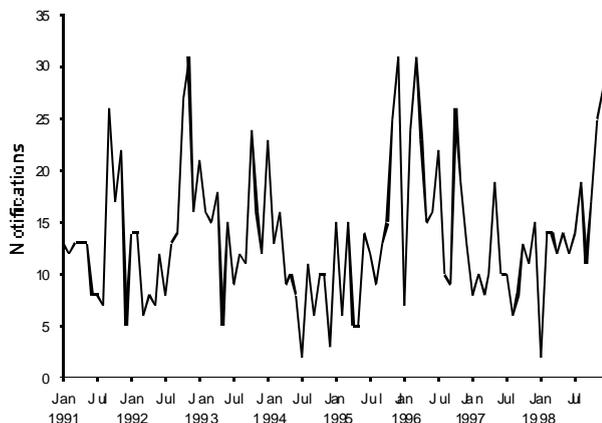
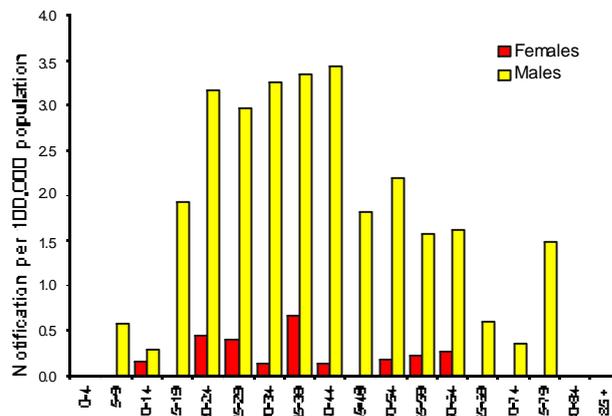


Figure 35. Notification rate of leptospirosis, 1998, by age group and sex



Divisions of Queensland, and the Western District (10.1 per 100,000) Statistical Division in Victoria.

Ornithosis

A total of 56 cases were notified for 1998 from all States and Territories except New South Wales and Queensland where it is not notifiable. Of these 50 (89.3%) were from Victoria. The national notification rate of 0.6 per 100,000 was slightly higher than the 0.4 per 100,000 reported in 1997.

Of these 56 cases, 38 (67.9%) were male and 18 (32.1%) female, with a male to female ratio of 2.1:1.

The highest age-specific rates were 2.0 per 100,000 reported in the 75-79 years age group for males, and 0.7 per 100,000 in the 55-59 years age group for females.

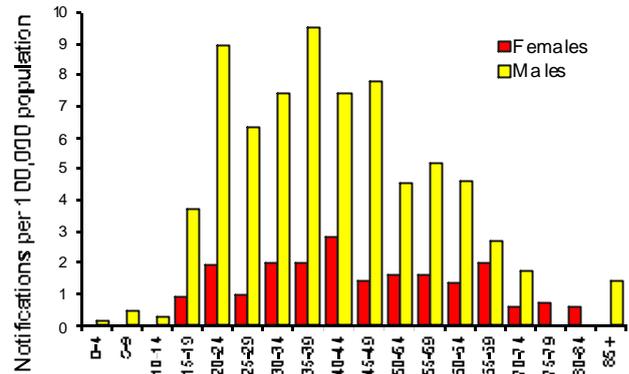
Q fever

In 1998, 571 notifications of Q fever, or *Coxiella burnetii* were reported, and the overall rate (3.0 per 100,000) was lower than the 3.2 per 100,000 reported in 1997.

Queensland and New South Wales each accounted for 45.2% and 41.3% of all the cases for the year, respectively. The highest notification rates were localised to the Statistical Divisions of South West (100.3 per 100,000) in Queensland and the North Western (62.3 per 100,000) in New South Wales (Map 11).

The highest age-specific notification rate in males was 9.5 per 100,000 in the 35-39 years age group and in females was 2.8 per 100,000 in the 40-44 years age group (Figure 36). Males accounted for 78.8% of all notifications, and the male to female ratio was 3.8:1.

