Australia's Notifiable Diseases Status, 1999

Annual report of the National Notifiable Diseases Surveillance System

Paul Roche,[1] Jenean Spencer,[1] Ming Lin,[1] Heather Gidding,[2] Martyn Kirk,[3] Margo Eyeson-Annan,[1] Alison Milton,[1] David Witteveen,[1] Angela Merianos[1]

With Contributions From:

National organisations

Communicable Diseases Network Australia
Australian Childhood Immunisation Register
Australian Gonococcal Surveillance Programme
Australian meningococcal Surveillance Programme
Australian Sentinel Practice Research Network
Australian Quarantine Inspection Service
National Centre in HIV Epidemiology and Clinical Research
National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases
National Enteric Pathogens Surveillance Scheme
National Rotavirus Research Centre
Sentinel Chicken Surveillance Programme
The National CJD Registry
WHO Collaborating Centre for Reference and Research on Influenza

State and Territory health departments

Communicable Diseases Control Unit, ACT Department of Health and Community Care, ACT
Communicable Diseases Surveillance and Control Unit, NSW Health Department, New South Wales
Centre for Disease Control, Territory Health Services, Northern Territory
Communicable Diseases Unit, Queensland Health, Queensland
Communicable Diseases Control Branch, South Australian Health Commission, South Australia
Communicable Diseases Surveillance, Department of Health and Human Services, Tasmania
Communicable Diseases Section, Department of Human Services, Victoria
Communicable Diseases Control Branch, Health Department of Western Australia, Western Australia

Abstract

In 1999 there were 88,239 notifications of communicable diseases in Australia reported to the National Notifiable Diseases Surveillance System (NNDSS). The number of notifications in 1999 was an increase of 3 per cent on notifications in 1998 (85,227) and the second largest reporting year since the NNDSS commenced in 1991. Notifications in 1999 consisted of 29,977 bloodborne infections (34% of total), 22,255 gastrointestinal infections (25%), 21,704 sexually transmitted infections (25%), 5,986 vector borne infections (7%), 5,228 vaccine preventable infections (6%), 1,967 (2%) other bacterial infections (legionella, meningococcal, leprosy and tuberculosis), 1,012 zoonotic infections (1%) and 3 quarantinable infections (0.003%). Notifications of bloodborne viral diseases particularly hepatitis B and hepatitis C and some sexually transmitted infections such as gonorrhoea and chlamydia continue to increase in Australia. Steep declines in vaccine preventable diseases such as *Haemophilus influenzae* type b, measles, mumps and rubella continued in 1999. This report also summarises data on communicable diseases from other surveillance systems including the Laboratory Virology and Serology Surveillance Scheme (LabVISE) and sentinel general practitioner schemes. In addition this report comments on other important developments in communicable disease control in Australia in 1999. *Commun Dis Intell* 2001;25:190-245.

Keywords: Surveillance, communicable diseases, epidemiology

1. Surveillance Section, Department of Health and Aged Care, PO Box 9848, Canberra, Australian Capital Territory, 2601
2. National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases, Royal Alexandra Hospital for Children, Westmead, New South Wales, 2124
3. Coordinating Epidemiologist, OzFoodNet, Australia New Zealand Food Authority and Department of Health and Aged Care.

Corresponding author: Dr Paul Roche, Epidemiologist, Surveillance Section, Department of Health and Aged Care, GPO Box 9848, Canberra, ACT 2601. Telephone: +61 2 6289 8152. Facsimile: +61 2 6289 7791. E-mail: paul.roche@health.gov.au.

Table of contents

List of Tables, Figures and Maps

Tables

Figures

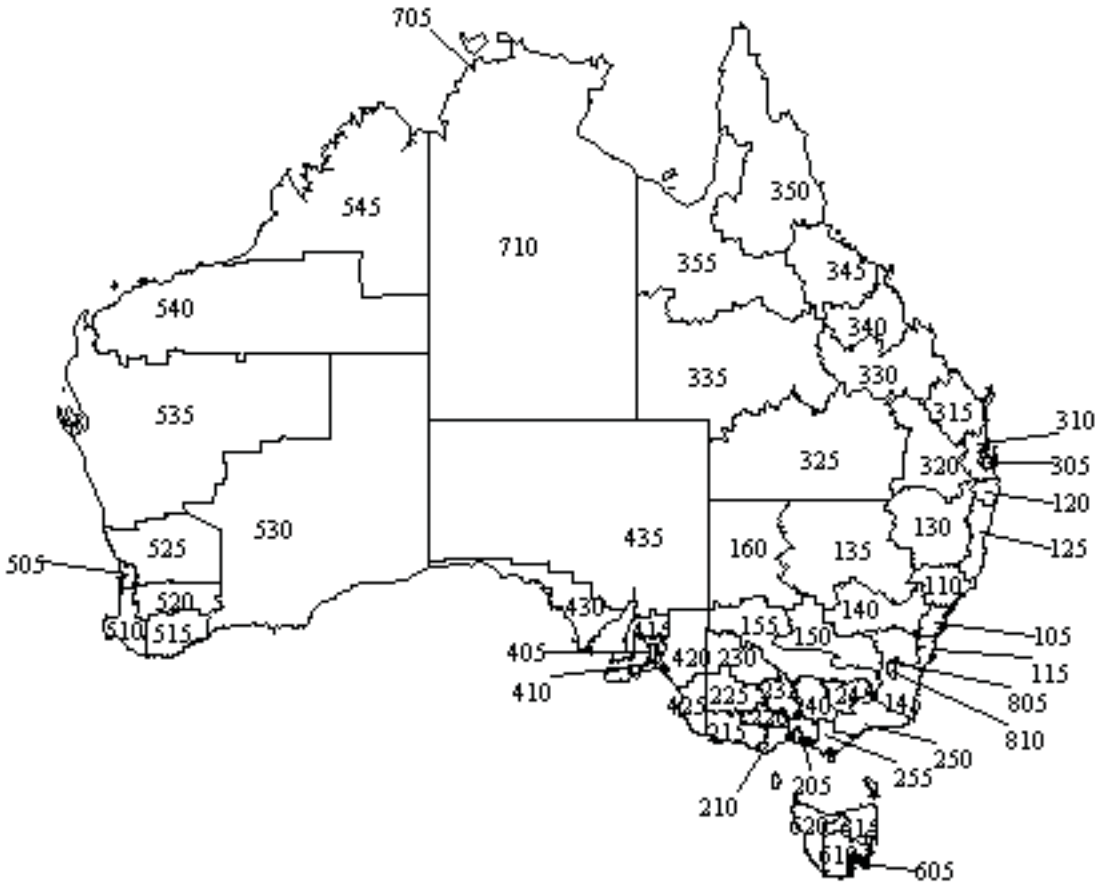
Maps

Abbreviations

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
ACIR	Australian Childhood Immunisation Register
AGSP	Australian Gonococcal Surveillance Programme
AIHW	Australian Institute of Health and Welfare
Ag	Antigen
APSU	Australian Paediatric Surveillance Unit
ASPREN	Australian Sentinel Practice Research Network
ATAGI	Australian Technical Advisory Group on Immunisation
BF	Barmah Forest virus
BSE	Bovine spongiform encephalopathy
CDC	Centers for Disease Control and Prevention
CDI	*Communicable Diseases Intelligence*
CDNA	Communicable Diseases Network Australia
CJD	Creutzfeldt-Jakob disease
CSF	Cerebrospinal fluid
DHAC	Department of Health and Aged Care
DTP	Diphtheria, tetanus, pertussis (vaccine)
ELISA	Enzyme-linked immunosorbent assay
GP	General practitioner
GPII	General Practitioner Immunisation Incentives
HBcAg	Hepatitis B core antigen
HBsAg	Hepatitis B surface antigen
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HDV	Hepatitis D virus
HEV	Hepatitis E virus
Hib	*Haemophilus influenzae* type b
HIV	Human immunodeficiency virus
HUS	Haemolytic uraemic syndrome
ICD10	International Classification of Diseases Version 10
IFA	Immunofluorescence assay
IgG	Immunoglobulin G
IgM	Immunoglobulin M
JE	Japanese encephalitis
JETACAR	Joint Expert Technical Advisory Committee on Antibiotic Resistance
LabVISE	Laboratory Virology and Serology Surveillance Scheme
LGV	Lymphogranuloma venereum
MMR	Measles-mumps-rubella (vaccine)
MMWR	Morbidity and Mortality Weekly Report
MRLN	Australian Mycobacterial Reference Laboratory Network
MVE	Murray Valley encephalitis

NNDSS	National Notifiable Diseases Surveillance System
NCHECR	National Centre in HIV Epidemiology and Clinical Research
NCIRS	National Centre for Immunisation Research and Surveillance (of Vaccine Preventable Diseases)
NEC	Not elsewhere classified
NEPSS	National Enteric Pathogen Surveillance Scheme
NHMRC	National Health and Medical Research Council
NLV	Norwalk-like virus
NMSS	National Mycobacterial Surveillance System
NN	Not notifiable
NSW	New South Wales
NT	Northern Territory
OPV	Oral polio vaccine
PCR	Polymerase chain reaction
PHLN	Public Health Laboratory Network
Qld	Queensland
RR	Ross River virus
SA	South Australia
SD	Statistical Division
SLTEC, VTEC	Shiga-like toxin producing *Escherichia coli*, verotoxigenic *E. coli*
STI	Sexually transmitted infection
Tas	Tasmania
TB	Tuberculosis
UK	United Kingdom
VAPP	Vaccine associated paralytic poliomyelitis
Vic	Victoria
WA	Western Australia
WHO	World Health Organization

Map 1. Australian Bureau of Statistics Statistical Divisions



Statistical Division		Population
Australian Capital Territory		
805	Canberra	309,850
810	ACT - balance	323
New South Wales		
105	Sydney	4,041381
110	Hunter	572,802
115	Illawarra	385,489
120	Richmond-Tweed	209,281
125	Mid-North Coast	271,330
130	Northern	174,955
135	North Western	117,588
140	Central West	173,306
145	South Eastern	181,608
150	Murrumbidgee	148,968
155	Murray	110,727
160	Far West	24,245
Northern Territory		
705	Darwin	88,124
710	NT - balance	104,758
Queensland		
305	Brisbane	1,601,417
310	Moreton	657,927

Statistical Division		Population
Queensland continued		
320	Darling Downs	201,446
325	South West	25,711
330	Fitzroy	181,202
335	Central West	12,255
340	Mackay	125,977
345	Northern	197,302
350	Far North	222,451
355	North West	35,683
South Australia		
405	Adelaide	1,092,857
410	Outer Adelaide	109,065
415	Yorke & Lower North	44,058
420	Murray Lands	68,435
425	South East	62,905
430	Eyre	33,251
435	Northern	82,503
Tasmania		
605	Greater Hobart	194,166
610	Southern	34,689
615	Northern	133,016
620	Mersey-Lyell	108,390

Statistical Division		Population
Victoria		
205	Melbourne	3,417,218
210	Barwon	245,582
215	Western District	99,050
220	Central Highlands	137,353
225	Wimmera	51,503
230	Mallee	88,204
235	Loddon-Campaspe	161,419
240	Goulburn	186,683
245	Ovens-Murray	90,541
250	East Gippsland	80,730
255	Gippsland	153,890
Western Australia		
505	Perth	1,364,188
510	South West	182,837
515	Lower Great Southern	51,840
520	Upper Great Southern	19,734
525	Midlands	52,697
530	South Eastern	58,778
535	Central	60,262
540	Pilbara	41,153
545	Kimberley	29,527

Table 1. Notifications of communicable diseases by State or Territory health authorities in 1999, by date of notification*

Disease	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
Bloodborne									
Hepatitis B (incident)	3	68	19	55	19	5	93	45	307
Hepatitis B (unspecified)[1]	67	4,327	NN	839	257	34	2,174	393	8,091
Hepatitis C (incident)	20	77	0	-	87	18	70	113	385
Hepatitis C (unspecified)[1]	280	9,215	232	3,104	924	306	6,162	1,021	21,244
Hepatitis D	0	16	0	5	0	0	0	NN	21
Hepatitis (NEC)	0	0	0	0	0	0	0	NN	0
Gastrointestinal									
Botulism	0	0	0	0	0	0	0	NN	0
Campylobacterosis[2]	290	-	237	3,200	2,405	411	4,686	1,414	12,643
Haemolytic uraemic syndrome	0	11	1	1	3	0	8	0	24
Hepatitis A	8	413	89	360	121	5	269	292	1,557
Hepatitis E	1	0	0	0	0	0	1	NN	2
Listeriosis	0	22	0	11	3	2	13	12	63
Salmonellosis	65	1,467	356	2,231	963	145	1,214	713	7,154
Shigellosis[2]	5	-	111	129	72	1	117	112	547
SLTEC,VTEC[3]	0	0	0	NN	39	0	4	NN	43
Typhoid	0	38	0	3	5	0	17	9	72
Yersiniosis[2]	1	-	0	101	18	0	17	6	143
Quarantinable									
Cholera	0	2	0	0	0	0	1	0	3
Plague	0	0	0	0	0	0	0	0	0
Rabies	0	0	0	0	0	0	0	0	0
Viral haemorrhagic fever	0	0	0	0	0	0	0	0	0
Yellow fever	0	0	0	0	0	0	0	0	0
Sexually transmissible									
Chancroid	0	0	0	0	0	0	0	0	0
Chlamydial infection	177	2,477	856	4,472	1,012	251	2,940	1,897	14,082
Donovanosis	0	0	6	3	NN	0	0	7	16
Gonococcal infection[4]	20	1,306	1,138	1,186	235	19	785	987	5,676
Lymphogranuloma venereum	0	0	0	0	0	0	0	NN	0
Syphilis[5]	10	668	328	829	19	9	6	110	1,979

Table 1. (continued) Notifications of communicable diseases by State or Territory health authorities in 1999, by date of notification*

Disease	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
Vaccine preventable									
Diphtheria	0	0	0	0	0	0	0	0	0
Haemophilus influenzae type b	1	13	3	12	4	0	3	4	40
Measles	5	32	10	33	5	11	111	23	230
Mumps	8	33	3	12	12	4	73	39	184
Pertussis	83	1,426	2	963	218	611	997	96	4,396
Poliomyelitis	0	0	0	0	0	0	0	0	0
Rubella[6]	17	46	3	157	4	7	121	21	376
Tetanus	0	1	0	1	0	0	0	0	2
Vectorborne									
Arbovirus infection NEC	0	0	1	12	0	0	46	3	62
Barmah Forest virus infection	0	249	18	310	0	2	13	47	639
Dengue	1	13	31	62	6	0	0	18	131
Malaria	22	180	67	304	29	9	81	32	724
Ross River virus infection	8	963	157	2,308	41	67	247	625	4,416
Zoonoses									
Brucellosis	0	0	0	49	0	0	3	0	52
Hydatid infection	0	NN	0	5	3	1	17	3	29
Leptospirosis	0	57	1	218	3	1	29	9	318
Ornithosis	0	NN	0	NN	9	2	66	7	84
Q fever	0	165	0	297	10	0	26	20	518
Other bacterial infections									
Legionellosis	2	40	4	34	63	2	61	43	249
Leprosy	0	1	0	1	0	0	1	3	6
Meningococcal infection	5	220	8	85	27	13	138	72	568
Tuberculosis	12	469	100	105	69	9	298	91	1,153
Total	1,111	24,015	3,781	21,497	6,685	1,945	20,908	8,287	88,229

1. Unspecified hepatitis includes cases with hepatitis in whom the duration of illness can not be determined.
2. Notified as 'foodborne disease' or 'gastroenteritis in an institution' in New South Wales
3. Infections with Shiga-like toxin (Verotoxigenic E. coli) (SLTEC/VTEC)
4. Northern Territory, Queensland, South Australia, Victoria, and Western Australia: includes gonococcal neonatal ophthalmia
5. Includes congenital syphilis
6. Includes congenital rubella

* Date of notification is a composite of three components: (I) the true onset date from a clinician, if available, (II) the date the laboratory test was ordered, or (III) the date reported to the NNDSS

NN Not notifiable

NEC Not Elsewhere Classified

\- Elsewhere classified

Table 2. Notification rates of diseases by State or Territory, 1999 (rate per 100,000 population)

Disease	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
Bloodborne diseases									
Hepatitis B (incident)	1.0	1.1	9.9	1.6	1.3	1.1	2.0	2.4	1.6
Hepatitis B (unspecified)[1]	21.4	67.5	NN	23.9	17.2	7.2	46.1	21.1	42.7
Hepatitis C (incident)	6.4	1.2	0	-	5.8	3.8	1.5	6.1	2.5
Hepatitis C (unspecified)[1]	89.4	143.7	120.3	88.4	61.9	65.1	130.8	54.9	112.0
Hepatitis D	0.0	0.2	0.0	0.1	0.0	0.0	0.0	NN	0.1
Hepatitis (NEC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NN	0.0
Gastrointestinal diseases									
Botulism	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NN	0.0
Campylobacterosis[2]	92.5	-	122.9	91.1	161.1	87.4	99.4	76.0	100.7
Haemolytic uraemic syndrome	0.0	0.2	0.5	0.0	0.2	0.0	0.2	0.0	0.1
Hepatitis A	2.6	6.4	46.1	10.2	8.1	1.1	5.7	15.7	8.2
Hepatitis E	0.3	0.0	0.0	0.0	0.0	0.0	0.0	NN	0.0
Listeriosis	0.0	0.3	0.0	0.3	0.2	0.4	0.3	0.6	0.3
Salmonellosis	20.7	22.9	184.6	63.5	64.5	30.8	25.8	38.3	37.7
Shigellosis[2]	1.6	-	57.5	3.7	4.8	0.2	2.5	6.0	4.4
SLTEC,VTEC[3]	0.0	0.0	0.0	NN	2.6	0.0	0.1	NN	0.3
Typhoid	0.0	0.6	0.0	0.1	0.3	0.0	0.4	0.5	0.4
Yersiniosis[2]	0.3	-	0.0	2.9	1.2	0.0	0.4	0.3	1.1
Quarantinable diseases									
Cholera	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plague	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rabies	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Viral haemorrhagic fever	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow fever	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sexually transmitted									
Chancroid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chlamydial infection	56.5	38.6	443.8	127.3	67.8	53.4	62.4	101.9	74.2
Donovanosis	0.0	0.0	3.1	0.1	NN	0.0	0.0	0.4	0.1
Gonococcal infection[4]	6.4	20.4	590.0	33.8	15.7	4.0	16.7	53.0	29.9
Lymphogranuloma venereum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NN	0.0
Syphilis[5]	3.2	10.4	170.1	23.6	1.3	1.9	0.1	5.9	10.4

Table 2. (continued) Notification rates of diseases by State or Territory, 1999 (rate per 100,000 population)

Disease	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
Vaccine preventable									
Diphtheria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Haemophilus influenzae type b	0.3	0.2	1.6	0.3	0.3	0.0	0.1	0.2	0.2
Measles	1.6	0.5	5.2	0.9	0.3	2.3	2.4	1.2	1.2
Mumps	2.6	0.5	1.6	0.3	0.8	0.9	1.5	2.1	1.0
Pertussis	26.5	22.2	1.0	27.4	14.6	129.9	21.2	5.2	23.2
Poliomyelitis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubella[6]	5.4	0.7	1.6	4.5	0.3	1.5	2.6	1.1	2.0
Tetanus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vectorborne diseases									
Arbovirus infection NEC	0.0	0.0	0.5	0.3	0.0	0.0	1.0	0.2	0.3
Barmah Forest virus infection	0.0	3.9	9.3	8.8	0.0	0.4	0.3	2.5	3.4
Dengue	0.3	0.2	16.1	1.8	0.4	0.0	0.0	1.0	0.7
Malaria	7.0	2.8	34.7	8.7	1.9	1.9	1.7	1.7	3.8
Ross River virus infection	2.6	15.0	81.4	65.7	2.7	14.2	5.2	33.6	23.3
Zoonoses									
Brucellosis	0.0	0.0	0.0	1.4	0.0	0.0	0.1	0.0	0.3
Hydatid infection	0.0	NN	0.0	0.1	0.2	0.2	0.4	0.2	0.2
Leptospirosis	0.0	0.9	0.5	6.2	0.2	0.2	0.6	0.5	1.7
Ornithosis	0.0	NN	0.0	NN	0.6	0.4	1.4	0.4	0.9
Q fever	0.0	2.6	0.0	8.5	0.7	0.0	0.6	1.1	2.7
Other bacterial infections									
Legionellosis	0.6	0.6	2.1	1.0	4.2	0.4	1.3	2.3	1.3
Leprosy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Meningococcal infection	1.6	3.4	4.1	2.4	1.8	2.8	2.9	3.9	3.0
Tuberculosis	3.8	7.3	51.8	3.0	4.6	1.9	6.3	4.9	6.1

1. Unspecified hepatitis includes cases with hepatitis in whom the duration of illness can not be determined.
2. Notified as 'foodborne disease' or 'gastroenteritis in an institution' in New South Wales
3. Infections with Shiga-like toxin (verotoxigenic E. coli) (SLTEC/VTEC)
4. Northern Territory, Queensland, South Australia, Victoria, and Western Australia: includes gonococcal neonatal ophthalmia
5. Includes congenital syphilis
6. Includes congenital rubella

NN Not notifiable
NEC Not Elsewhere Classified
- Elsewhere classified.

Table 3. National Notifiable Diseases Surveillance System notifications and rates, 1995 to 1999, by year and disease

Disease	Notifications					Rate per 100,000 population				
	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Bloodborne										
Hepatitis B (incident)	331	213	268	262	307	1.8	1.2	1.4	1.4	1.6
Hepatitis B (unspecified)[1]	6,477	5,911	7,044	6,620	8,091	35.8	32.3	38.0	35.3	42.7
Hepatitis C (incident)	70	75	154	345	385	0.5	0.5	1.0	2.3	2.5
Hepatitis C (unspecified)[1]	9,959	9,712	19,331	19,006	21,244	55.1	53.0	104.4	101.4	112.0
Hepatitis D	37	14	17	10	21	0.2	0.1	0.1	0.1	0.1
Hepatitis (NEC)	13	16	5	4	0	0.1	0.1	0.0	0.0	0.0
Gastrointestinal										
Botulism	0	0	0	1	0	0.0	0.0	0.0	0.0	0.0
Campylobacterosis[2]	11,298	12,117	11,742	13,282	12,643	94.6	100.1	95.8	107.0	100.7
Haemolytic uraemic syndrome	-	-	4	13	24	-	-	0.0	0.1	0.1
Hepatitis A	1,645	2,112	3,069	2,443	1,557	9.1	11.5	16.6	13.0	8.2
Hepatitis E	5	4	7	1	2	0.0	0.0	0.0	0.0	0.0
Listeriosis	60	68	73	55	63	0.3	0.4	0.4	0.3	0.3
Salmonellosis	6,041	5,791	7,089	7,489	7,154	33.4	31.6	38.3	39.9	37.7
Shigellosis[2]	734	677	796	594	547	6.1	5.6	6.5	4.8	4.4
SLTEC,VTEC[3]	-	-	20	14	43	-	-	0.2	0.1	0.3
Typhoid	75	79	81	63	72	0.4	0.4	0.4	0.3	0.4
Yersiniosis[2]	309	272	246	190	143	2.6	2.2	2.0	1.5	1.1
Quarantinable										
Cholera	5	5	2	4	3	0.0	0.0	0.0	0.0	0.0
Plague	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Rabies	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Viral haemorrhagic fever	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Yellow fever	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Sexually transmissible										
Chancroid	2	1	1	1	0	0.0	0.0	0.0	0.0	0.0
Chlamydial infection	6,398	8,445	9,242	11,339	14,082	35.4	46.1	49.9	60.5	74.2
Donovanosis	84	49	48	27	16	0.5	0.3	0.3	0.2	0.1
Gonococcal infection[4]	3,315	4,175	4,692	5,398	5,676	18.3	22.8	25.3	28.8	29.9
Lymphogranuloma venereum	1	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Syphilis[5]	1,810	1,510	1,355	1,677	1,979	10.0	8.2	7.3	8.9	10.4

Table 3. (continued) National Notifiable Diseases Surveillance System notifications and rates, 1995 to 1999, by year and disease

Disease	Notifications					Rate per 100,000 population				
	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Vaccine preventable										
Diphtheria	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Haemophilus influenzae type b	78	49	52	34	40	0.4	0.3	0.3	0.2	0.2
Measles	1,194	481	858	290	230	6.6	2.6	4.6	1.5	1.2
Mumps	157	126	191	182	184	0.9	0.7	1.0	1.0	1.0
Pertussis	4,247	4,384	10,941	5,739	4,396	23.5	23.9	59.1	30.6	23.2
Poliomyelitis	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Rubella[7]	4,590	2,556	1,389	745	376	25.4	14.0	7.5	4.0	2.0
Tetanus	7	3	7	8	2	0.0	0.0	0.0	0.0	0.0
Vectorborne										
Arbovirus infection NEC	69	47	21	83	62	0.4	0.3	0.1	0.4	0.3
Barmah Forest virus infection	759	859	696	531	639	4.2	4.7	3.8	2.8	3.4
Dengue	39	123	175	509	131	0.2	0.7	0.9	2.7	0.7
Malaria	623	866	751	647	724	3.4	4.7	4.1	3.5	3.8
Ross River virus infection	2,684	7,853	6,643	3,128	4,416	14.9	42.9	35.9	16.7	23.3
Zoonoses										
Brucellosis	27	39	40	43	52	0.1	0.2	0.2	0.2	0.3
Hydatid infection	51	44	61	40	29	0.3	0.2	0.3	0.2	0.2
Leptospirosis	165	215	128	189	318	0.9	1.2	0.7	1.0	1.7
Ornithosis	186	86	35	64	84	1.3	0.6	0.2	0.4	0.9
Q fever	466	554	580	560	518	2.6	3.0	3.1	3.0	2.7
Other bacterial infections										
Legionellosis	164	201	157	262	249	0.9	1.1	0.8	1.4	1.3
Leprosy	10	7	12	4	6	0.1	0.0	0.1	0.0	0.0
Meningococcal infection	381	421	484	453	568	2.1	2.3	2.6	2.4	3.0
Tuberculosis	1,154	971	1,043	972	1,153	6.4	5.3	5.6	5.2	6.1
Total	65,720	71,131	89,550	83,321	88,229					

1. Unspecified hepatitis includes cases with hepatitis in whom the duration of illness can not be determined.
2. Notified as 'foodborne disease' or 'gastroenteritis in an institution' in New South Wales.
3. Infections with Shiga-like toxin (verotoxin) producing *E. coli* (SLTEC/VTEC)
4. Northern Territory, Queensland, South Australia, Victoria, and Western Australia: includes gonococcal neonatal ophthalmia
5. Includes congenital syphilis
6. Includes congenital rubella

NN Not notifiable
NEC Not Elsewhere Classified
- Elsewhere classified.

Table 4. Diseases notified to the National Notifiable Diseases Surveillance System in 1999

Disease Group	Disease	Comments
Bloodborne disease	Hepatitis B (incident)	All jurisdictions
	Hepatitis B (unspecified)	All jurisdictions except NT
	Hepatitis C (incident)	All jurisdictions except Qld
	Hepatitis C (unspecified)	All jurisdictions
	Hepatitis D	All jurisdictions except WA
	Hepatitis (NEC)	All jurisdictions except WA
Gastrointestinal disease	Botulism	All jurisdictions except WA
	Camplyobacteriosis	All jurisdictions except NSW
	Haemolytic uraemic syndrome	All jurisdictions
	Hepatitis A	All jurisdictions
	Hepatitis E	All jurisdictions except WA
	Listeriosis	All jurisdictions
	Salmonellosis	All jurisdictions
	Shigellosis	All jurisdictions except NSW
	SLTEC, VTEC	All jurisdictions except Qld, WA
	Typhoid	All jurisdictions
	Yersiniosis	All jurisdictions except NSW
Quarantinable diseases	Cholera	All jurisdictions
	Plague	All jurisdictions
	Rabies	All jurisdictions
	Viral haemorrhagic fever	All jurisdictions
	Yellow fever	All jurisdictions
Sexually transmitted infections	Chancroid	All jurisdictions
	Chlamydial infections	All jurisdictions
	Donovanosis	All jurisdictions except SA
	Gonococcal Infections	All jurisdictions
	Lymphogranuloma venereum	All jurisdictions except WA
	Syphilis	All jurisdictions
Vaccine preventable diseases	Diphtheria	All jurisdictions
	Haemophilus influenzae type B	All jurisdictions
	Measles	All jurisdictions
	Mumps	All jurisdictions
	Pertussis	All jurisdictions
	Poliomyelitis	All jurisdictions
	Rubella	All jurisdictions
	Tetanus	All jurisdictions

Table 4. (continued) Diseases notified to the National Notifiable Diseases Surveillance System in 1999

Disease Group	Disease	Comments
Vectorborne diseases	Arbovirus infection (NEC)	All jurisdictions
	Barmah Forest virus	All jurisdictions
	Dengue	All jurisdictions
	Malaria	All jurisdictions
	Ross River virus	All jurisdictions
Zoonoses	Brucellosis	All jurisdictions
	Hydatid disease	All jurisdictions except NSW
	Leptospirosis	All jurisdictions
	Ornithosis	All except NSW and Qld
	Q fever	All jurisdictions
Other bacterial infections	Legionellosis	All jurisdictions
	Leprosy	All jurisdictions
	Meningococcal infection	All jurisdictions
	Tuberculosis	All jurisdictions

1999: The year in review

In 1999, control of communicable diseases in Australia enjoyed some notable successes, weathered some major challenges and prepared for some major threats.

In Australia in 1999 measles and mumps were reported at record low rates in children and rubella was reported at a record low rate in women of childbearing age. This was in part the result of the Measles Control Campaign in late 1998, in which 1.7m children were immunised with a second dose of the measles-mumps-rubella vaccine. It was estimated that immunity to measles increased to 94 per cent among Australian children as a consequence of improved vaccination coverage.[1]

A major challenge in 1999 was the influx into Australia of refugees from Kosovo and East Timor under the 'Safe Havens' initiative. In May and June 1999, 3,920 ethnic Albanians from Kosovo arrived in Australia. After initial processing in Sydney, refugees were accommodated in 8 centres in 5 States. There were significant presentations to medical authorities of refugees with upper respiratory tract infections, gastrointestinal illness and ear problems.[2] In September 1999, 1,863 people were evacuated from East Timor to Darwin. All evacuees had a mandatory health screen on arrival, 100 were admitted to hospital, 324 were reviewed in a 'fever/chest' clinic, 1,218 were reviewed in a transit camp and there were 7 births. Communicable diseases detected included 14 cases of malaria, 61 cases of tuberculosis (TB), 17 laboratory-confirmed cases of infectious diarrhoea and 3 laboratory-confirmed cases of measles and 14 suspected cases.[3] Up to this time there had been no health surveillance guidelines in Australia for such a rapid response setting. Protocols for future health screening of refugees arriving in emergency situations have since been developed and published.[4]

The future of the treatment of microbial infections is increasingly uncertain given the rise of antibiotic resistant bacteria in 1999. Beta-lactamase producing vancomycin resistant *Enterococcus faecilis* was for the first time reported in Australia.[5] A national response to the threat of antimicrobial resistance was the establishment of a Joint Technical Advisory Committee on Antibiotic Resistance (JETACAR). The report of this committee was released in September 1999. Details of the JETACAR report are included in this report. In response to the report, unprecedented co-operation between human and animal health practitioners has started to develop new ways to control and combat the development of antibiotic resistant microbes in Australia.

In common with other countries, Australia faces a threat of bloodborne viruses, particularly hepatitis C. Two major documents were produced in 1999, one describing the epidemiology of hepatitis C in Australia[6] and another on an Australian plan to control hepatitis C.[7] These 2 documents along with the Hepatitis C surveillance strategy are guiding Australia's response to the hepatitis C epidemic.

In 1999 there were important moves toward uniform baseline and enhanced disease-specific surveillance. The Communicable Diseases Network Australia New Zealand (now Communicable Diseases Network Australia), agreed in 1999 to revise the list of diseases which are designated as notifiable in Australia and to collect a more comprehensive set of data on each case. In addition, 'enhanced' surveillance systems for tuberculosis measles and hepatitis C were discussed and designed. These 'enhanced' systems aim to collect important additional information at a national level, that is critical for the surveillance and control of these diseases.

Internationally, there was considerable concern over bovine spongiform encephalopathy (BSE) transmission to humans causing variant Creutzfeldt-Jakob disease (vCJD). There is

now convincing evidence that the human disease has been caused by the consumption of foods contaminated with the BSE prion. It is still too early to predict the total number of cases of vCJD that may appear in the United Kingdom (UK) in the next two decades. In January 1999, the offspring of BSE affected cattle born after June 1996 were slaughtered in the UK, to avoid the possibility of transmission of the disease into the food chain. Deferral of blood donations from Australian citizens who were resident in the UK between 1980 and 1996 was instituted in 2000 to protect recipients from the theoretical risk that vCJD can be transmitted by blood transfusion. No cases of BSE have been found in Australian cattle herds nor have there been any cases of vCJD. The classical form of CJD does occur in Australia at a rate of 1.5 cases per million annually, consistent with international rates.[8]

In 1999, an outbreak in Malaysia and Singapore of a viral encephalitis among workers with exposure to pigs was reported.[9] Investigations led to the identification of a previously unrecognised virus, similar to the Hendra virus which caused deaths in horses and one human handler in Queensland in 1994. The virus has since been named the Nipah virus after the area in which most infections occurred. In 1999, 265 people were infected, of whom 105 died. Consequently, 1.1 million pigs were destroyed.[10] A recently published serosurvey of piggeries in Queensland confirmed that the herds were free of infection with either the Hendra or Nipah virus.[11]

In late August 1999, an unusual clustering of cases of meningoencephalitis was reported in New York City. The cause of the outbreak was confirmed as the West Nile virus.[12] This was the first time this virus had been detected in the Western Hemisphere. Associated with the human cases were an unusually large number of deaths among birds, particularly crows. Necropsies on these birds revealed West Nile virus infection. This outbreak appears to be associated with the appearance of a new variant West Nile virus, which first appeared in Romania in 1996 and Israel in 1998.[13] The disease has since spread along the eastern seaboard of the United States (US), and is carried by at least 14 species of mosquito. Mosquito larval control measures have limited subsequent human disease to small geographic foci. West Nile viruses are flaviviruses and are part of the 'Japanese encephalitis complex' of viruses, which include Kunjin and Murray Valley encephalitis viruses. Kunjin has been described as a subtype of lineage 1 West Nile virus. Recent studies on the relationship between Kunjin virus and West Nile virus,[14] demonstrate that Kunjin virus is one of several subgroups of West Nile virus and that Australian Kunjin virus shows genetic and antigenic differences to both the West Nile virus isolated in New York in 1999 and the Kunjin virus from Malaysia. Kunjin virus is not associated with the same morbidity and mortality caused by infection with West Nile virus.

In summary, communicable disease surveillance and control in Australia was advanced in 1999 by important new initiatives and strategic control measures. The sudden influx of refugees stretched the resources of the public health system; nonetheless refugees received adequate quality medical care. Communicable diseases were diagnosed and treated and there was no spread of disease to the broader Australian community. Important new diseases have been recognised while research and surveillance suggests they will have a limited impact in Australia.

Introduction

Surveillance of communicable diseases is an essential public health activity. Surveillance allows the detection of disease outbreaks prompting the appropriate investigation and control measures to be instigated. Surveillance also allows for the monitoring of trends in disease prevalence 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 the need for and impact of national control programs; guidance of national policy development; resource allocation; and description of the epidemiology of rare diseases for which there are only a few notifications in each jurisdiction. National surveillance 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 (CDNA, formally the Communicable Diseases Network Australia New Zealand, CDNANZ). The CDNA monitors trends of an agreed list of communicable diseases in Australia. Data are regularly published in the *Communicable Diseases Intelligence (CDI)* and on the Internet site Communicable Diseases Australia. This is achieved through the national collation of notifications of these diseases received by health authorities in the States and Territories. In 1999, 49 diseases or disease categories were included (Table 4), largely as recommended by the National Health and Medical Research Council (NHMRC).[15] 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. [16,17,18,19,20,21,22]

Methods

Australia is a federation of 6 States (New South Wales, Queensland, South Australia, Tasmania, Victoria and Western Australia) and 2 Territories (the Australian Capital Territory and the Northern Territory). The States and Territories collect notifications of communicable diseases under their public health legislation. The Commonwealth (or Federal) Government does not have any legislated responsibility for public health apart from human quarantine. States and Territories have agreed to forward data on communicable diseases to the Commonwealth Department of Health and Aged Care (DHAC) for the purposes of national communicable disease surveillance.

In 1999, the States and Territories transmitted data to the Commonwealth, fortnightly. Summaries of the data were

published fortnightly on the *Communicable Diseases Australia* Website and in the *Communicable Diseases Intelligence (CDI)* every 4 weeks. The Commonwealth received final data sets from the States and Territories of cases reported in 1999, by August 2000. Where possible, missing data and apparent errors were corrected, 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 from the State or Territory where the case was diagnosed.

Case definitions for each disease can be found in Appendices 1a-1h. For each case, the national data set includes fields for a unique record reference number; a code for the disease; age, sex, indigenous status; postcode of residence; 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. Analysis of the data by indigenous status was not possible because of the incomplete reporting of this information. Additional information was available on the species and serogroups isolated in cases of legionellosis, brucellosis, meningococcal disease, malaria and enterotoxigenic (verotoxigenic) *Escherichia coli*.

Analyses in this report are based on date of disease onset. For analysis of seasonal trends, notifications were reported by month of onset. Population notification rates were calculated using 1999 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 MapInfo based on the postcode of residence and allocated to Australian Bureau of Statistics Statistical Divisions (Map 1). The 2 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. 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 that occurred. This proportion may vary between diseases, between States and Territories and with time (Appendix 2). 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 of the disease, or the area in which public health actions were taken in response to the notification.

As no personal identifiers are collected in records, duplication in reporting may occur if patients moved from one jurisdiction to another and were notified in both. Data from those Statistical Divisions with small populations (Map 1) may result in high notification rates even with small numbers of cases. Notifications of diseases with longer incubation periods are more likely to be affected in this way than short incubation diseases.

The completeness of data in this report is summarised in Appendix 5. Missing data were patients' sex in 0.9 per cent notifications (n = 780) and patients' age in 0.3 per cent notifications (n = 256). The proportion of reports with missing data in these fields varied by State or Territory, and also by disease.

This is the first annual report where data are analysed by date of disease onset. The date of disease onset is uncertain for some communicable diseases and is often equivalent to the date of presentation to a medical practitioner or date of specimen collection at a laboratory. Analysis by disease onset is an attempt to estimate disease activity within a reporting period. Analysis by date of onset should be interpreted with caution, particularly for chronic diseases such as hepatitis B and C. NNDSS data from previous years (1994–1998, Table 3) show totals and rates for those years as analysed in August 2000. States and Territories continue to revise totals from previous years as duplicates are removed and other data are corrected. For this reason the totals and rates shown in Table 3 differ from totals and rates published in the annual reports from these years. All comparisons in this report are to the most recent totals, which are more accurate than those previously published.

Rates per 100,000 population were calculated using State, Territory and national population estimates for mid-year 1999, suppled by the Australian Bureau of Statistics (ABS). Mortality statistics for 1999 were available from ABS in 2001. The Australian Institute of Health and Welfare (AIHW) supplied hospital admission data for the financial year 1998/1999.

Data were analysed every 4 weeks and a short report published in *CDI*. This report is based on 'finalised' annual data from each jurisdiction, from which duplicate or erroneous records have been removed. For this reason, totals in this report may vary from the cumulative totals of the numbers reported in the four-weekly *CDI* reports. This report is informed by the discussions and comments of members of the CDNA, who met fortnightly by teleconference to discuss developments in communicable disease in their jurisdiction. The contribution of State and Territory data managers, to ensure that the data in this report are accurate, is gratefully acknowledged.

Results — surveillance notifications and reports

There was a total of 88,239 communicable disease notifications in 1999 (Table 1). 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 4 years are shown in Table 3.

In 1999, cases of haemolytic uraemic syndrome became notifiable in all States and Territories and shiga-toxin producing *E. Coli* (SLTEC, also called verotoxigenic *E. Coli* (VTEC)) infections were reported in all jurisdictions except Queensland and Western Australia.

The number of notifications in 1999 was an increase of 3 per cent on notifications in 1998 (85,227) and the second largest

number of reports since the NNDSS commenced in 1991 (Figure 1). In 1999 there were 29,977 bloodborne infections (34% of total), 22,255 gastrointestinal infections (25%), 21,704 sexually transmitted disease (25%), 5,986 vector-borne diseases (7%), 5,228 vaccine preventable diseases (6%), 1,967 other bacterial infections (2%), 1,012 zoonotic infections (1%) and 3 quarantinable diseases (<1%), (Figure 2).