Figure 36. Notification rate of Q fever, 1998, by age group and sex



Discussion

All States and Territories reported notifiable zoonotic cases to NNDSS during 1998, except New South Wales which only reported cases of brucellosis, leptospirosis and Q fever. A total of 915 notifiable zoonotic cases was received by NNDSS during 1998, which accounted for 1.1% of all notifications. The most frequent notifiable zoonotic infections were reported from Queensland (45.3%) and New South Wales (31.2%). Queensland reported the highest notification rates for Q fever (7.5 per 100,000), leptospirosis (3.2 per 100,000) and brucellosis (1.0 per 100,000); and Victoria reported the highest

Map 11. Notification rate of Q fever, 1998, by Statistical Division of residence

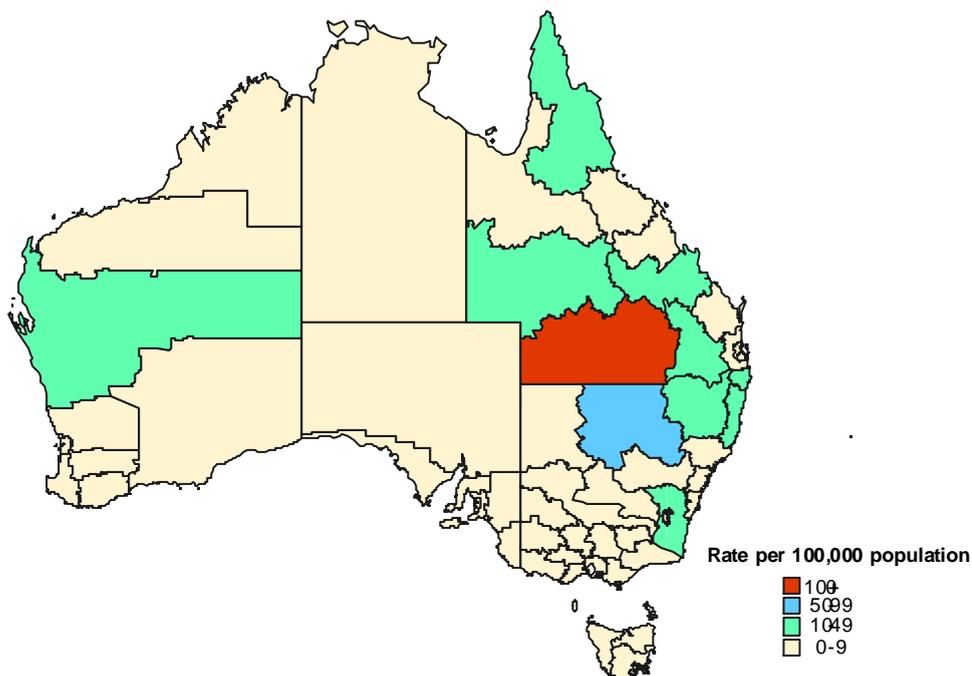
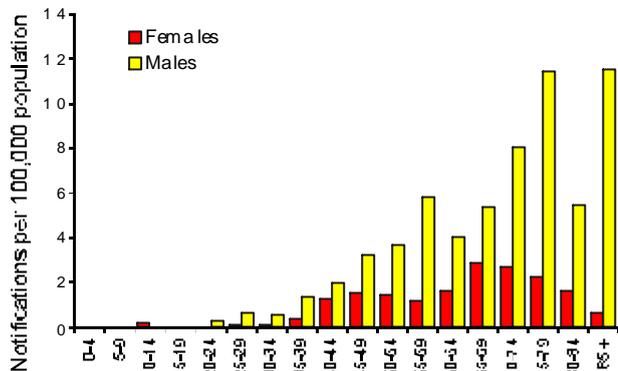