The major changes in notifications in 1999 are shown in Figure 3 as a ratio of 1999 notifications compared with a 5-year mean. Only diseases with major changes in numbers of notifications in 1999 are shown. There was more than 50 per cent increase in notifications of hepatitis C (incident notifications) and leptospirosis. Smaller increases were noted in the reporting of chlamydial, gonococcal and meningococcal infections, legionellosis, mumps and syphilis. Measles notifications fell by more than 50 per cent compared with 1998. Declines in *Haemophilus influenzae* type b (Hib) infections and mumps were also noted.

In 1999, infectious and parasitic diseases (ICD-10 codes A00-B99) accounted for 1.25 per cent of all deaths in Australia (1,603 deaths). Pneumonia and influenza (ICD-10 codes J10-J18) accounted for a further 1.5 per cent of deaths (1,898 deaths). Death rates increased with age and were greater for males than females aged 45 years and over (Causes of death Australia 1999, Ausstats 3303.0 ABS, 2000).

Bloodborne viruses

The bloodborne viruses notified to NNDSS include hepatitis B, C and D. New HIV diagnoses are notified directly to the National Centre in HIV Epidemiology and Clinical Research (NCHECR), which reports separately in its Annual Surveillance Report. Information on the HIV data collection can be obtained through the NCHECR Website at: www.med.unsw.edu.au/nchecr.

Incident hepatitis C virus (HCV) infections are diagnosed by seroconversion (positive for anti-hepatitis C antibodies, with a negative test in the previous year), or by a clinical illness compatible with acute viral hepatitis where other causes have been excluded. Incident hepatitis B virus (HBV) infections are diagnosed by serology (presence of anti-HBc IgM antibodies) or by a clinical illness compatible with acute viral hepatitis where other causes have been excluded. Some jurisdictions may include cases with a previous negative HBsAg test in the last 12 months. Notifications of hepatitis B and hepatitis C that do not meet the incident case definition are recorded as 'unspecified'. Collectively, cases of hepatitis B and C represented 34 per cent of all notifications to the NNDSS in 1999, similar to the proportion in 1998.

Hepatitis B

Incident cases of hepatitis B have been notified to the NNDSS by all jurisdictions since 1994. In 1999, 307 incident cases were reported to the NNDSS at a national notification rate of 1.6 per 100,000 population, consistent with the rate reported in 1998 (1.4 per 100,000 population). The highest rates were recorded in the Northern Territory (9.9 per 100,000 population), Western Australia (2.4 per 100,000 population) and Victoria (2.0 per 100,000 population).

The majority of incident hepatitis B notifications were in the 15–34 year age range (Figure 4). Infections in males exceeded those in females (male to female ratio of 1.8:1). Risk factor information on incident hepatitis B cases were only available from Victoria, where 77 per cent of the cases occurred in injecting drug users (IDU) and their sexual partners. Three incident cases in Victoria were household contacts of a patient with chronic hepatitis B.

Figure 1. Notification rate (per 100,000 population) to NNDSS 1991 to 1999)

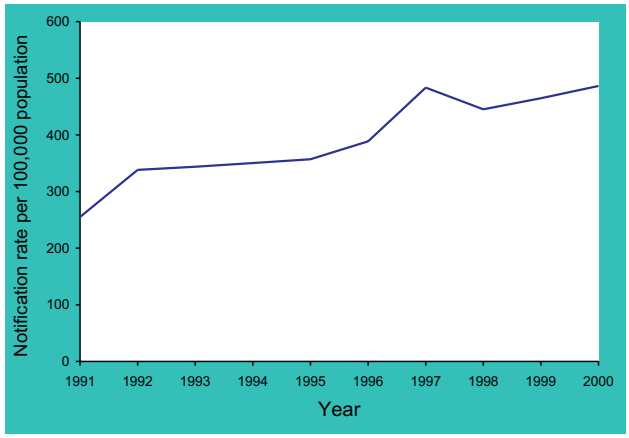


Figure 2. Breakdown of communicable disease notifications by disease category

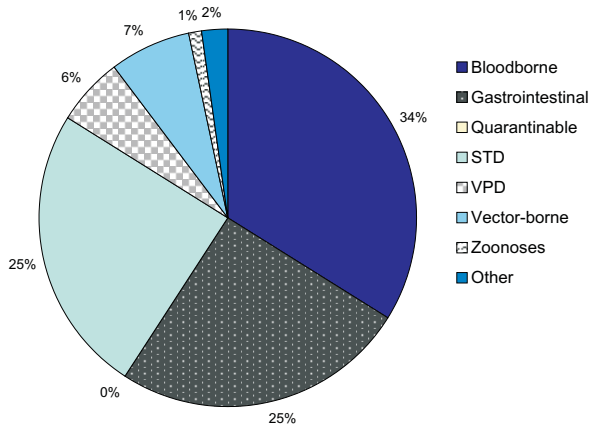
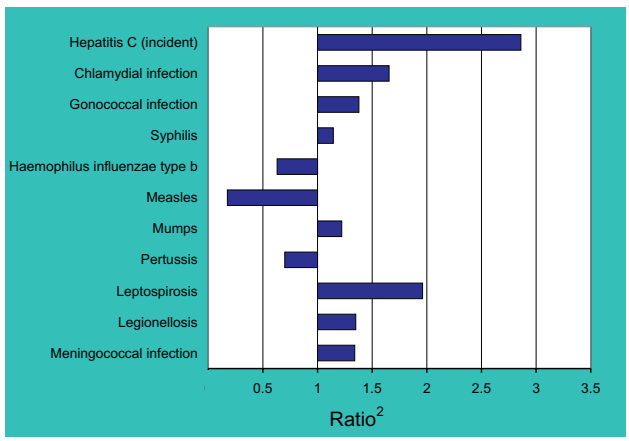


Figure 3. Comparison of selected disease totals in 1999 with historical data (5 year mean)



Unspecified hepatitis B has been notified to the NNDSS by all jurisdictions except the Northern Territory since 1997. In 1999, 8,091 unspecified cases were notified at a rate of 42.7 per 100,000 population (Tables 1 and 2), a rate higher than that recorded in 1998 (35.6 per 100,000 population). The male to female ratio for unspecified cases was 1.2:1. The highest rates of notification were in New South Wales (67.5 per 100,000 population), Victoria (46.1 per 100,000 population) and the Australian Capital Territory (21.4 per 100,000 population). The highest rates were in the 35–39 year age group for men (87.3 per 100,000 population) and the 25-29 year age group for women (77.3 per 100,000 population, Figure 5).

Vaccination against HBV commenced nationally for 'at-risk' infants in Australia in 1987 (except in the Northern Territory which started in 1988 and South Australia which started in 1996) and in adolescents in 1998 (except New South Wales and South Australia which started in 1999). National universal infant vaccination against HBV started in May 2000. In the Northern Territory, vaccination for Aboriginal infants started in 1988 and universal vaccination in 1990).[24] Rates of HBV infection in Australian children are low and it will be some years before the impact of HBV vaccination is seen in older age groups. In the Northern Territory, where infant immunisation with HBV vaccine started 10 years before the rest of the country, there were no child cases of hepatitis B reported in 1999.

Figure 4. Notification rate for incident HBV, Australia, 1999, by age and sex

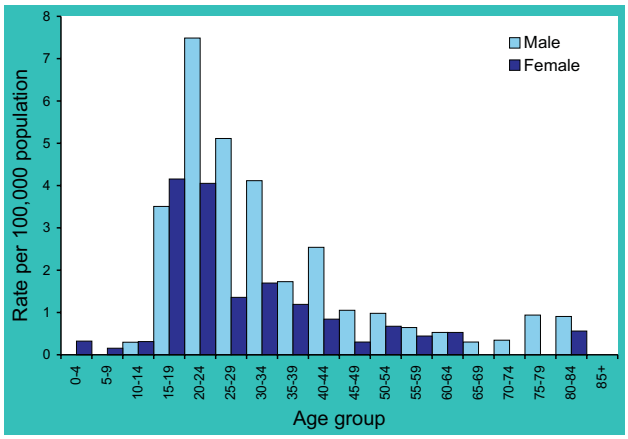
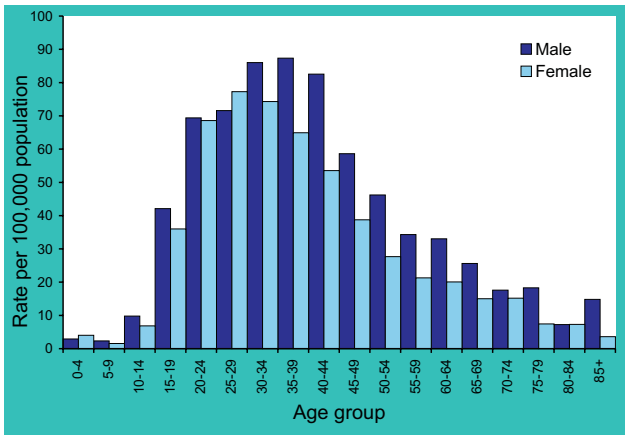


Figure 5. Notification rate for unspecified HBV, Australia, 1999, by age and sex

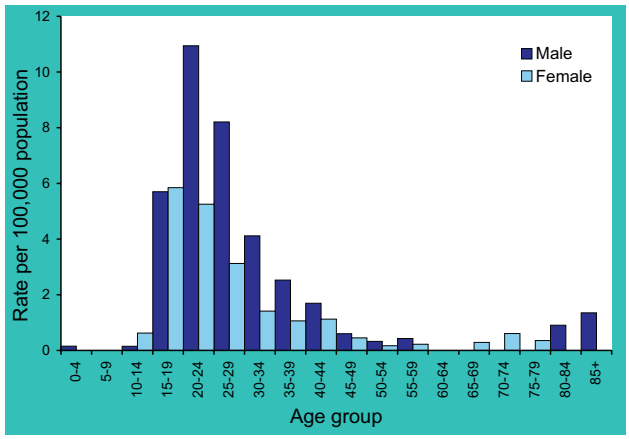


Hepatitis C

It has been estimated that more than 170 million people in the world have been infected with Hepatitis C, five times the number of people infected with HIV worldwide.[25] The virus was only identified in 1988, and was one of the first viruses to be identified solely by molecular biology. Serological screening tests became commercially available only in 1990 and while the first generation of assays had problems with both sensitivity and specificity, these have improved in recent years. Nucleic acid-based diagnostic methods are now commercially available. Hepatitis C infection has been notifiable in most Australian jurisdictions since 1991, and the number of 'unspecified' hepatitis C notifications remains stable at around 20,000 notifications per year. Incident cases of hepatitis C have been separately notifiable since 1993. Most cases of hepatitis C are asymptomatic during the acute phase, and incident cases are rarely identified. Most cases are diagnosed when the patient presents with symptoms of chronic disease, or by screening. As the timing of infection is often unknown, most cases are notified as 'unspecified'. The number of notifications to the NNDSS of incident hepatitis C has increased over recent years, although it is recognised that the number of notifications vastly underestimates the true incidence of hepatitis C in Australia. The increase in incident hepatitis C notifications to the NNDSS should not necessarily be interpreted as evidence of increasing transmission in the Australian community. Instead these notifications are largely a product of improved surveillance, increased awareness, and more widespread testing which vary across the jurisdictions.

In 1999, all States and Territories reported unspecified cases of hepatitis C. Incident cases were reported from all jurisdictions except Queensland. The total number of hepatitis C notifications (incident and unspecified) was similar in 1998 and 1999. There were 385 incident cases of hepatitis C reported in 1999, at a rate of 2.5 per 100,000 population. The proportion of all notifications that were known incident cases was 1.8 per cent in 1999, similar to the proportion in 1998 (1.7%). The highest rates of incident hepatitis C infection were reported from the Australian Capital Territory (6.4 per 100,000 population), Western Australia (6.1 per 100,000 population) and South Australia (5.8 per 100,000 population). The majority of incident hepatitis C notifications were in the 15–29 year age range (Figure 6).

Figure 6. Notification rate for incident hepatitis C, Australia, 1999, by age and sex



In 1999 only limited data were collected nationally on incident hepatitis C infections. The Australian Capital Territory, South Australia, Tasmania, Victoria and Western Australia collected additional data on risk factors for infection and the reason for testing or reporting source. The following analyses refer only to incident hepatitis C cases identified in these jurisdictions.

Demographic profile of incident hepatitis C cases

The age and sex of incident hepatitis C cases notified in 1999 are summarised in Table 5, according to the State or Territory of diagnosis. The age of incident cases ranged from 13 to 85 years. The majority of cases were, however, between 20 and 40 years of age. Overall, the male to female ratio of cases was 1.8:1, although the proportion of male cases did vary across jurisdictions, with South Australia recording the highest proportion of male cases.

Method of diagnosis of incident hepatitis C

Diagnosis was based either on seroconversion or on the clinical diagnosis of acute hepatitis. In some patients, seroconversion and acute hepatitis were recorded. Data were not available for Victoria, however, data for the other 4 jurisdictions are shown in Table 6. In some jurisdictions the decision of whether a cases in incident or unspecified is made by the clinician. In some of these cases information regarding the method of diagnosis may not be made available to the health department (recorded as unknown in Table 6).

Reporting sources for incident hepatitis C infections

In South Australia the reporting source is recorded, while in the other jurisdictions (the Australian Capital Territory, Tasmania, Victoria and Western Australia), the reason for testing is documented. Recording of multiple responses was possible in Tasmania, while in the remaining jurisdictions recording of one reporting source/reason for test was possible.

A general practitioner was the reporting source for 14 (70%) of the 20 notifications from the Australian Capital Territory, while the remaining 6 cases were identified by screening at a detoxification unit. Prisons were a major reporting source in South Australia, while an investigation of symptomatic hepatitis was the major reason for testing in Tasmania. The reason for testing in Western Australia was often not reported, or reported as 'other'. In Victoria the most commonly identified reason for testing was having another medical problem. The variation across jurisdictions in the recording of the reason for testing or reporting source limits the utility of this information.

Exposure assessment for incident hepatitis C infections

The Australian Capital Territory, Tasmania, Western Australia and Victoria provided exposure assessment data for incident hepatitis C infections. In Tasmania, Western Australia, and Victoria more than one exposure factor was recorded.

Injecting drug use is the major exposure factor for incident infections in all jurisdictions (range 65% in the Australian Capital Territory to 92% in Victoria). Multiple exposures were often recorded, but there were few cases that were not IDU associated. Other risk factors included surgery, tattooing and sexual contact with a hepatitis C-infected person. A proportion of cases had no exposure factor identified, ranging from 1 per cent in Victoria to 24 per cent in Western Australia.

Unspecified hepatitis C accounted for 21,244 notifications; a notification rate of 112 per 100,000 population, similar to the 102.7 per 100,000 population reported in 1998. Of the total notifications of unspecified hepatitis C, 43 per cent of the notifications were from New South Wales. The highest notification rates were from New South Wales (143.7 per 100,000 population), Victoria (130.8 per 100,000 population) and the Northern Territory (120.3 per 100,000 population). The male to female ratio was 1.8:1. The highest notification rates were in the 20 to 49 year age range for both males (318 per 100,000 population) and females (177 per 100,000 population, Figure 7).

Hepatitis D

Hepatitis D is a co-infection occurring in HBV-infected people and particularly prevalent among injecting drug

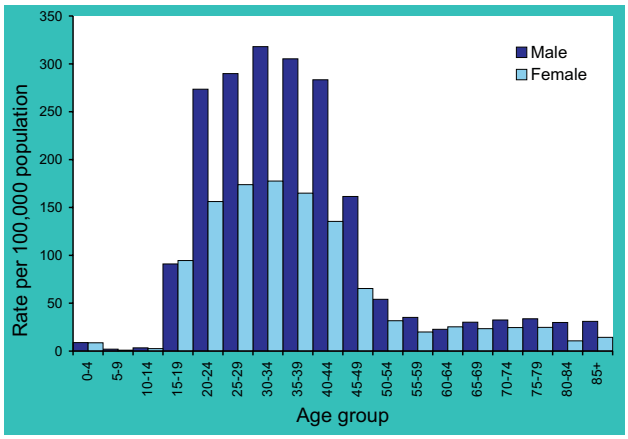
Table 5. Demographics of incident hepatitis C cases in the Australian Capital Territory, South Australia, Tasmania, Victoria and Western Australia, 1999

	ACT	SA	Tasmania	Victoria	WA
% Males	45	70	56	66	63
Median age (range)					
Males	21 (18-30)	25 (17-44)	23 (17-42)	21 (14-40)	27 (18-85)
Females	29 (19-37)	24 (17-74)	31 (17-42)	20 (13-59)	24 (15-50)

Table 6. Method of diagnosis, incident hepatitis C cases in the Australian Capital Territory, South Australia, Tasmania, and Western Australia, 1999

Method of diagnosis	ACT	SA	Tas	WA
Seroconversion %	75	95	49	58
Clinically defined acute hepatitis %	25	5	-	9
Illness and seroconversion %	-	-	-	2
Unknown %	-	-	51	31

Figure 7. Notification rate for unspecified hepatitis C, Australia, 1999, by age and sex



users.[26] There were 21 notifications of hepatitis D to the NNDSS in 1999 at a notification rate of 0.1 per 100,000 population. Of the 21 notifications, 16 (76%) of the notifications came from New South Wales (0.2 per 100,000 population). The majority (85%) of notifications was in males aged between 15 and 49 years.

Gastrointestinal diseases

Introduction

Gastrointestinal and foodborne diseases are a major cause of illness in Australia, despite the often mild nature of symptoms. The exact burden of disease due to food is not easy to quantify, as there is a significant under-estimate in surveillance data and there are multiple modes of transmission for gastrointestinal disease. Surveillance data may be biased by different levels of reporting of gastrointestinal disease in different age groups, with children and the elderly more likely to be seen by a medical practitioner.

It is important to recognise that differences in laboratory testing practices and surveillance methods in States and Territories may account for the difference in observed notification rates. This is particularly true for diseases such as *Shiga*-toxin producing *E. coli* (SLTEC/VTEC), where laboratory diagnosis is difficult, and screening practices vary between laboratories and jurisdictions. States and Territories also have different reporting requirements for doctors and laboratories, which can make national comparison difficult. To overcome some of these difficulties, the CDNA agreed to standardise reportable conditions in each jurisdiction from 1 January 2001.

In January 1999, the NSW Health Department established sentinel surveillance for foodborne disease in the Hunter Public Health Unit. This program of work was modelled on the Centers for Disease Control and Prevention (CDC) FoodNet Active Surveillance Network. The Hunter Public Health Unit heightened surveillance within the region for diarrhoeal disease and syndromic illnesses associated with food. It also established case control studies for *Salmonella* and *Campylobacter*. This pilot program of enhanced surveillance has run for over 2 years, and was used as a model for an Australia-wide program of heightened surveillance — coined OzFoodNet, in 2000.

The major outbreaks of foodborne illness in 1999 were the nationwide outbreak of typhoid following a cruise in the Pacific, and an outbreak of *Salmonella* Typhimurium PT135a associated with orange juice in South Australia. The outbreak of typhoid required multi-state cooperation, as cases were reported to various State and Territory health departments. The CDNA collaborative investigation was lead by the Victorian Department of Human Services.

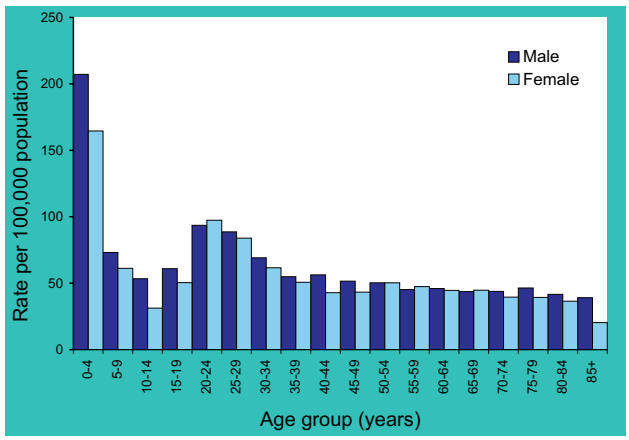
Botulism

There have been no cases of foodborne botulism reported to the NNDSS since the inception of the system in 1991. A single case of infant botulism was reported in 1998. There were no cases of botulism reported in 1999.

Campylobacteriosis

There were 12,643 cases of campylobacteriosis notified to the NNDSS with symptom onset in 1999 (Table 1), which was a decrease of 6 per cent from 13,282 cases notified in 1998. *Campylobacter* species are the most common cause of gastrointestinal disease notified to the NNDSS. Despite this there are very few outbreaks detected due to the lack of a robust typing method. The median age of cases in 1999 was 26 years (range 0-94 years) and 53.4 per cent of notified cases were male. The highest age-specific rate was 188.2 cases per 100,000 population in 0–4 year-old children (Figure 8). The highest notification rates were in South Australia (161.1 per 100,000 population) and the lowest rates were in Western Australia (76.0 per 100,000 population, Table 2). Analysis by Statistical Division showed the highest rates of *Campylobacter* occurred in Outer Adelaide (186 per 100,000 population), the Western District of Victoria (163 per 100,000 population) and Yorke and Lower North in South Australia (163 per 100,000 population) (Map 2). Reports of campylobacteriosis were greatest in

Figure 8. Notification rate for campylobacteriosis, Australia, 1999, by age and sex



Spring and Summer (Figure 9). *Campylobacter* infections were not specifically notifiable in New South Wales.

Hepatitis A

There were 1,557 cases of hepatitis A notified to NNDSS with symptom onset in 1999 (Table 1), which was a decrease of 38 per cent from 2,443 cases notified in 1998 (Table 3). Although a faecal-oral route through

Figure 9. Notifications of campylobacteriosis, Australia, 1991 to 1999, by month of onset

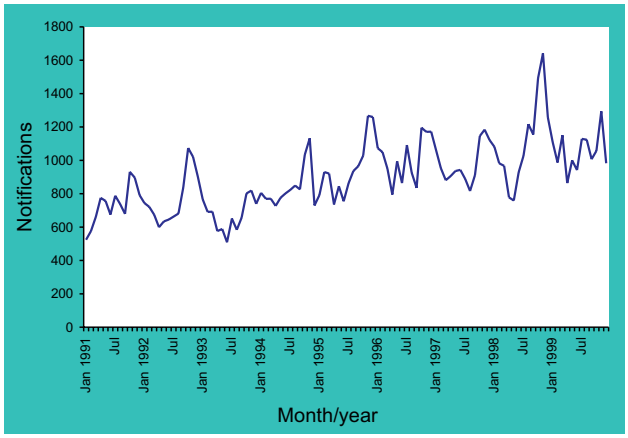
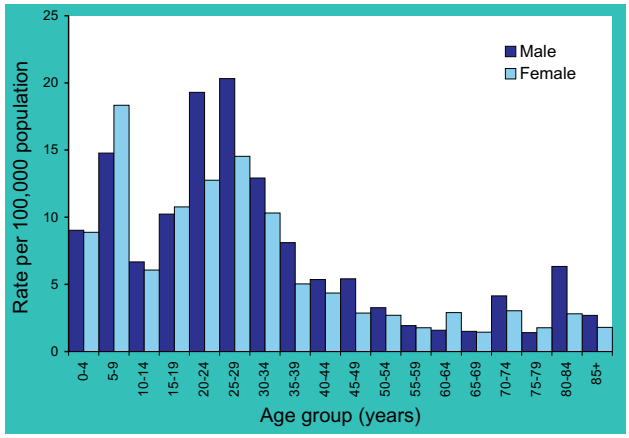
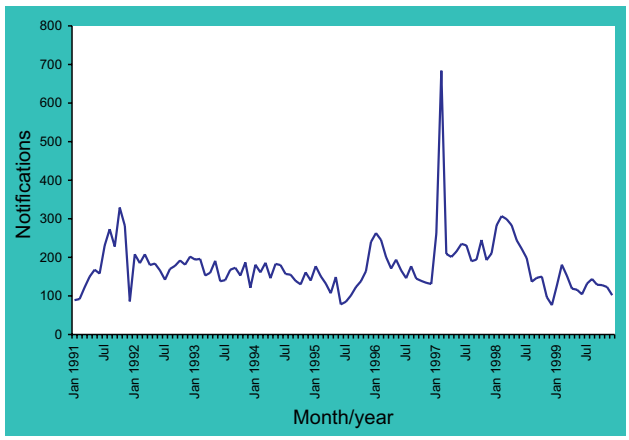


Figure 10. Notification rate for hepatitis A, Australia, 1999, by age and sex

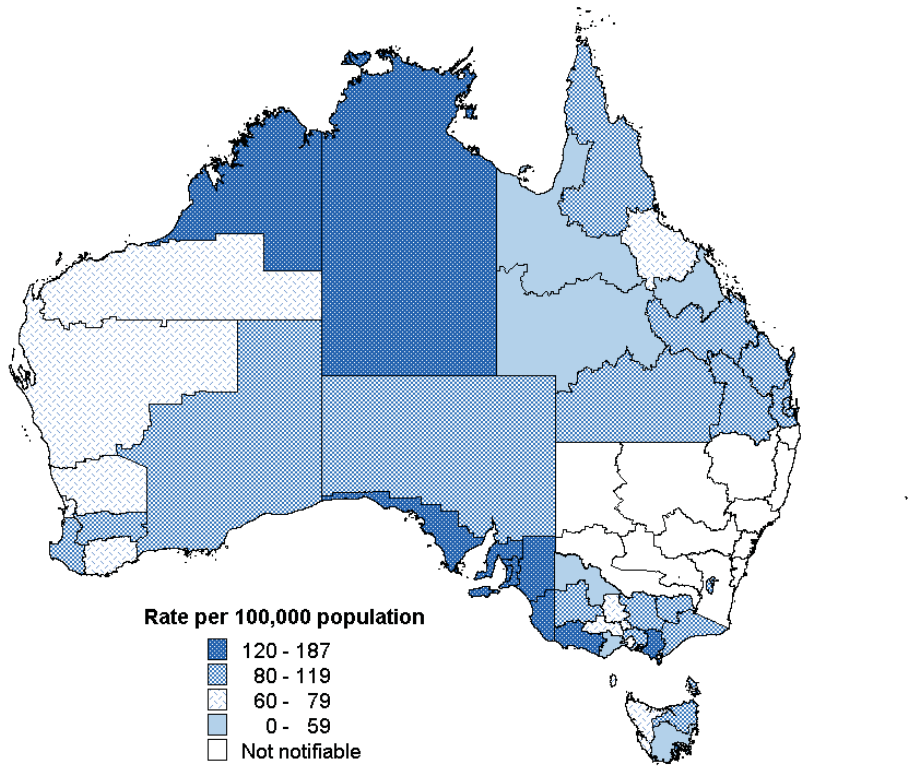


contaminated food or shellfish from contaminated waters commonly spreads hepatitis A, recent outbreaks in the USA and Europe have been associated with injecting drug users. Similarly, in Australia in 1999, there were reports of hepatitis A outbreaks among injecting drug users.[27,28] The median age of cases reported to NNDSS in 1999 was 24 years (0–98 years) and 54.7 per cent of notified cases were male. The highest age-specific rates were in 5–9 year-old children (16.5 cases per 100,000 population), and among adults aged between 20–29 years (16.9 cases per 100,000 population, Figure 10). The highest notification rates were in the Northern Territory (46.1 per 100,000 population) and the lowest rates were in Tasmania (1.1 per 100,000 population, Map 3). Reports of hepatitis A were received throughout the year, but were greatest in the month February (Figure 11).

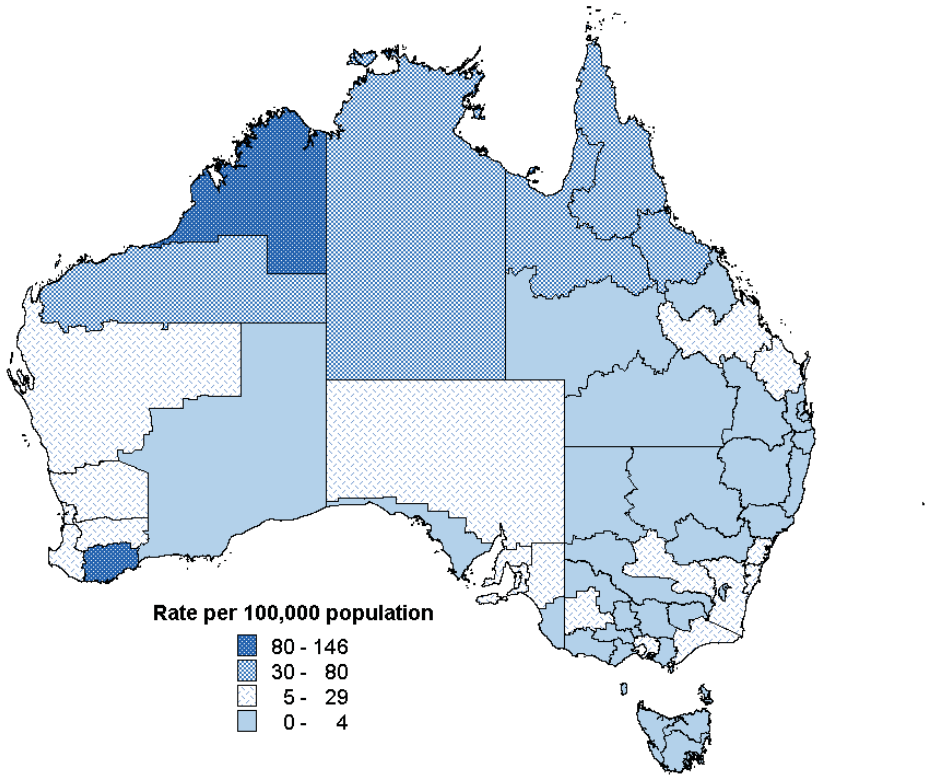
Figure 11. Notifications of hepatitis A, Australia, 1991 to 1999, by month of onset



Map 2. Campylobacteriosis notification rate by Statistical Division of residence



Map 3. Hepatitis A notification rate by Statistical Division of residence



Hepatitis E

Hepatitis E virus is now recognized taxonomically as the type species of the genus 'Hepatitis E-like viruses'. Hepatitis E virus (HEV) exhibits similarity in structure and genome organisation with the caliciviruses, and low amino acid similarity with rubella virus and the alphaviruses of the family Togaviridae. It is unrelated to the other hepatitis viruses (A, B, C, D, and G). HEV is associated with sporadic cases of enterically transmitted acute hepatitis. HEV is considered to be endemic in tropical and subtropical regions of Asia, Africa, and Central America. Antibody prevalence suggests global distribution of strains of low pathogenicity. Antibodies to HEV or closely related viruses have been detected in primates and swine. Women in the third trimester of pregnancy are susceptible to fulminant hepatitis E disease that has a case fatality rate as high as 20 per cent.[29] Outbreaks in South Asia among young adults in recent years pose a risk to Australian travellers to these regions. There were 2 cases of hepatitis E notified to NNDSS in 1999, one of which was a 19-year-old male from Victoria and the other a 38-year-old male from the Australian Capital Territory. Both cases had a history of overseas travel and in one case it appeared the infection was acquired in India.

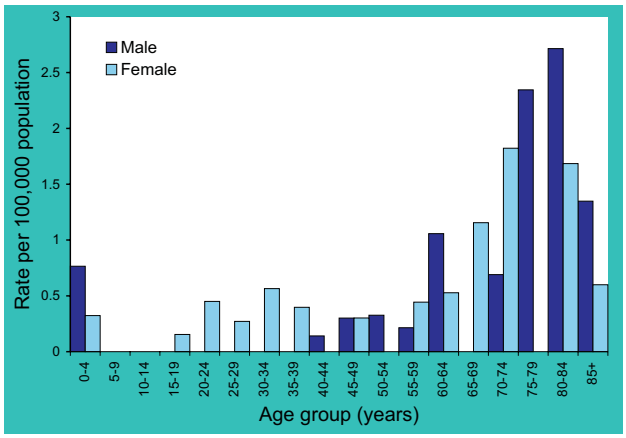
Listeriosis

Listeriosis is a serious but relatively rare foodborne disease to which neonates, pregnant women, the immunocompromised and the elderly are particularly susceptible. Infection during pregnancy can be transmitted to the foetus. Infants may be stillborn, born with septicaemia or develop meningitis in the neonatal period. Clusters of cases of listeriosis have been noted in hospitals, nurseries and aged care facilities.[29]

The interpretation of State and Territory comparisons of listeriosis data is complicated by reporting practices. Some jurisdictions report both cases of maternal-foetal pairs while others report the pair as a single case.

There were 63 cases of listeriosis reported to NNDSS with onset of symptoms in 1999, which was similar to previous years (Table 1). The median age of cases in 1999 was 60 years (0–86 years) and 55.6 per cent of notified cases were female. The highest age-specific rate was 2.1 cases per 100,000 population in 80–84 year-old people (Figure 12). The highest notification rates were in Western Australia (0.6 cases per 100,000 population) and there were no cases reported from the Northern Territory or the Australian Capital Territory. There was no evidence of clustering of cases of listeriosis. Victoria reported that 5 cases occurred as maternal-foetal cases, from which there were only 2 live births.

Figure 12. Notification rate for listeriosis, Australia, 1999, by age and sex



Salmonellosis (excluding typhoid)

There were 7,154 cases of salmonellosis (not elsewhere classified) reported to NNDSS with symptom onset in 1999, which was a decrease of 9.5 per cent from 7,489 cases reported in 1998. The median age of cases in 1999 was 11 years (range 0–97) and 50.7 per cent of notified cases were male. The highest age-specific rate was 220.7 cases per 100,000 population in 0–4 year-old children (Figure 13). The highest notification rates were in the Northern Territory (184.6 per 100,000 population) and the lowest rates were reported from the Australian Capital Territory (20.7 per 100,000 population). The Kimberly Statistical Division had in excess of 300 cases per 100,000 population, which was comparable to previous years (Map 4). Reports of salmonellosis were greatest in the months January to March (Figure 14).

In Australia during 1999, the National Enteric Pathogen Surveillance Scheme (NEPSS) recorded 7,179 cases of non-typhoidal salmonellosis, and 15 outbreaks involving more than 10 cases, and 15 clusters of less than 10 cases (NEPSS 1999 annual report). The largest of these was an outbreak of 501 cases of *Salmonella* Typhimurium 135a associated with commercial orange juice. This outbreak occurred predominantly in South Australia, but cases were identified in neighbouring States.[30] A waterborne outbreak of *S.* Saintpaul was reported in March 1999 in 28 workers at a large construction site in Central Queensland.[31]

Salmonella Typhimurium was the most common serovar reported to NEPSS in 1999, with phage types 135, 135a and 9 being the most common. NEPSS recorded 201 cases of *Salmonella* Enteriditis phage type 4. In New South Wales, the Australian Capital Territory, Victoria and South Australia, there were a total of 88 cases of *S.* Enteriditis phage type 4.

Figure 13. Notification rate for salmonellosis, Australia, 1999, by age and sex

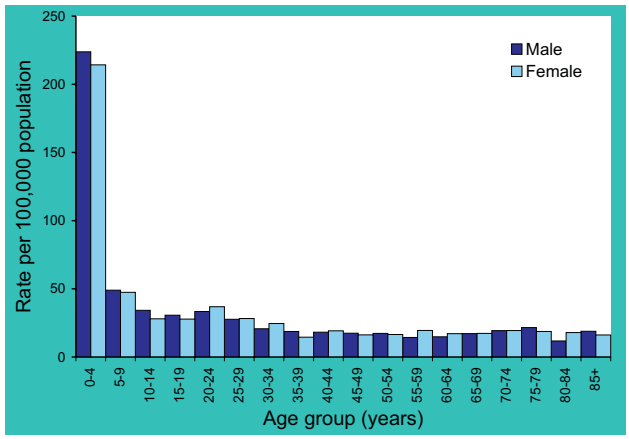
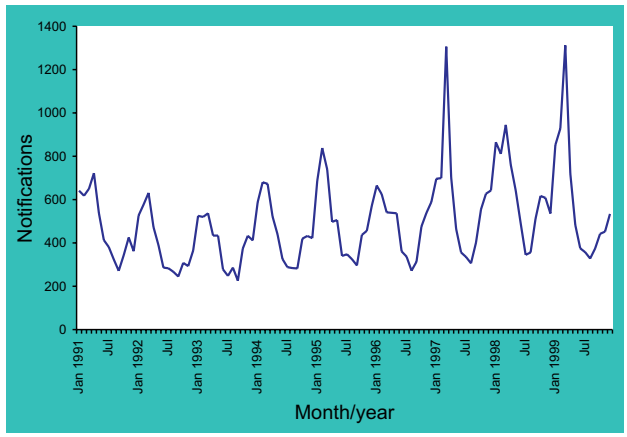
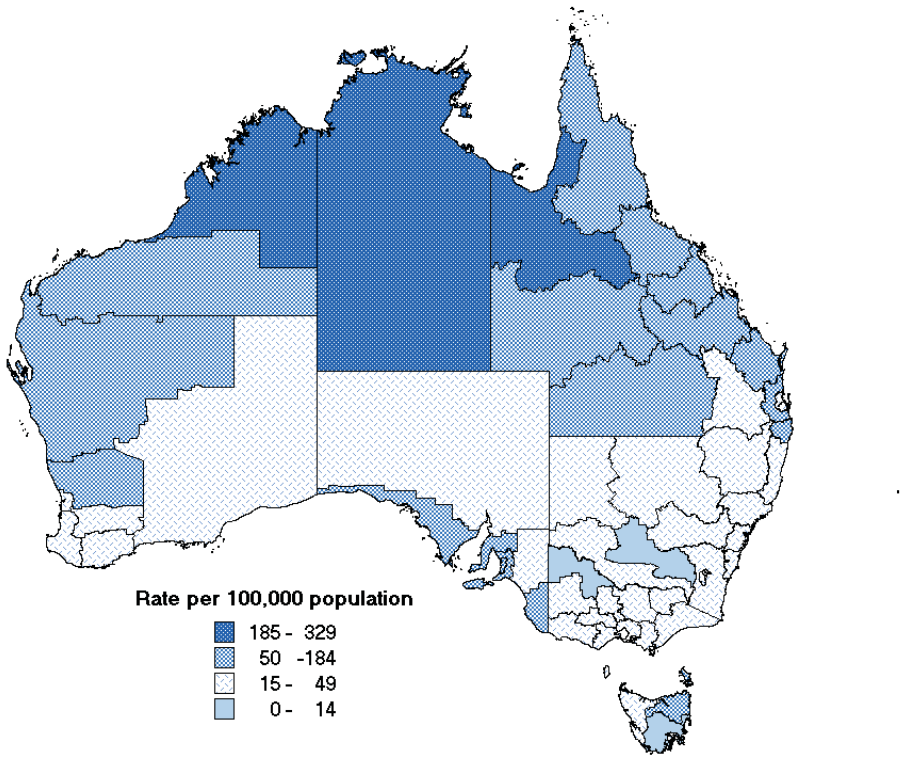


Figure 14. Notifications of salmonellosis, Australia, 1991 to 1999, by month of onset



Map 4. Salmonellosis notification rate by Statistical Division of residence



Of those cases where data on overseas travel was available, all had a history of recent overseas travel, and the majority had travelled to Indonesia.

Shigellosis

There were 547 cases of shigellosis reported to NNDSS with onset of symptoms in 1999, which was a 8 per cent decrease from 594 cases reported in 1998. The median age of cases in 1999 was 21 years (range 0–83 years) and 54.1 per cent of notified cases were female. The highest age-specific rate was 13.0 cases per 100,000 population in 0–4 year-old children (Figure 15). The highest notification rates were in the Northern Territory (57.5 per 100,000 population) and the lowest rates were reported from Tasmania (0.2 per 100,000 population). Shigellosis was not specifically notifiable from New South Wales. Cases were more commonly notified during the months of January to April (Figure 16).

A report of a *Shigella sonnei* outbreak in a long-term nursing centre was reported.[32] Thirteen cases of multi-drug resistant *S. sonnei* were found among staff and patients and the isolates were genetically indistinguishable. It is probable that transmission was person-to-person and that break-downs in the institutional infection control procedures were responsible.