Figure 37. Notification rate of legionellosis, 1998, by age group and sex



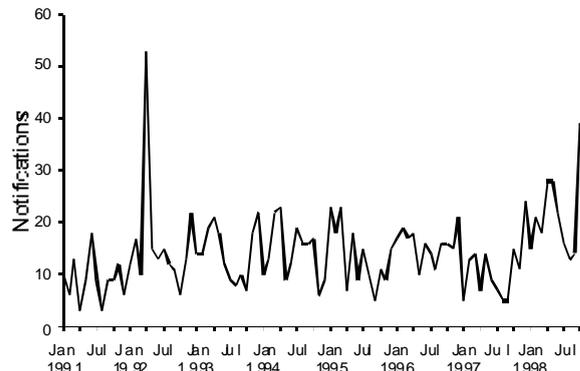
notification rates for ornithosis (1.1 per 100,000) and hydatid infection (0.6 per 100,000).

Q fever is a worldwide zoonoses except in New Zealand,⁴² and has long been associated with outbreaks in abattoirs and among animal handlers predominantly working with sheep, cattle and feral goats.⁴³ Q fever still is the most important of all zoonotic diseases in terms of reported numbers of cases in Australia. Q fever outbreaks occurred in 1998 in abattoir workers⁴⁴ and contract abattoir workers, who were not immunised before work (CDNANZ, personal communication). In general, Q fever tends to be under-reported with only about 50% of Q fever cases diagnosed by health professionals.^{45,46} A recent study found that among 829 staff of the New South Wales Department of Agriculture, 89 (10.7%) tested positive for Q fever infection.⁴⁶ An effective vaccine available in Australia is useful in preventing Q fever in high risk groups.

Brucellosis has remained at a low level since 1994 in Australia due to effective eradication programs in cattle.⁴⁷ An earlier report⁴⁸ suggested that *Brucella suis* is the dominant human pathogen in Queensland, especially among occupational groups hunting and slaughtering feral pigs.

Although the number of notifications of hydatid infection in 1998 was lower than the previous year, the rate increased compared with 1997. This disease occurs widely in rural Australia, and amongst urban dwellers it is more common in the overseas born. Hydatid infection in the Australian born occurs typically in rural settings where humans become infected by the ingestion of eggs passed in the faeces of dogs, dingoes or foxes. Wallabies, wombats, feral pigs, sheep and kangaroos are all intermediate hosts that act as reservoirs of the disease. Dogs and foxes, feeding off the offal or other remains of these animals become infected, and can carry the disease into rural communities, or to the periphery of urban settlements.⁴⁹ Hydatid disease generally is under-reported in Australia,⁵⁰ because the symptoms usually occur in the advanced stages, and infection may remain quiescent for many years. Infection acquired in childhood will usually manifest in adulthood.

Figure 38. Notifications of legionellosis, 1991-1998, by month of onset



Other diseases

Legionellosis

Legionellosis is notifiable in all the States and Territories in Australia, and includes notifications of infections caused by all *Legionella* species. There were 271 cases of legionellosis reported to NNDSS in 1998 with a national annual rate of 1.4 per 100,000 population, an increase on 1997 (0.9 per 100,000). Both notifications and the rate were the highest in NNDSS since 1993. Large increases in notifications in 1998 compared with 1997 occurred in Queensland, South Australia and Victoria (Table 1).

A higher number of males were reported (72.7%) than females (27.3%) for legionellosis, with a male to female ratio of 2.7:1. The ages of cases ranged from 14 to 100 years, with 44% of reports for the 60+ age group (Figure 37).

The reported species were *Legionella longbeachae* (139, 51%), *Legionella pneumophila* (17, 6%) and 'another species' (6, 3%); 108 notifications (40%) were unspecified *Legionella* species as not all States and Territories reported these species separately. The peak of notifications was in October (Figure 38).