Figure 15. Notification rate for shigellosis, Australia, 1999, by age and sex

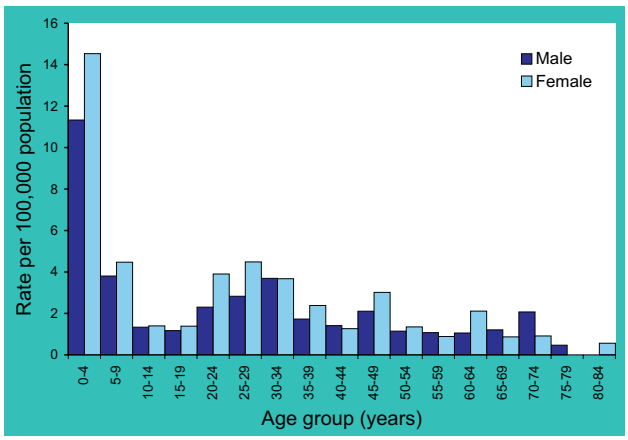
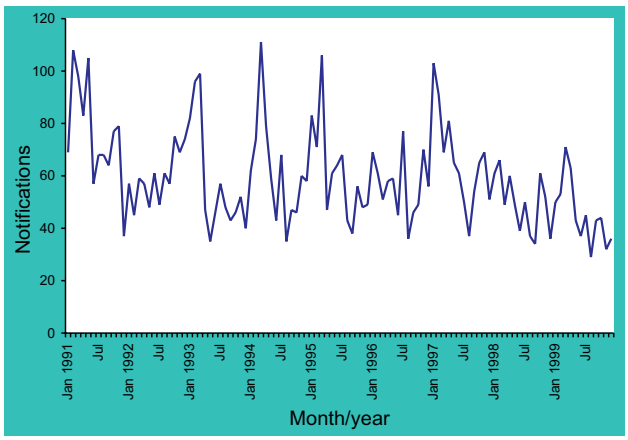


Figure 16. Notifications of shigellosis, Australia, 1991 to 1999, by month of onset



Shiga-like toxin producing *Escherichia coli*/Verotoxigenic *E. coli*

There were 43 cases of Shiga-like toxin producing *Escherichia coli*/Verotoxigenic *E. coli* (SLTEC/VTEC) reported to NNDSS with symptom onset in 1999, which was a 207 per cent increase from 14 cases reported in 1998. It should be noted however, that SLTEC/VTEC only became notifiable in August 1998, which may account for some of the increase in 1999. South Australia reported 90.7 per cent of cases, which reflects this State's policy of screening for toxin genes in faecal specimens (by PCR), from all cases of bloody diarrhoea. The median age of cases in 1999 was 33 years (range 1–77 years) and 37.2 per cent of notified cases were male. The highest age-specific rates were 0.5 per 100,000 population in 5–9 year-old children, and 0.9 per 100,000 population in 75–79 year-old people. SLTEC/VTEC was not specifically notifiable from Queensland or Western Australia.

Haemolytic uraemic syndrome

Infections with SLTEC/VTEC have the potential to cause severe and life-threatening illness including haemolytic uraemic syndrome (HUS). HUS is generally diagnosed on the basis of microangiopathic haemolytic anaemia, acute renal impairment and thrombocytopaenia (reduced platelet counts). Children aged less than 5 years are at increased risk of HUS. In an outbreak of HUS associated with the consumption of mettwurst in South Australia in 1994/1995 there was one death and 18 children required dialysis.[33]

There were 24 cases of HUS notified to NNDSS with symptom onset in 1999 (Table 1). States and Territories made this condition nationally notifiable in August 1998. New South Wales reported 11 cases and Victoria reported 8 cases. In New South Wales, 5 of the cases of HUS were considered to be a cluster. All presented with bloody diarrhoea, but no cultures were positive for VTEC. A common food source, minced beef, was postulated as the source of bacterial infection, but not proven.[34] In Victoria, 8 cases and 2 deaths were reported, however, they appeared to be sporadic cases.[35]

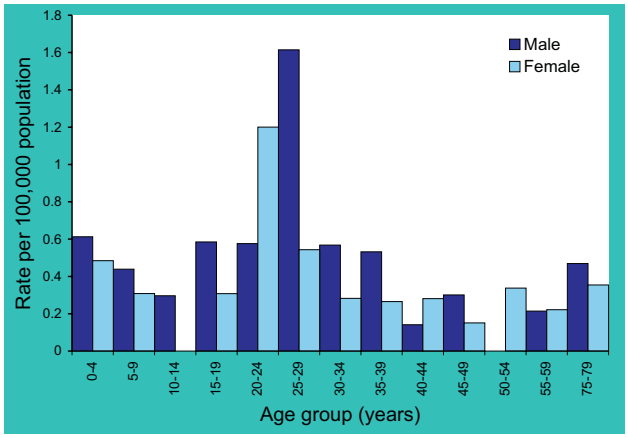
The median age of cases reported to NNDSS in 1999 was 4.5 years (range 0–70 years) and 54 per cent of notified cases were female. The highest age-specific rate was 0.9 cases per 100,000 population in 0–4 year-old children.

Typhoid

Most cases of typhoid in Australia occur in travellers returning to Australia from typhoid endemic countries. There were 72 cases of typhoid with symptom onset in 1999, which was a 12.5 per cent increase from 63 cases reported in 1998. The median age of cases reported to NNDSS in 1999 was 25.5 years (range 1–78 years) and 41.7 per cent of notified cases were female. The highest age-specific rate was 1.1 cases per 100,000 population in 25–29 year-old people (Figure 17). The highest notification rates were in New South Wales (0.6 per 100,000 population).

In June 1999, Australian health departments were notified of 12 cases of typhoid in people who had attended a Pacific Island cruise in May 1999 (Typhoid Epidemiology Working Group, unpublished report). The CDNA co-ordinated a national response to the outbreak. All 12 cases of typhoid had attended a tour on the Kokoda Trail in Papua New

Figure 17. Notification rate for typhoid, Australia, 1999, by age and sex



Guinea. Investigators found that typhoid illness in tour participants was associated with either contaminated coleslaw or drinking water. A mixed infection was suspected as 81 per cent of 159 tour participants experienced gastroenteritis following the tour.

Yersiniosis

There were 143 cases of yersiniosis reported to NNDSS with dates of symptom onset in 1999, which was a 25 per cent decrease from 190 cases reported in 1998. The median age of cases in 1999 was 19 years (range 0–86 years) and 56.6 per cent of notified cases were male. The highest age-specific rates were 3.8 cases per 100,000 population in 0–4 year-old children, and 1.1 per 100,000 population in 20–24 year-old people (Figure 18). The highest notification rates were in Queensland (2.9 per 100,000 population) and South Australia (1.2 per 100,000 population). Yersiniosis was not specifically notifiable in New South Wales. Cases were more commonly notified during January to March (Figure 19).

Quarantinable diseases

In Australia, the human diseases proclaimed to be quarantinable under the *Quarantine Act 1908* are cholera, plague, rabies, yellow fever, and 4 viral haemorrhagic fevers (Ebola, Marburg, Lassa and Crimean-Congo). Cholera, plague, yellow fever and the viral haemorrhagic fevers are of international public health significance with mandatory reporting to the WHO, under International Health Regulations (http://www.who.int/m/topics/international_health_regulations/en/index.html). Rabies is a disease of both human and animal quarantine importance in Australia. All States and Territories notify the quarantinable diseases to the NNDSS.

The only cases of quarantinable disease reported in Australia in 1999 were 3 cases of cholera. Two of these cases were imported, one from Indonesia and one from India. The other case occurred from local water sources in New South Wales. Two were *Vibrio cholerae* 01 classical Ogawa and one was 01 El Tor/Ogawa.

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 developing countries.

Although no cases of rabies or yellow fever were reported in Australia, worldwide these 2 diseases continue to cause fatalities and travellers should be aware of measures they can take to prevent infection with these viruses. Travellers intending to visit central Africa or central South America are encouraged to be vaccinated with the yellow fever vaccine from an approved Australian vaccination centre. Information on quarantinable diseases can be found on the Department of Health and Ageing Website at: http://www.health.gov.au/pubhlth/consumer/index/index.html

Sexually transmitted infections

The infections classified as sexually transmissible for surveillance in the NNDSS are chancroid, chlamydial infection, donovanosis, gonococcal infection, lymphogranuloma venereum and syphilis.

States and Territory health departments follow NHMRC case definitions for the reporting of these conditions (Appendix 1d).

There are important infections commonly or usually spread by sexual contact, which are not subject to national surveillance through the NNDSS. These include genital herpes (herpes simplex virus type I and II), genital warts

Figure 18. Notification rate for yersiniosis, Australia, 1999, by age and sex

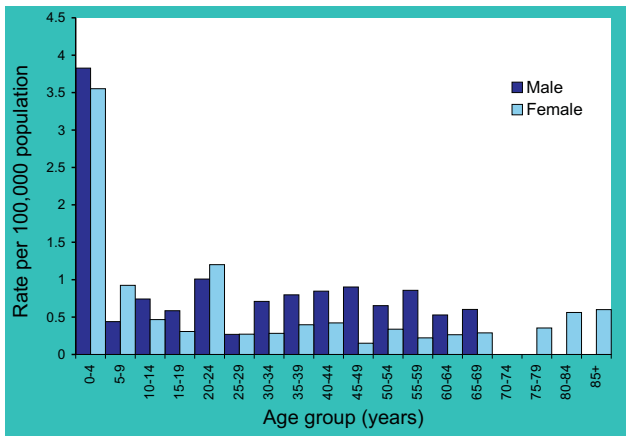
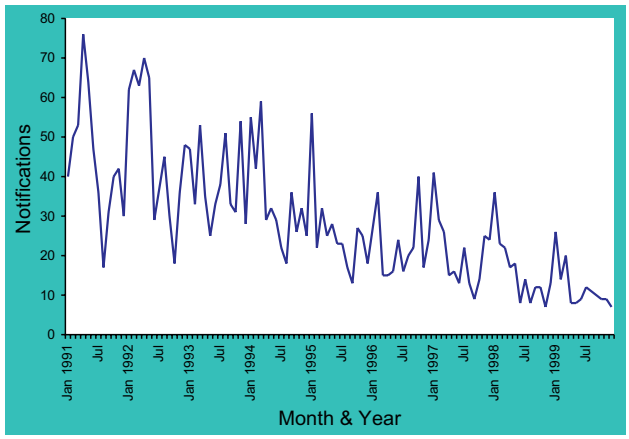


Figure 19. Notifications of yersiniosis, Australia, 1999, by month of onset



(human papilloma virus, several types), trichomoniasis and parasitic infestations such as pubic lice and scabies.

In addition to the sexually transmissible infections (STI) surveillance by the 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. National data on HIV and AIDS are collected and reported separately by the National Centre in HIV Epidemiology and Clinical Research. The Centre also reports on trends in sexually transmissible infection notifications received via NNDSS. The full report for 1999 is available at www.med.unsw. edu.au/nchecr.

Chancroid

Chancroid is a bacterial infection causing genital ulcers. There have only been 11 cases reported to the NNDSS since 1991. No cases of chancroid were reported in Australia in 1999.

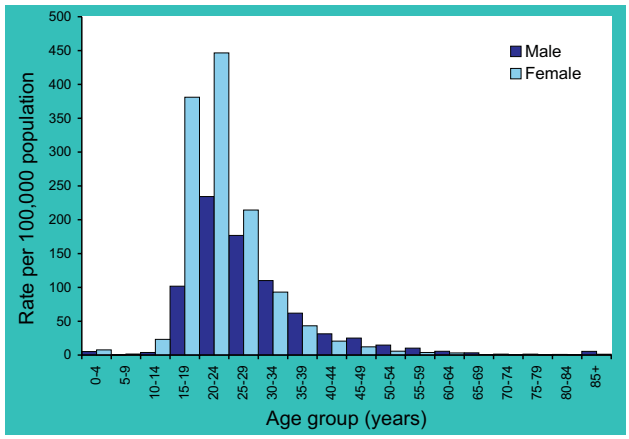
Chlamydial infection

Chlamydial infections were the most commonly reported STI and the third most commonly reported notifiable disease in Australia in 1999, when 14,082 notifications of chlamydial infection were reported to the NNDSS (Table 1). In New South Wales, reporting of genital chlamydial infection commenced in September 1998, so that the reporting for chlamydial infections was national for the first time in 1999. The inclusion of New South Wales data gives a more accurate estimate of the national prevalence than previous years. Chlamydial infections may be under-reported because of a high proportion of asymptomatic infections, particularly among women.[29] The recent advent of nucleic acid tests (NAT) for chlamydia may also explain increases in notification; up to 83 per cent (2,747 of 3,298) of chlamydial infections reported to the Laboratory Virology and Serology Reporting Scheme (LabVISE) were detected by nucleic-acid methods.

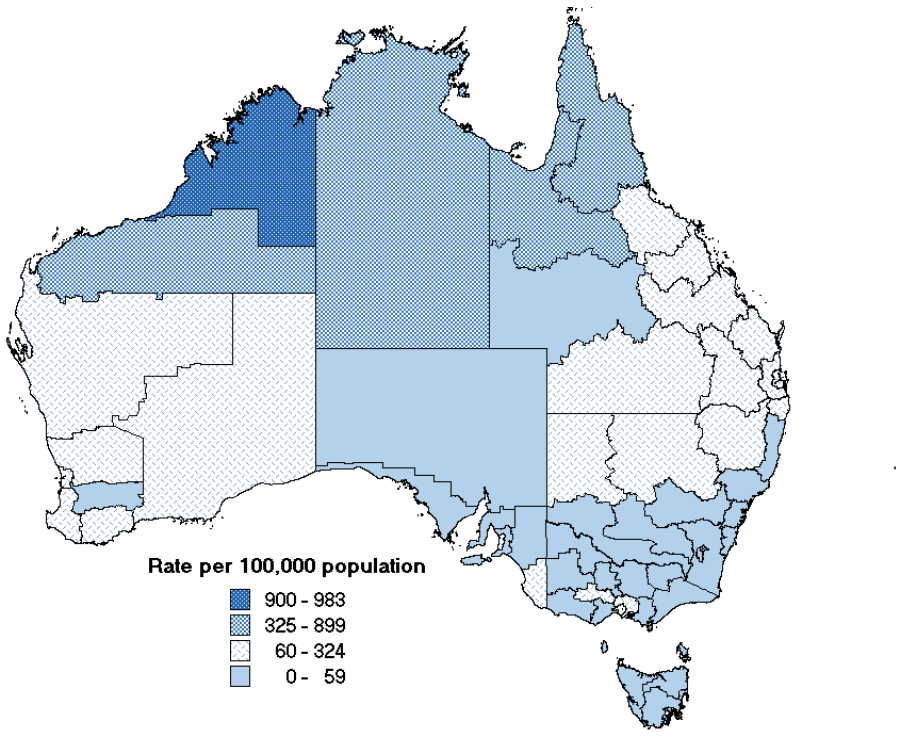
The majority (92%) of reported cases of chlamydia were in the 15–39 year age range. The notification rate for chlamydial infections in 1999 was 74.2 cases per 100,000 population, higher than the rate of 60.5 cases per 100,000 population reported in 1998.

The male to female ratio was 1:1.5. In both males and females the highest rates of disease were recorded for the 20–24 year age group (Figure 20). High rates of notification were reported from northern Australia, including rates over 400 per 100,000 population in the Northern Territory (Map 5). The National Centre in HIV Epidemiology and Clinical Research (NCHECR) reported rates of chlamydial disease in indigenous Australians from NNDSS data in their annual report. Based on data from the Northern Territory,

Figure 20. Notification rate for chlamydial infection, Australia, 1999, by age and sex



Map 5. Chlamydial infection notification rate by Statistical Division of residence



South Australia and Western Australia, which were the only jurisdictions to report indigenous status in more than half of notifications, the NCHECR estimated a rate of chlamydial infection among indigenous Australians of 882 per 100,000 population compared with a rate of 75 per 100,000 population in non-indigenous Australians.

Lymphogranuloma venereum

Lymphogranuloma venereum (LGV) is a sexually acquired chlamydial infection caused by certain serovars of *Chlamydia trachomatis*. The disease begins with a painless genital lesion and may progress to suppurating draining lymph nodes and the development of inguinal buboes. LGV is a common sexually transmitted infection especially in poorer communities in tropical and sub-tropical regions of the world. In Australia, there have only been 7 reports to the NNDSS since 1991 and none since 1995. There were no cases of lymphogranuloma venereum reported from any State or Territory in 1999.

Donovanosis

Donovanosis is a notifiable disease in all jurisdictions except South Australia. Donovanosis is a chronic genital ulcer disease that occurs in indigenous Australians in rural and remote communities. Notifications of donovanosis have fallen significantly over the past 10 years, and particularly since 1994 due to the introduction of more sensitive and acceptable testing methods and more effective treatment with azithromycin. Since 1994, the notification rate of donovanosis has fallen ten-fold from 1.1 per 100,000 population to 0.1 per 100,000 population. Donovanosis only became a notifiable disease in New South Wales in September 1998. A total of 16 notifications were received in 1999, all from the Northern Territory, Queensland or Western Australia. The male to female ratio was 1:7, a ratio consistent with that in 1998. Fifty percent of the notifications were in the 15–29 year age range.

Gonococcal infection

In 1999, a total of 5,676 notifications of gonococcal infection were received nationally (Table 1). The notification rate of 29.9 per 100,000 population continues a steady increase in notifications since 1994 (Figure 21).[36] 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.[37] The number of notifications of gonococcal infection has increased over the past decade. The increase was due in part to an outbreak of gonorrhoea among men who have sex with men in Victoria and to increased testing as part of sexual health programs in Victoria and New South Wales.

There was a wide geographical variation in the rate of notification of gonococcal infection (Map 6). The highest rates of notification were from the Northern Territory (590 per 100,000 population) and from northern Statistical Divisions in Western Australia (Map 6). The male to female ratio of 2.2:1 was higher than in previous years. However, the notification rate for females aged 15 to 19 years was higher than for males in the same age group (Figure 22). The NCHECR reported rates of gonococcal disease in indigenous Australians, from NNDSS data in their annual report. Based on data from the Northern Territory, South Australia and Western Australia, which were the only jurisdictions to report indigenous status in more than half of notifications, the NCHECR estimated a rate of gonococcal infection among indigenous Australians at 1334 per 100,000 population compared with a rate of 17 per 100,000 population in non-indigenous Australians.

Figure 21. Trends in the national notification rate for gonococcal infections, Australia, 1991 to 1999

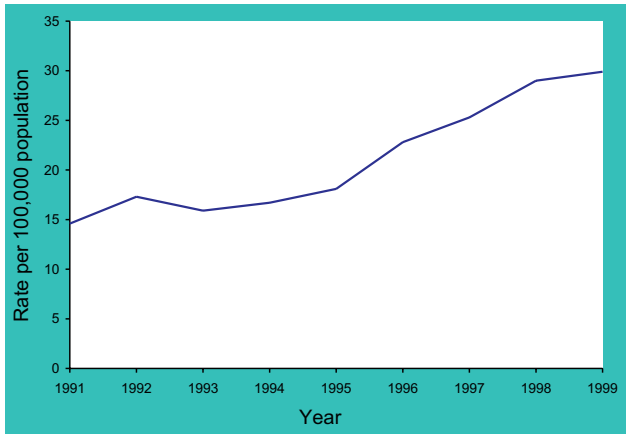
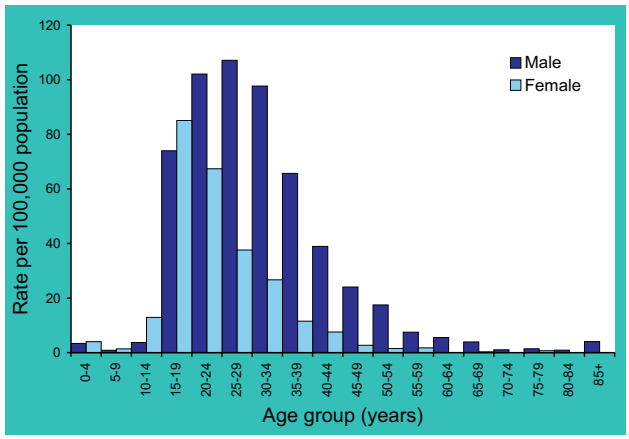


Figure 22. Notification rate for gonococcal infections, Australia, 1999, by age and sex



A survey of the antibiotic susceptibility of *Neisseria gonorrhoeae* by the AGSP on 3,740 isolates in 1999 has been published.[38] Antibiotic susceptibility patterns varied significantly between regions. Generally rates of resistance to penicillin and quinolone groups of antibiotics were higher in urban than in rural areas.

Syphilis

A total of 1,979 notifications of syphilis were received in 1999 (Table 1) with a rate of 10.4 per 100,000 population, representing a 16.9 per cent increase in the rate compared with 1998 (1,689 notifications and a rate of 9 per 100,000 population). This increase continues that seen in 1998 and reverses the trends seen since 1992. However, the rate remains lower than those seen in the 1980s. There was wide geographical variation in the notification rate (Table 2, Map 7). While most States and Territories show a slow decline in notification rates for syphilis, Queensland has shown an increase since 1997 (Figure 23). Subsequent information received from the Queensland Communicable Disease Unit suggests that the increase shown is due to poor case definition and the recording of follow-up syphilis

Map 6. Gonococcal infections notification rate by Statistical Division of residence

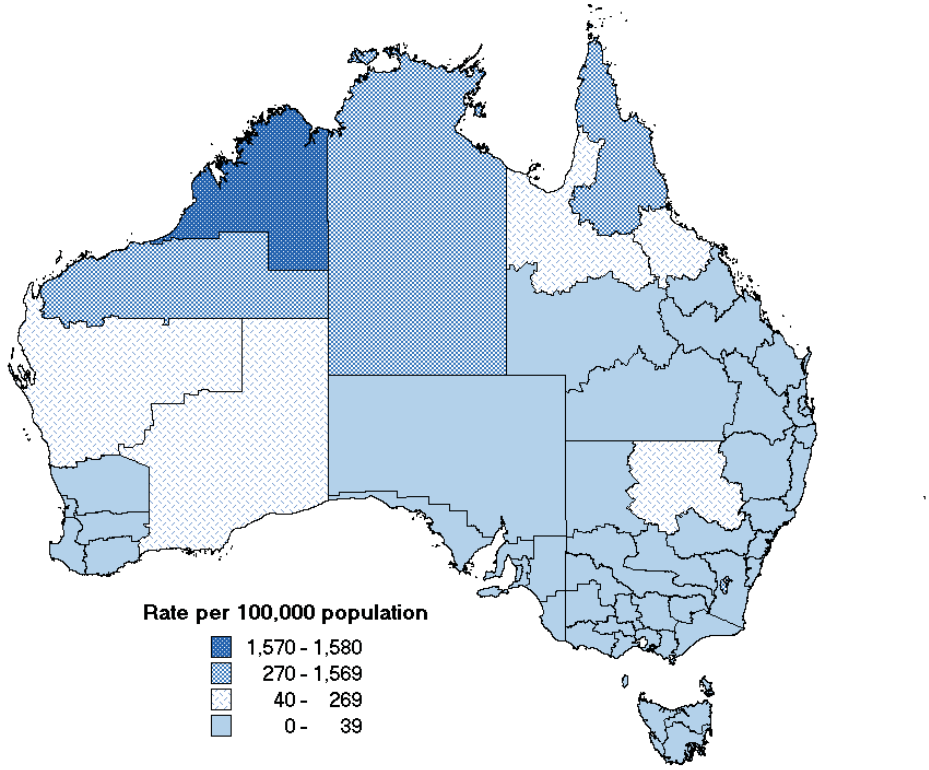


Figure 23. Notification rate for syphilis, New South Wales, Western Australia and Queensland, 1991 to 1999

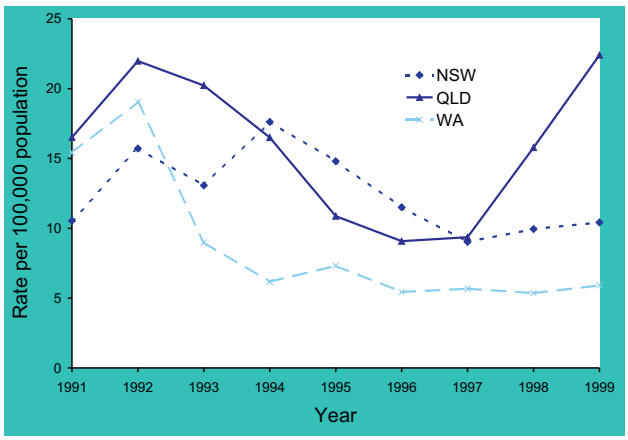
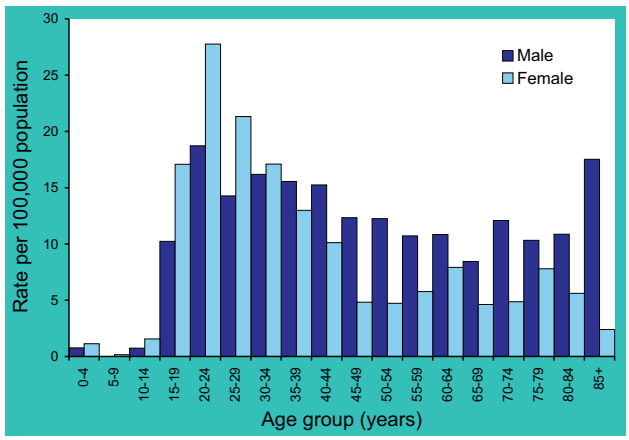


Figure 24. Notification rate for syphilis, Australia, 1999, by age and sex



serology results on the register. A review of Queensland syphilis registers was undertaken in July 2001. High notification rates continued to be reported from the Northern Territory and Western Australia but these are declining.

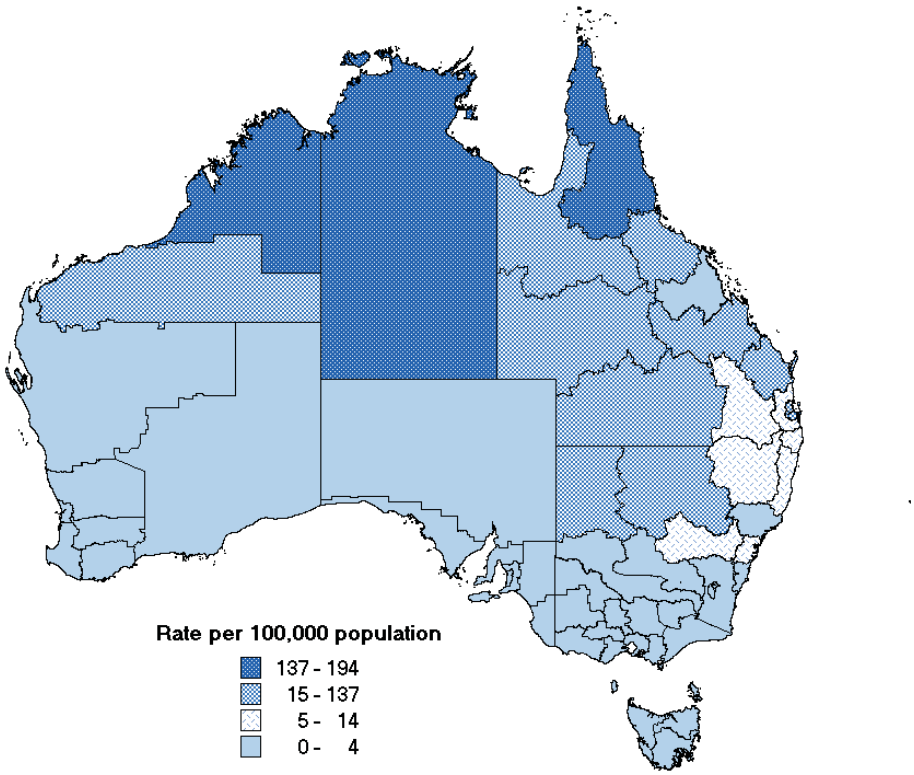
The male to female ratio for syphilis notifications was 1.1:1. Notification rates were higher among females than males in age groups younger than 34 years and higher in males than females in age groups older than 35 years (Figure 24). The NCHECR reported rates of syphilis in indigenous Australians based on NNDSS data in their annual report. Based on data from the Northern Territory, South Australia and Western Australia, which were the only jurisdictions to report indigenous status in more than half of notifications, the NCHECR estimated a rate of syphilis among indigenous Australians of 253 per 100,000 population compared with a rate of 3 per 100,000 population in non-indigenous Australians. There were 2 cases of congenital syphilis in 1999, both reported from New South Wales.

Vaccine preventable diseases

Introduction

This section summarises the national notification data for diseases targeted by the standard childhood vaccination schedule in 1999. The only change to the schedule in 1999 was the recommendation that DTPa (Diphtheria-Tetanus-acellular Pertussis) be used for all 5 infant doses. Previously this vaccine was only funded nationally for the 2 booster

Map 7. Syphilis notification rates by Statistical Division of residence



doses. Other diseases for which vaccines are licensed in Australia but which were not incorporated into the standard childhood schedule in 1999 (hepatitis A, hepatitis B, invasive pneumococcal disease, influenza, some serotypes of meningococcal disease, varicella and Q fever) are not described in this section. The 1999 influenza surveillance data, and investigations for polio and acute flaccid paralysis have been published in earlier editions of *CDI*.[39,40,41] Congenital rubella notifications for 1999 (5 notifications, one definite congenital rubella infection late in pregnancy) are described in the Seventh Annual Report of the Australian Paediatric Surveillance Unit.[42]

The third annual report of vaccination coverage estimates for children aged 12 months and the second annual report for children aged 24 months (using data extracted from the Australian Childhood Immunisation Register-ACIR) are also included in this section. A full description of the methodology used for calculating these estimates have been described previously.[43]

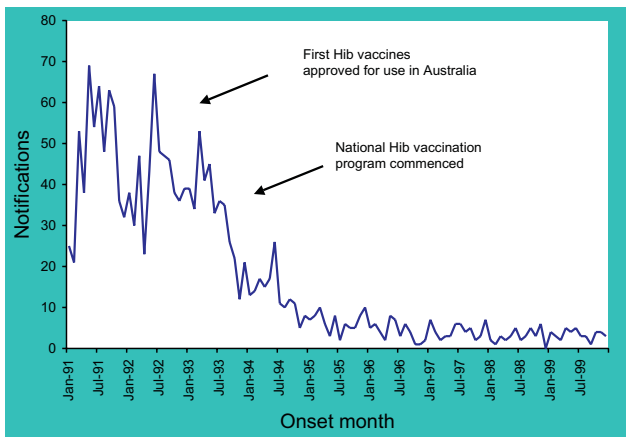
Diphtheria

There were no cases of diphtheria notified in 1999. Prior to this, the last known case occurred in 1992 and was notified in 1993.

Haemophilus influenzae type b

There were 40 notifications of *Haemophilus influenzae* type b (Hib) disease in 1999, five more than in 1998 but considerably less than in the pre-vaccine era (Figure 25). As in previous years, most notified cases (52.5%) were less than 5 years of age and the highest notification rates were in children less than 2 years of age. The notification rate for children 0 to 11 months of age was 3.6 per 100,000 population and for one-year-olds was 4.0 per 100,000 population. This compares with an overall notification rate of 0.2 per 100,000 population. There were slightly more females than males (male:female ratio 1:1.2). The Northern Territory had the highest notification rate (1.6 per 100,000 population, 3 cases) although most cases (25/40) were from New South Wales and Queensland.

Figure 25. Notifications of Hib, Australia, 1991 to 1999, by month of onset



Measles

There were 230 measles notifications in 1999, a rate of 1.2 per 100,000 population. This is the lowest annual rate for Australia since national surveillance began in 1991 (Figure 26).

Geographical distribution

All States and Territories except Victoria and the Northern Territory had their lowest ever annual notification rates of measles. In 1999, the Northern Territory reported 10 cases, nine more than in 1998, leading to a notification rate for 1999 which was at least double that of any other jurisdiction (Table 2). Although the Northern Territory had the highest rate, Victoria had by far the greatest proportion of cases (48%). Most of the Victorian cases (62/111, 56%) occurred during an outbreak in February/March (Figure 26). This outbreak had as its index case a returned traveller from Bali, and all except 10 of the 62 cases were young adults aged 18–30 years.[44] Two other smaller clusters of measles cases occurred in Victoria between August and October. The first was traced to a returned traveller arriving from London via Malaysia, while the second was associated with evacuees from East Timor.[35] Queensland experienced increased numbers of notifications in June and July while other jurisdictions recorded their lowest numbers for the year at that time.

Age and sex distribution

As in recent years, age-specific notification rates for measles were highest for 0–4 year-olds (6.3 per 100,000 population) especially those aged less than one year (15.4 per 100,000 population) and one year of age (7.6 per 100,000 population). However, rates for these age groups were considerably lower than in the past (Figure 27). Rates for 5–9 year-olds were also the lowest on record. In contrast, rates for older ages increased compared with those for the previous year — a reflection of the outbreak amongst young adults in Victoria in 1999. The most apparent rise was in the 20–24 year age group (rate: 4.0 per 100,000 population) which accounted for 20 per cent of the cases in 1999 (compared with less than 10 per cent in the previous 6 years). This age group had the second highest age-specific rate. As in past years there were similar numbers of male and female cases, with slightly more females than males in 1999 (male:female ratio 1:1.2).

Mumps

In 1999 there were 184 notifications of mumps, a rate of 1.0 per 100,000 population. This is similar to the number of notifications in the past 2 years. There were notifications from most age groups (Figure 28) with 50.8 per cent from people aged at least 15 years. As in previous years the highest notification rates were in the 5–9 year age group (2.7 per 100,000 population) and the 0–4 year age group (2.6 per 100,000 population, Figure 29). However rates in these age groups have been lower since 1995 while rates in people aged at least 15 years have been steadily increasing since 1993. This pattern was apparent even in New South Wales where only laboratory-confirmed cases are notifiable. In 1999, there was a secondary peak in notifications in the 25–29 year age group (1.4 per 100,000 population).

Overall, there were similar numbers of mumps notifications from males and females (male:female ratio 1.1:1), however, there were more notifications for males than females in the age groups most frequently reported. The rates were highest in the Australian Capital Territory and Western Australia (Table 1) while Victoria provided most of the notifications (39.7%) (Table 1). Notified cases occurred throughout the year, but peaked in May largely due to increased reports from Victoria at this time.

Figure 26. Notifications of measles, Australia, 1991 to 1999, by month of onset (and State/ Territory of residence)

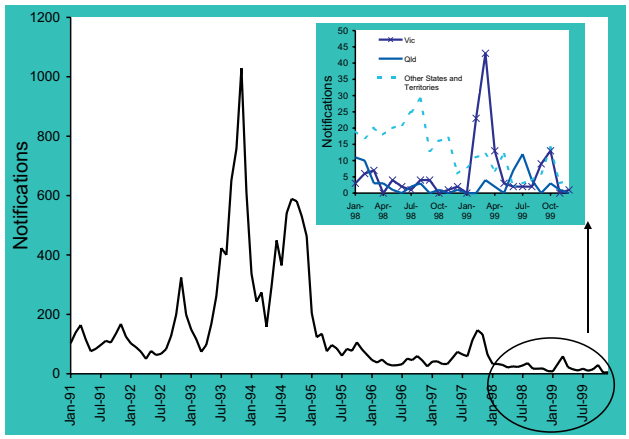


Figure 27. Notification rate for measles, Australia, 1996 to 1999, by age group and year of onset

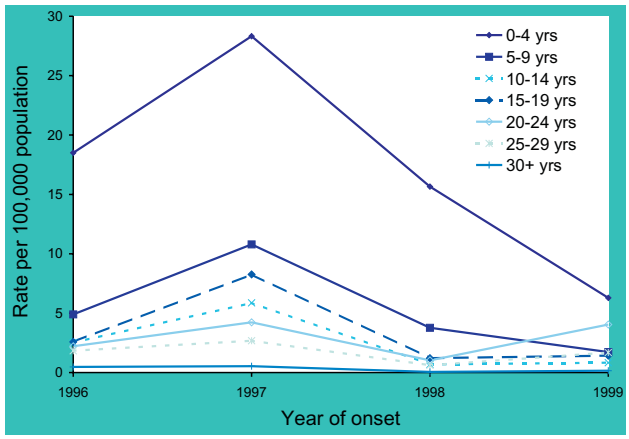


Figure 28. Mumps notification rate, Australia, 1999, by age and sex

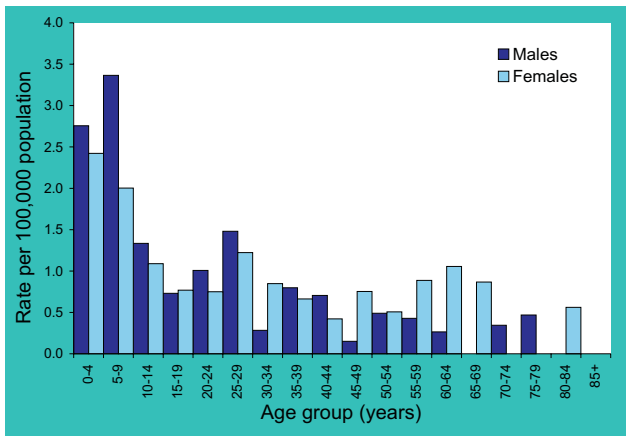


Figure 29. Notification rate for mumps, Australia, 1993 to 1999, by age group and year of onset

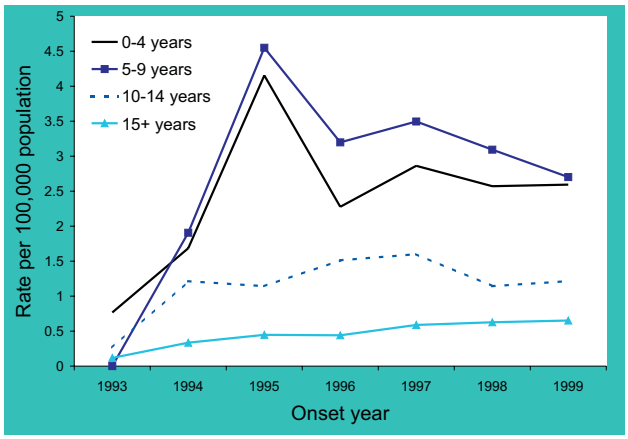
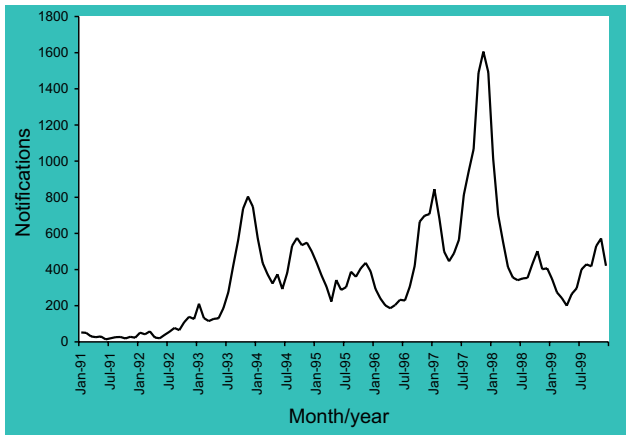


Figure 30. Notifications of pertussis, Australia, 1991 to 1999, by month of onset



Pertussis

There were 4,396 notified cases of pertussis in 1999, 1,430 fewer than in 1998. The annual notification rate of 23.2 per 100,000 population was the lowest recorded since 1992. The majority (63%) of the notifications occurred in the second half of the year when there were outbreaks in Tasmania, Western Australia, Queensland and Victoria. Notifications peaked in November 1999, when 572 cases were notified (Figure 30).

For the first time since the establishment of the current notification system, the 10–14 year age group had the highest notification rate of pertussis instead of infants aged less than one year (Figure 31). Children aged 1–4 years had the lowest rate, which is also in contrast to past years when rates were lowest in adults. The notification rate in 5–9 year-olds continued to decline, both overall and relative to all other age groups except those aged less than one year. In 1999, the rate for 5–9 year-olds was only marginally higher than the rate in adults and 1–4 year-olds.

Notification rates of pertussis varied considerably by geographic location (Map 8). At the State/Territory level, rates were highest in Tasmania (129.9 per 100,000 population) and lowest in the Northern Territory (only 2 cases notified, giving a rate of 1 per 100,000 population).