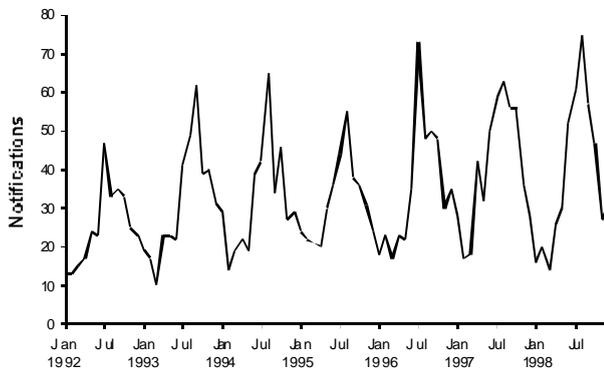
Leprosy

There were only three notifications of leprosy in 1998; from New South Wales, South Australia and Western Australia, significantly lower than 1997. The national rate was 0.02 per 100,000 population, compared with 0.1 per 100,000 in 1997. The reported cases were two males and one female.

Meningococcal infection

There were 455 notifications of meningococcal infection in 1998 (Table 1); a rate of 2.4 per 100,000 compared with 2.7 per 100,000 in 1997 (Table 2). The notifications included 140 serotype B (31%), 83 serotype C (18%), 6 serotype W (1%), 14 serotype Y (3%) and 208 (46%) unknown. A pattern of seasonal variation in meningococcal infection notifications continued, with the greatest number of cases occurring in late Winter/early Spring (Figure 39). The distribution of notifications by age shows the highest

Figure 39. Notifications of meningococcal infection, 1992-1998, by month of onset



peak in the 0-4 years and additional peaks in the 15-24 years age groups and 75-85+ years (Figure 40). Overall, the male to female ratio was 1.2:1.

Tuberculosis

There are three national surveillance systems through which tuberculosis (TB) notifications are handled. The NNDSS provides the most timely information on national TB notifications, but demographic information is limited. The National Mycobacterial Surveillance System (NMSS), a surveillance system dedicated to tuberculosis and atypical mycobacterial notifications, produces an annual report on TB notifications¹¹ with detailed information on risk factors, diagnostic methods, drug therapy and relapse status. The 1997 annual report for the NMSS will be published in *CDI* in 1999. The Australian Mycobacterial Reference Laboratory Network (MRLN) maintains national data on drug susceptibility profiles, site of disease, age, sex and laboratory method of diagnosis for all mycobacterial isolates. These data are published annually in conjunction with the NMSS surveillance report.

In 1998, 982 notifications of TB were reported nationally, and the corresponding rate was 5.2 per 100,000. The highest disease rate of 14.2 per 100,000 was reported in the Northern Territory. These data are consistent with those reported since 1991.

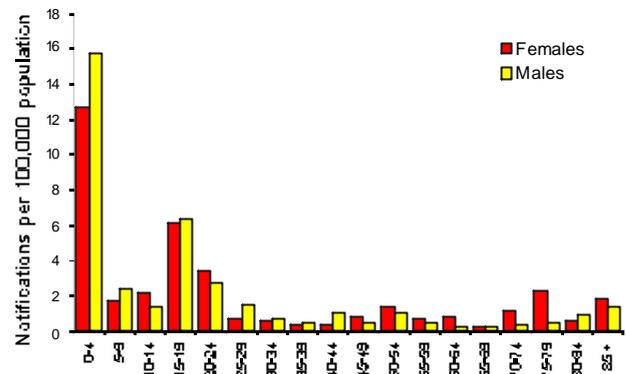
Rates of TB were highest in males over the age of 65 years and females over the age of 75 years. A smaller peak in age-specific rates was reported in the 25-29 year age group (Figure 41).

There was little difference between notification rates between males and females with males accounting for just over 50% of the 976 notifications in which sex was reported.

Discussion

The peak of legionellosis in late 1998 was the highest since 1992. An outbreak occurred in Victoria at this time and cultures from cooling towers yielded *Legionella pneumophila* serogroup⁵¹ (CDNANZ personal communication).