Map 8. Pertussis notification rates by Statistical Division of residence

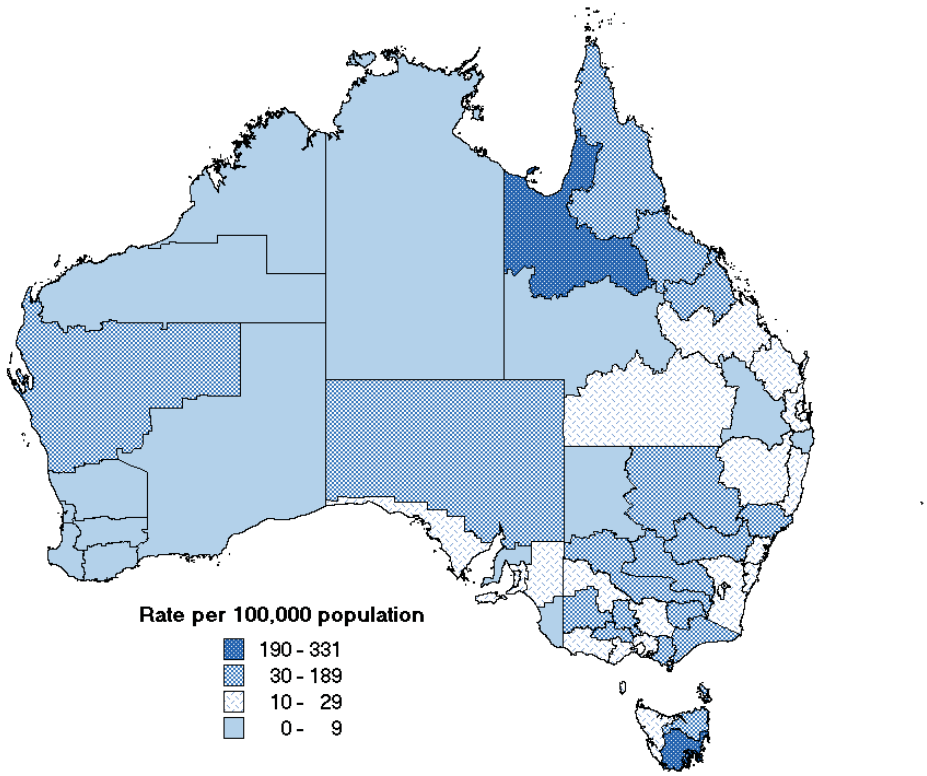
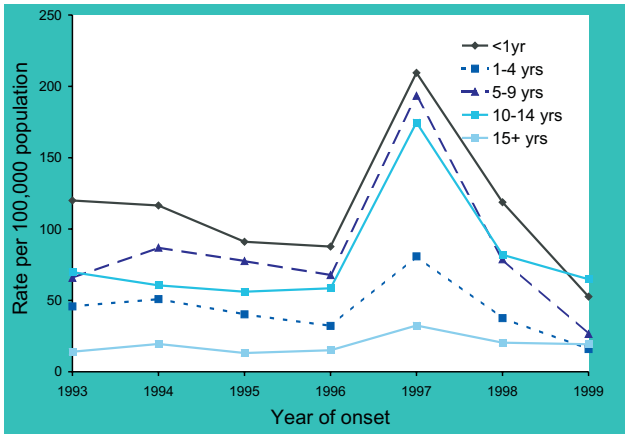


Figure 31. Notification rate for pertussis, Australia, 1993 to 1999, by age group and year of onset



Poliomyelitis

No cases of poliomyelitis were reported in 1999.

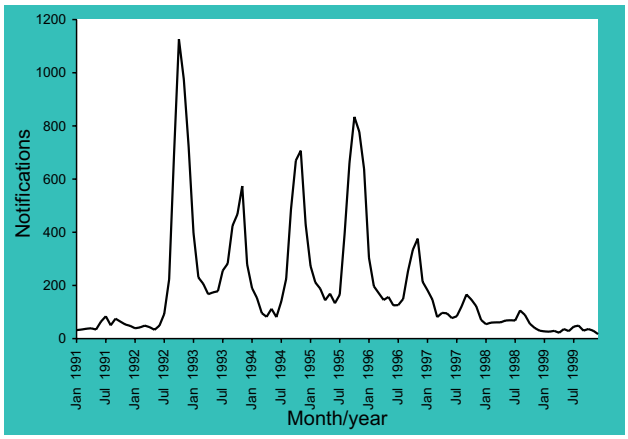
It is difficult to determine exactly when the last case of locally acquired poliomyelitis occurred in Australia. However, the last laboratory confirmed case was in 1967 and there were three clinically compatible cases notified in 1972 with no additional information currently available.[45] All cases notified since 1972 have been investigated further and this has led them to be re-classified as cases of vaccine-associated paralytic poliomyelitis (VAPP). The last known imported case of poliomyelitis was due to wild poliovirus type 1 in 1977.

Rubella

Secular and geographic distributions

Since 1995, annual numbers of rubella notifications have been declining (Figure 32). In 1999, there were 376 notifications, a notification rate of 2.0 per 100,000 population. This is half the number/rate of 1998, and the lowest on record both nationally and in each State and Territory. As in 1998, the highest number of notified cases occurred in August, which is slightly earlier than the expected seasonal increase in spring months. This peak was predominantly due to increased notifications from Victoria and Queensland who also contributed most (73.9%) of the notifications for the year. Despite most notifications coming from these 2 States, the highest notification rate was from the Australian Capital Territory (Table 2).

Figure 32. Notifications of rubella, Australia, 1991 to 1999, by month of onset

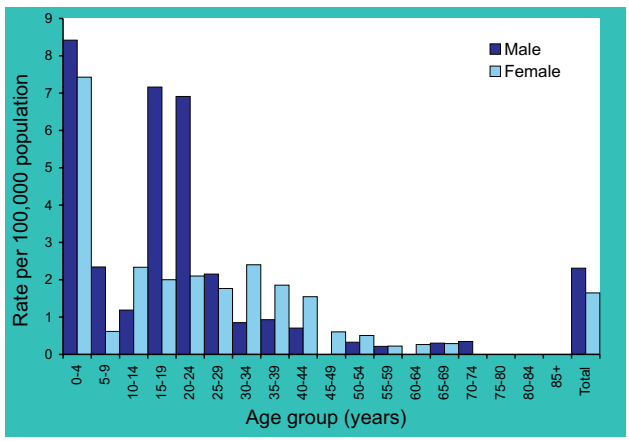


Age and sex distribution

In 1999, notification rates were highest for both males and females aged 0–4 years (rate 8.0 per 100,000 population, Figure 33), which is in contrast to the previous 6 years when males aged 15–24 years had the highest rate.[24] This altered distribution reflects a continued decline in rates for 15–24 year-old males, while rates for 0–4 year-olds remained constant between 1998 and 1999. Rates for young adult males have been decreasing in recent years due to the replacement of the schoolgirl rubella program with adolescent vaccination of both males and females between 1994 and 1998. Despite the lower rates for males aged 15–24 years, this group continued to contribute a significant proportion of the notifications (25.8%) and overall there were still more males than females notified with rubella (male:female ratio 1.4:1). Within the 0–4 year age group, the majority of cases (80.4%) were aged less than 2 years. Those aged less than one year had the highest rate (21.9 per 100,000 population) and were the only age group to show a marked increase in rates in 1999.

Notification rates in 1999 for women of childbearing age were the lowest on record; there were 82 cases, a rate of 1.9 per 100,000 population. The rate reductions were seen in each of the 5-year age groups between 15 and 44 years.

Figure 33. Notifications of rubella, Australia, 1999, by age and sex



Tetanus

In 1999 there were 2 cases of tetanus (one male and one female). Both cases were aged at least 60 years with one reported from Queensland and the other from New South Wales. This is the lowest number of cases reported for a year since the establishment of the current notification database in 1991.

Childhood vaccination coverage reports

Estimates of vaccination coverage both overall and for individual vaccines for children at 12 months of age continued to improve in 1999 (Table 7). This trend was also evident in each State and Territory.

Vaccination coverage at 2 years of age was first reported in 1998. Coverage estimates for vaccines recommended at 12 months and 18 months of age were higher in 1999 compared with the previous year, as were the estimates for being fully vaccinated at 2 years of age (Table 8). However, only MMR coverage nationally and DTP coverage for the Northern Territory showed any trend upwards during 1999. 'Fully vaccinated' coverage levels were reported to be lower than estimates for individual vaccines. One likely factor is poor identification of children on immunisation encounter forms, 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 vaccination with these vaccines at 2 years of age.

In 1999, notification rates for measles, rubella and tetanus were the lowest on record. Rates for Hib infection also remained low, while pertussis rates were the lowest since before the epidemic of 1997. Although overall pertussis notification rates for Australia were the lowest since 1992, many temporally and geographically distinct outbreaks occurred in 1999, with adolescents aged 10–14 years emerging as the age group most at risk. Improved vaccination coverage for the first 4 doses of DTP vaccine and the inclusion of a fifth dose at 4 years of age (in 1994) have been associated with a more rapid decline in rates for ages less than 10 years old compared with those for 10–14 year-olds. The implications of this trend, now that a pertussis vaccine is available for ages 9 years and over, will be considered by a working party of the Australian Technical Advisory Committee on Immunisation (ATAGI) in 2001.

The record low notification rates for measles and rubella highlight the success of the Measles Control Campaign (MCC),[46] and the current vaccination program. The MCC actively targeted pre-school and primary school-aged children and significantly improved their immunity to both measles and rubella.[47] As a result, in 1999 Australia recorded the lowest ever notification rates for measles and rubella for children in these age groups. Importantly, improved rubella control has also led to the lowest rate of rubella amongst women of childbearing age with only one definite congenital rubella infection reported in 1999.[42]

With record low rates of measles, most clinically compatible cases are now likely to be due to other viral infections.[48] Hence, it is imperative that the recommendations for measles surveillance proposed in the National Measles Surveillance Strategy are introduced; laboratory confirmation should be sought on all sporadic clinical notifications and at least 2 cases during an outbreak.[49]

Clusters of measles cases continued to occur in 1999, mostly amongst young adults. Serosurveys have shown that some young adults may have low levels of measles immunity,[50] as they are too old to have been part of the two-dose MMR vaccination program (introduced in 1994) but have grown up in a period when exposure to wild measles virus was declining. A vaccination initiative to improve MMR coverage in this age group is currently under way.[51] In addition to reducing the incidence of measles, it is hoped that the initiative will impact on the burden of mumps in adults, which has also been increasing in recent years.

Table 7. Percentage of Australian children born in 1998 vaccinated according to data available on the Australian Childhood Immunisation Register. Estimate at one year of age

Birth date	1 January to 31 March 1998	1 April to 30 June 1998	1 July to 30 September 1998	1 October to 31 December 1998
Vaccine group	% vaccinated	% vaccinated	% vaccinated	% vaccinated
DTP (3)	87.6	88.0	88.3	89.5
OPV (3)	87.3	87.9	88.3	89.5
Hib (2 or 3*)	87.4	87.7	87.9	88.9
Fully vaccinated	86.1	86.5	87.0	88.1

* Number of doses depends on the vaccine used

Table 8. Percentage of Australian children born in 1997 vaccinated according to data available on the Australian Childhood Immunisation Register. Estimate at 2 years of age

Birth date	1 January to 31 March 1997	1 April to 30 June 1997	1 July to 30 September 1997	1 October to 31 December 1997
Vaccine	% vaccinated	% vaccinated	% vaccinated	% vaccinated
DTP (4)	82.8	83.8	82.8	83.6
OPV (4)	87.7	89.8	82.8	83.7
Hib (3 or 4*)	82.8	83.8	82.4	83.4
MMR (1)	87.8	88.7	89.0	89.7
Fully vaccinated	73.5	75.9	74.9	76.7

* Number of doses depends on the vaccine used

Vaccination coverage estimates from the ACIR continued to increase in 1999. During 1999, the impact of the General Practice Immunisation Incentives (GPII) Program, which began in July 1998, would have been expected to improve both reporting of vaccinations to the ACIR and vaccination delivery in general practice. Given the role of general practitioners as the largest single group of immunisation providers nationally, the GPII Program together with linking maternity and child-care allowance payments to vaccination uptake are expected to lead to continued improvement in vaccination coverage at 12 and 24 months. Improvements in the accuracy and timeliness of ACIR data compared to earlier years[52] should enable their use in documenting the vaccination status of notified cases of vaccine preventable diseases. This, together with continued efforts to improve the quality of NNDSS surveillance data will be important components of enhanced surveillance in the future.

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 vector-borne diseases include several arboviruses and malaria. Although there are over 70 types of arboviruses in Australia, only a small number cause disease in humans (Mackenzie, 1998).

The NNDSS collects information on 2 alpha viruses, Barmah Forest (BF) and Ross River (RR) viruses, and one flavivirus, dengue, as well as malaria and arboviruses (not elsewhere classified). This category includes infections with the flaviviruses Murray Valley encephalitis (MVE) virus, Kunjin virus, Japanese encephalitis (JE) virus, Kokobera virus and Stratford virus, as well as the alphavirus Sindbis.

In the States and Territories, data on human cases are supplemented by sentinel chicken surveillance (seroconversions to MVE and Kunjin viruses), animal surveillance (seroconversions to JE in pigs), vector data, virus isolations and meteorological data.

Alphavirus infections

Barmah Forest virus infection

Barmah Forest virus was first isolated from mosquitoes trapped in the Barmah Forest in Victoria in 1974. The first association with disease in humans was described in 1988. Subsequently epidemics of BF virus disease were reported from the Northern Territory (1992), Western Australia (1992–1993) and New South Wales (1995).[53] BF virus infection is characterised by polyarthritis, myalgia, rash, fever, lethargy and malaise and may cause a chronic disease in some patients.[54] *Aedes* and *Culex* mosquitoes spread the disease and marsupials are a suspected host. The Southern Oscillation Index, which is closely related to temperature and rainfall patterns in eastern Australia also appears to be linked to levels of BF virus disease.[55]

In 1999, 639 notifications of BF virus infection were reported, representing a slight increase above the number of cases reported in 1998. The highest rates were reported in the Northern Territory (9.3/100,000 population) and Queensland (8.8/100,000 population). Rates were very low in southern states; no cases were reported from South Australia (Map 9). The male to female ratio was 1.5:1. The highest rates of infection were in those aged 45–49 years (Figure 34). Peak notifications were in the period January to April and followed previously observed seasonal trends (Figure 35). The first reports of BF virus disease were reported from Tasmania in 1999.

Map 9. Barmah Forest virus infection notification rate by Statistical Division of residence

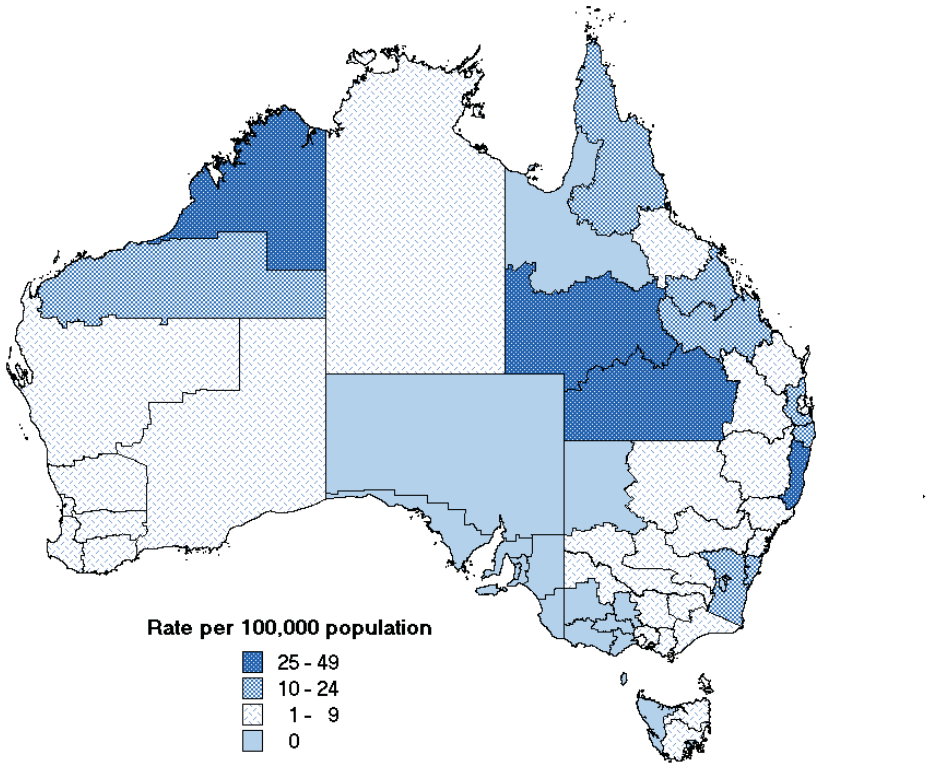


Figure 34. Notification rate for Barmah Forest virus infections, Australia, 1999, by age and sex

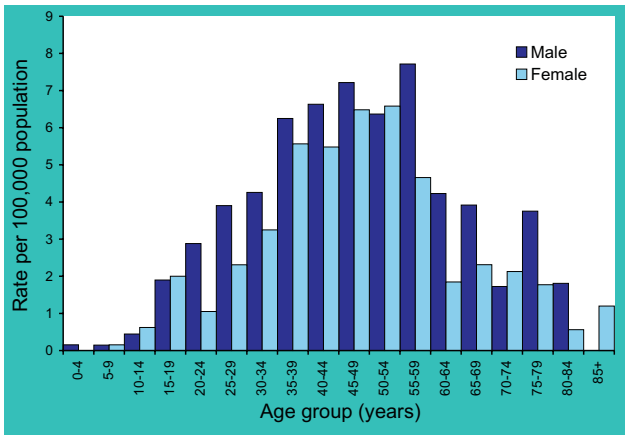
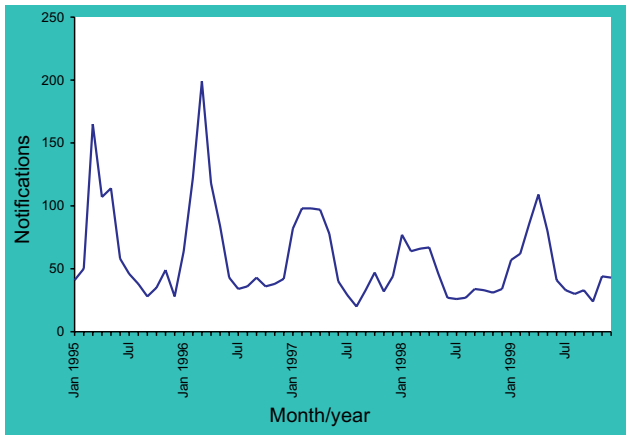


Figure 35. Notifications of Barmah Forest virus infections, Australia, 1995 to 1999, by month of onset

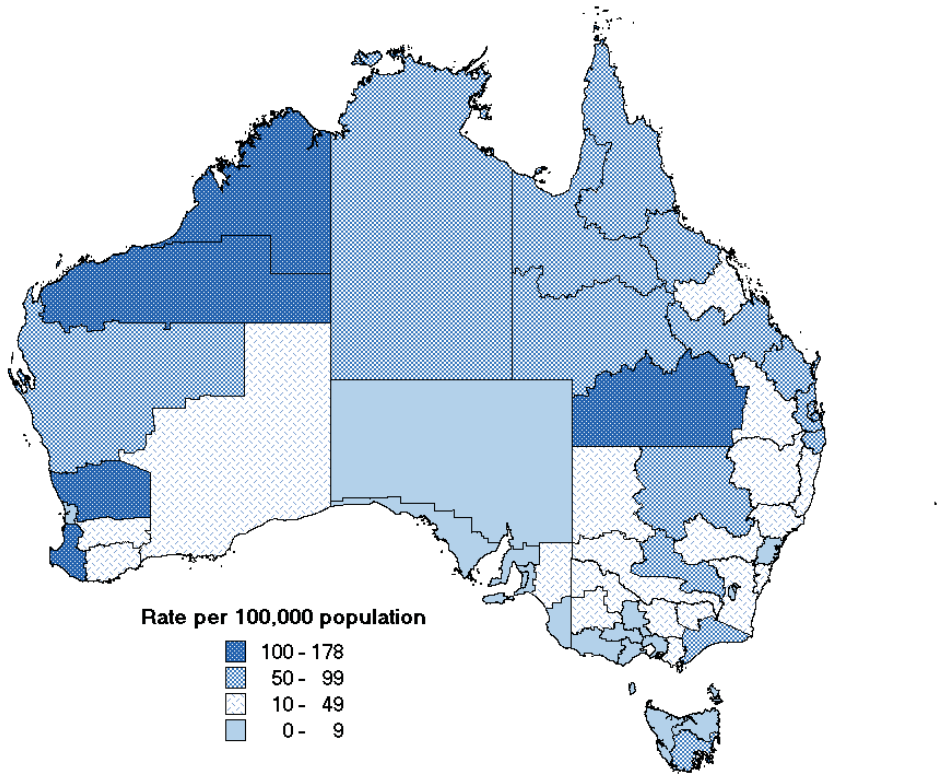


Ross River virus infection

Ross River virus is the most common arbovirus reported in Australia and the cause of the most arboviral disease. Sporadic cases occur throughout Australia. Epidemics, associated with heavy rainfall occur in temperate regions while transmission in tropical north-eastern Australia occurs throughout the year. Major outbreaks have been recorded in Western Australia (1991-1992 and 1995-1996), Victoria and South Australia (1993 and 1997), New South Wales (1996 and 1997) and Queensland (1996). Since 1991, more than half of all reports of RR virus have originated in Queensland. Recent evidence indicates that the virus may persist in desiccation-resistant eggs of the *Aedes* spp mosquito, which would explain the rapid onset of cases after heavy rain and flooding. Marsupials and horses have been implicated as hosts for the virus and flying foxes may be responsible for the wide spread dispersal of different genetic types of the virus.[53] Clinical RR virus disease occurs most commonly in adults, marked by arthralgia and myalgia (joint and muscle pain). True arthritis occurs in over 40 per cent of patients, while about 50 per cent of patients have a fever or rash.[57]

There were 4,416 notifications of RR virus infections in 1999, an increase from 17.0 to 23.3 cases per 100,000 population since 1998. Rates were highest in the Northern Territory (81.4/100,000 population), Queensland (65.7 per 100,000 population) and Western Australia (33.6/100,000 population) (Map 10). The male to female ratio was 1.1:1.