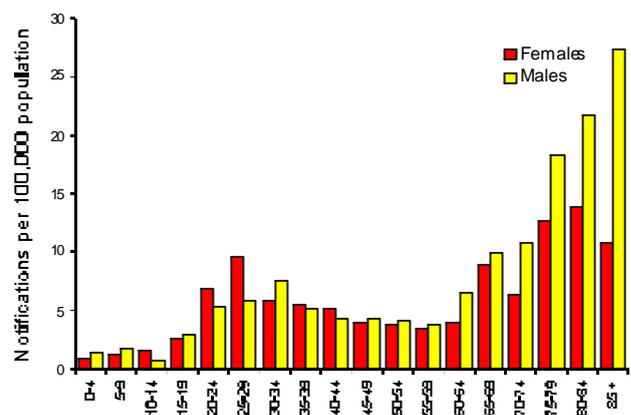
Figure 40. Notification rate of meningococcal infection, 1998, by age group and sex



Notification of the serogroup involved in meningococcal infection remains poor as almost half of the 1998 notifications of meningococcus are type unknown. Of the serogroup data provided, serogroup B was the most common being reported twice as frequently as serogroup C. This mirrors the Australian Meningococcal Surveillance Programme report for 1997 in which twice as many of referred isolates were type B (64%) as type C (32%).¹⁴ Not all notifications of meningococcal infection are linked to a referred isolate by the Australian Meningococcal Surveillance Programme. In 1997 there were 499 notifications and 343 (69%) had isolates typed by the surveillance program. Meningococcal notifications for 1998 were highlighted in surveillance reports in *CDI*^{52,53} The Annual Report of the Australian Meningococcal Surveillance Programme for 1998 will be published in *CDI* later this year or early next year.

Tuberculosis rates in Australia have been stable over the last decade. Published surveillance reports, based on data collected by the NMSS have consistently identified elderly Australian born persons, migrants from high prevalence countries, and Indigenous Australians as those at

Figure 41. Notification rate of tuberculosis, 1998, by age group and sex



increased risk of TB disease. Proposed changes to the national Tuberculosis information collection process will improve the information collected on the diagnosis of TB, further refine information on the risk factors for developing TB in Australia and allow information to be more readily linked between the NNDSS, NMSS and MRLN.

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Preparing for refugee crises in Australia: Kosovar health surveillance

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Australia provided a temporary safe haven for nearly 4,000 Kosovar refugees in response to a request for assistance from the United Nations High Commission for Refugees (UNHCR). From May 7, 1999, eleven groups of between 50 and 450 refugees arrived in Australia at 2 to 7 day intervals. The refugees were initially received at East Hills Reception Centre in Sydney for health checks and immigration formalities, then transferred to 'safe havens' across five States. By the ninth flight, 3,397 refugees had arrived. Most (59%) were between 16 and 65 years of age; specifically 62 (2%) were less than 1 year of age, 1,342 (40%) were between 1 and 15 years and 45 (1%) were older than 65 years of age. All refugees completed a questionnaire on health symptoms to identify communicable disease risks and the need for urgent medical care. Of the 3,397 people on flights 1 to 9, 97 reported a cough of more than 2 weeks duration, 68 a productive cough, 9 blood in phlegm, 26 fever, 83 night sweats, 27 diarrhoea, and 30 a rash of less than 4 days duration. A total of 543 (16%) reported an urgent need to see a doctor. Presentations at the acute care clinic were mainly for upper respiratory infections (15%),

gastrointestinal illness (13%) or ear-related problems (10%). There were no disease outbreaks in the period at East Hills.

A health surveillance system was established during Operation Safe Haven to plan health care, monitor for potential outbreaks, record health status and service use, and to meet international surveillance requirements. The system provided the necessary infrastructure to link, analyse and disseminate health data as well as other benefits, both at an operational level within health clinics and in communication among the many local, national and international collaborating agencies. However, there were delays in establishing, and difficulties in maintaining, a co-ordinated surveillance system. Health surveillance needs to be an integral part of Australian responses to refugee emergencies in line with international practice. A further intake of refugees into Australia from East Timor more recently reinforced our need for preparedness. Before the knowledge accumulated from these recent experiences is lost, guidelines should be prepared for responding to future refugee crises.

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Correction

The author list for the article 'Unusual cluster of mild invasive serogroup C meningococcal infection in a university college' published in Volume 23;10:261, should also include the following authors:

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