Map 10. Ross River virus infection notification rate by Statistical Division of residence



The highest rates were in the 35–39 year age group (Figure 36). Peak reporting was in the first and second quarters of the year (Figure 37).

Flavivirus infections

Dengue fever

Historical trends of dengue in Australia

Despite periodic epidemics of dengue fever since the 1980s, dengue virus is not endemic in Australia. The spread of dengue in Australia is limited to the range of the mosquito vector *Aedes aegypti*, which is limited to the Torres Strait Islands and north Queensland.[53]

Outbreaks of dengue in Australia have included a few cases of dengue type 1 in Cairns and the Torres Strait. An outbreak of more than 900 confirmed cases in Townsville and Charters Towers in 1992–1993 was caused by dengue type 2. In 1996–1997 another outbreak of dengue type 2 occurred in the Torres Strait. In 1997–1998 165 cases of dengue type 3 and 12 of dengue type 2 were reported from Cairns.[53]

Dengue haemorrhagic fever (DHF), first described in Australia in 1897[56] is a major complication arising from secondary infection with heterologous serotypes of the dengue virus which enhances viral uptake and replication. This complication, which primarily affects children in endemic countries, has a high fatality rate and is common in countries such as Thailand. Two cases of DHF have been reported in Australia, one in 1992 and another in 1997.[53] There is a concern that introduction of other dengue serotypes into northern Australia could increase the risk of dengue haemorrhagic fever.

Dengue occurrence in 1999

There were 131 notifications of dengue in 1999, a rate of 0.7 per 100,000 population. This was a significant reduction on the 1998 rate of 3.1 per 100,000 population. The highest rates were found in the Northern Territory (16.1 per 100,000 population) and Queensland (1.8 per 100,000 population). The male to female ratio was 1.2:1. The highest rate among men was in the 45–49 year age group and in the 25–29 year group for women. Notifications for the year peaked in the summer (first and fourth quarters of the year, Figure 38). While all cases of dengue reported from the Northern Territory were infected overseas, an outbreak of dengue in north Queensland in 1999 accounted for 45 cases or 73 per cent of the State's total.

Arbovirus infections not elsewhere classified (NEC)

In 1999 there were 62 cases of infections with arboviruses 'not elsewhere classified' reported (a rate of 0.3 per 100,000 population). This rate was similar to that found in 1998 (0.5 per 100,000 population). The cases reported in 1999 were predominantly from Victoria and the Northern Territory. The male to female ratio was 0.9:1. The highest rate for women was in the 50–54 year age group and for men in the 45–49 year age group. While not specifically identified in NNDSS, reports from individual States and Territories indicate that there were no reports of infection with Murray Valley encephalitis or Japanese encephalitis from any jurisdiction in 1999.

Figure 36. Notification rate for Ross River virus infections, Australia, 1999, by age and sex

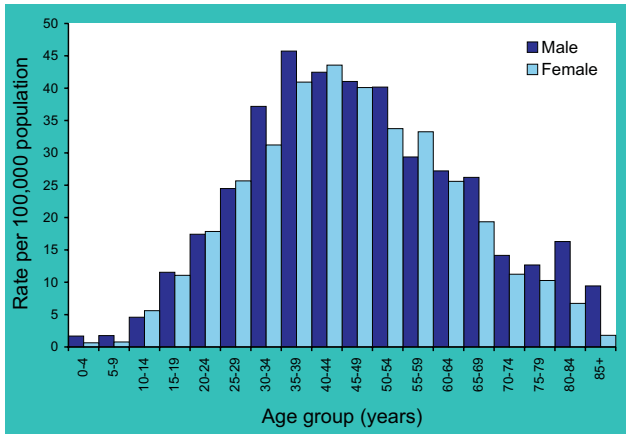


Figure 37. Notifications of Ross River virus infections, Australia, 1991 to 1999, by month of onset

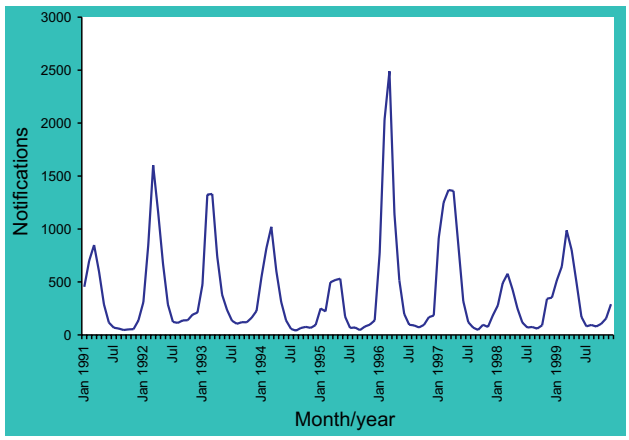
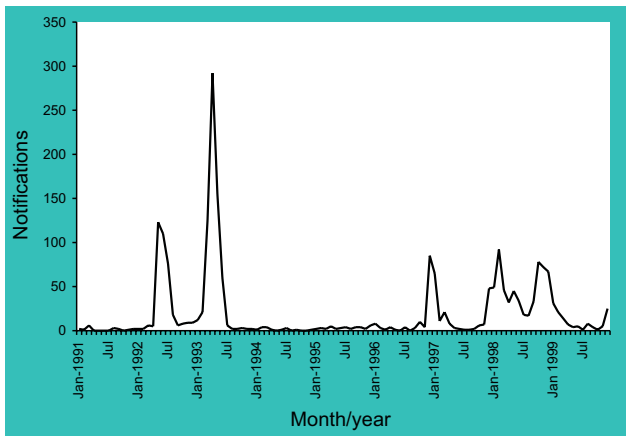


Figure 38. Notifications of dengue fever, Australia, 1991 to 1999, by month of onset



A report of the finding of the mosquito species *Culex gelidus* from the Northern Territory following the first detection of this species in Brisbane in 1999 has potentially important implications.[58] The report noted prolific breeding of this

species in wastewater around dairies, sewerage treatment facilities, abattoirs and piggeries. The mosquito is an important vector and amplification host for the virus causing Japanese encephalitis. Larval surveys are required to delineate the range of this mosquito before control programs are implemented.

Malaria

Australia has been free of endemic malaria since 1983. Sporadic cases are reported primarily among returning travellers in malaria endemic countries such as Indonesia and Papua New Guinea. The three requirements for malaria transmission exist in Australia: infected humans, mosquito vectors and suitable climate. Surveillance of malaria and the rapid entomological response to prevent infection of local *Anopheles* mosquitoes are important public health activities in northern Australia.[59]

In 1999 there were 724 cases of malaria reported to the NNDSS. Overall, the national rates remained stable compared with those reported in 1998 (3.8 per 100,000 population compared with 3.6 per 100,000 population). Among the jurisdictions, the highest rates were reported from the Northern Territory (34.7 per 100,000 population; an increase from 14.2 per 100,000 population in 1998), Queensland (8.7 per 100,000 population) and the Australian Capital Territory (7.0 per 100,000 population). The male to female ratio was 2.6:1. The peak rates were in the 25–29 year age group for men and in the 15–19 age group for women.

Malarial parasites were identified and reported in 588 (81%) of the cases. *Plasmodium vivax* was the most common isolate (358 cases, 61% of the total), followed by *P. falciparum* (193 cases, 26% of cases).

Information on overseas travel in cases of malaria was available from Victoria and the Northern Territory only. In Victoria, 72 per cent of the 81 cases reported had a history of recent travel in Papua New Guinea and/or Indonesia.[35] All Northern Territory malaria notifications were in people who had travelled to malaria endemic countries. In the Northern Territory cases the history of anti-malarial prophylaxis was also recorded. Among the 63 cases reported in 1999, 44 (70%) had not taken any prophylaxis, 4 (6%) had taken some and 15 (24%) had taken full courses of anti-malarial medications (data summarised from reports in *NT Communicable Diseases Bulletin* Vol 6).

Other vectorborne disease surveillance

AQIS exotic mosquito interceptions in 1999

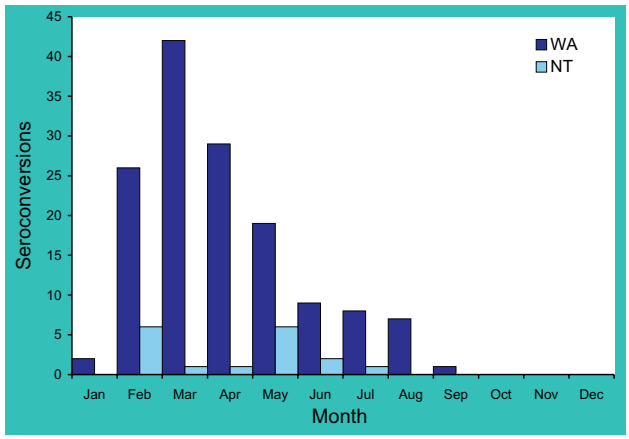
In 1999, the Australian Quarantine Inspection Service (AQIS) reported 30 interceptions of mosquitoes on various imported goods. Seventeen species of mosquitoes were identified, of which 11 species were considered unknown to Australia. These were 8 interceptions of *Culex* spp, one of *Aedes* spp, one of *Coquillettidia* spp and one of *Toxorhynchites* spp. These figures indicate a constant threat of importation of exotic mosquito species, some of which may be vectors for disease.

Sentinel Chicken Surveillance Programme

Sentinel chicken flocks are used to monitor flavivirus activity in Australia. The main viruses of concern are Murray Valley encephalitis (MVE) and Kunjin. In 1999, 26 flocks were maintained in the north of Western Australia, seven in the Northern Territory, 9 in New South Wales and 10 in Victoria. Flocks in Western Australia and the Northern Territory were tested year round and those in New South Wales and Victoria were tested only from November to March during the main risk season. Maps identifying the location of these flocks were published in *Commun Dis Intell* 1999;23:55 and bimonthly reports on seroconversions in sentinel chickens were published in *CDI* throughout 1999.

A summary of seroconversion to MVE virus in Western Australia and the Northern Territory sentinel chicken flocks in 1999 is shown in Figure 39. The peak months of seroconversion are between February and August. There were only small numbers of seroconversions to Kunjin virus in the same flocks. There were no seroconversions to any flavivirus among sentinel chicken flocks in New South Wales or Victoria in 1999.

Figure 39. Seroconversions to Murray Valley encephalitis virus in sentinel chickens, Western Australia and the Northern Territory, 1999



Zoonoses

Zoonoses are diseases of humans acquired from an animal source. Although there are many recognised zoonoses in Australia, only 5 zoonotic infections are reported at the national level. All notifiable zoonoses have epidemic potential and are associated with certain occupations. Zoonotic infection may present with non-specific clinical symptoms and a definitive diagnosis depends on appropriate laboratory investigations.

Brucellosis, leptospirosis and Q fever infections were nationally notifiable in 1999. In New South Wales neither hydatid infection nor ornithosis were notifiable diseases and ornithosis was not notifiable in Queensland. Zoonotic diseases in Australia are not found in all jurisdictions; the Northern Territory has never reported a case of Q fever and has only reported a single case of hydatid (in 1994).

A total of 1,001 notifiable zoonotic infection cases were received by NNDSS in 1999, which accounted for 1.1 per cent of all the notifications. Most notifiable zoonotic infections were reported from Queensland (569, 57%) and New South Wales (222, 22%). Queensland had the highest notification rates for Q fever (8.5 per 100,000 population), leptospirosis (6.2 per 100,000 population) and brucellosis

(1.4 per 100,000 population), and Victoria had for the highest notification rates for ornithosis (1.4 per 100,000 population) and hydatid infection (0.4 per 100,000 population).

Brucellosis

Brucella are small aerobic gram-negative bacilli. Human brucellosis is caused by any of 4 species: *Brucella melitensis* (primarily from goats, sheep, and camels), *Brucella abortus* (from cattle), *Brucella suis* (from pigs) and *Brucella canis* (from dogs).

Brucellosis is transmitted from *Brucella*-infected animals to humans by direct contact with blood, tissues and urine of infected animals. Infection is through breaks in the skin or through consumption of contaminated animal products, such as milk and meat. Airborne transmission from animal to humans is also possible. Zoonotic organisms may be transmitted from human to human via blood transfusion and bone marrow transplantation, through the placenta, during breast-feeding, and during sexual activity.

Brucellosis is still a significant public health problem in some geographical areas in Australia. There were 52 notifications of brucellosis in 1999, giving a notification rate of 0.3 per 100,000 population which was an increase from 1998 (43 cases; 0.2 per 100,000 population). The national notification rate has been stable since 1991.

Most notifications (33, 63.4%) occurred between August and November. The majority of the brucellosis cases were males (48/52, 92.3%), with the overall male to female ratio of 12:1 reflecting occupational risk. The age-specific rates peaked in the 25–29 years male age group at 1.3 per 100,000 population.

Queensland reported 94.2 per cent (49/52) of all cases, with the other 3 cases from Victoria. The highest rates of disease were reported in the Central West (97.9 per 100,000 population) and the South West (31.1 per 100,000 population) Statistical Divisions of Queensland. A study has shown a high frequency of *B. suis* infections in Queensland, especially among men who hunt and slaughter feral pigs.[60]

Hydatid disease

Hydatid disease is caused by the larval stage of the tapeworm *Echinococcus granulosus*. Hydatid cysts are prevalent in areas where livestock is raised in association with dogs. In 1999, hydatid infection was notifiable for all States and Territories in Australia, except New South Wales.

There were a total of 29 hydatid disease notifications in 1999, the lowest since 1991; giving an annual notification rate of 0.2 per 100,000 population (Table 2). Notifications of hydatid infection were from Victoria (17 cases, 59% of the national total), Queensland (5 cases), Western Australia (3 cases), South Australia (3 cases) and Tasmania (1 case). The highest rates of disease were reported in the South West Statistical Division of Queensland (3./100,000 population), followed by the Midland Statistical Division of Western Australia (1.9 per 100,000 population).

Of the 29 notifications, 13 were in men, 14 were in women and two were in persons of unknown gender. The male to female ratio of disease was 0.9:1. Hydatid infections commonly occurred in the 45–64 year age range. The highest age-specific rates were in women aged 60–64 years (1.1 per 100,000 population) and in men aged 45–49 years (0.6 per 100,000 population).

Hydatid disease is distributed widely in rural Australia. In urban dwellers it is more common among the overseas born who would probably have acquired the infection overseas.[61] Disease 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, infected by feeding off the offal or other remains of these animals, can carry the disease into rural communities, or to the periphery of urban settlements.[62] Because the symptoms of hydatid disease usually occur only in the advanced stages of disease, and the infection may remain quiescent for many years, hydatid disease is thought to be under-reported in Australia.[61]

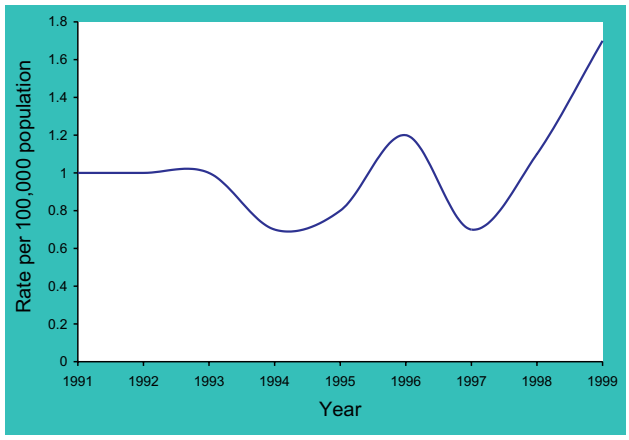
Leptospirosis

Leptospirosis is a zoonotic disease transmitted by wild and domestic animals caused by spirochetes of the *Leptospira* genus. The source of infection is soil or water contaminated with the urine of domestic or wild animals. Farmers, veterinarians and abattoir workers are at an increased risk of infection. Infections may be asymptomatic and the clinical manifestations of the disease are highly variable including fever, myalgia, meningitis, rash, haemolytic anaemia, and jaundice.[29] Leptospirosis occurs in all parts of Australia with the highest incidence in Queensland, where a laboratory based notification system has been in place since 1988.

There were 318 notifications of leptospirosis in Australia in 1999, a 68 per cent increase in notifications compared with 1998. The notification rate rose from 1.1 per 100,000 population in 1998 to 1.7 per 100,000 population in 1999 (Figure 40). The increased notification was mainly caused by an outbreak in January in Queensland, which consisted of 184 cases, half of whom required hospitalisation. This followed a period of heavy rainfall and flooding, and an increase in rodent population. At least 14 different serovars causing disease were isolated in this outbreak.[63]

In 1999, Queensland reported 69 per cent of all notifications (218 cases), 57 (18%) cases were from New South Wales and 29 (9%) cases were from Victoria. The highest rates of disease were localised to the Far North (19.2 per 100,000

Figure 40. Trends in national notification rate for leptospirosis, Australia, 1991 to 1999



population) and the South West (11.6 per 100,000 population) of Queensland, and the Western District (10.1 per 100,000 population) of Victoria.

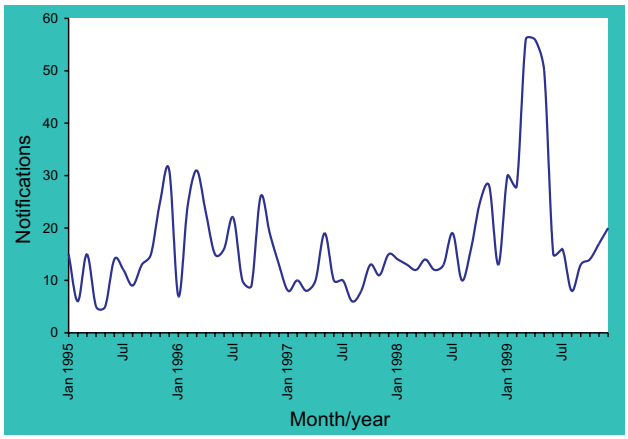
The seasonal trend showed notifications were higher in summer months and reached a peak in March and April (Figure 41). Ninety-one per cent of all notifications were male with a male to female ratio of 10:1. The most frequent age for disease onset was from 20–59 years.

Ornithosis

Ornithosis, also known as psittacosis, is an acute generalised infection with *Chlamydia psittaci* and is commonly associated with exposure to pet birds, particularly parrots.

Eighty-four notifications of ornithosis were reported in 1999, an increase compared with 1998 (64 cases). The national notification rate was 0.9 per 100,000 population. In 1999 ornithosis was not a notifiable diseases in New South Wales or Queensland. Of the 84 cases reported in this year, 66 (79%) were from Victoria, 49 (58.3%) were male and 35 (41.7%) female, and the male to female ratio of disease was 1.4:1. The highest age-specific rates were reported in the 45–49 years age group for women (1.2 per 100,000 population) and in the 50–54 years age group for men (1.8 per 100,000 population).

Figure 41. Notifications of leptospirosis, Australia, 1991 to 1999, by month of onset



Reported rates of ornithosis are highest in the older age groups, which may reflect increased investigation, and laboratory testing for atypical community acquired pneumonia in this group. Previously reported outbreaks have been associated with aviaries, pet shops or poultry processing plants, although an outbreak investigation in rural Victoria in 1995 showed no association with direct bird handling but rather lawn mowing and gardening in areas with high numbers of native birds.[64] Shedding of *C. psittaci* into the environment by sick birds and subsequent inhalation of aerosolised dust and bird excreta was postulated as the mechanism of human infection.

Q fever

Q fever is a rickettsial illness caused by *Coxiella burnetii*. Livestock, such as sheep, cattle, goats, cats, dogs, some wild animals (bandicoots and many species of feral rodents), birds and ticks are natural reservoirs. Outbreaks have occurred in occupational groups working with animals, including stockyard workers, meat packing and rendering workers, abattoir and dairy workers, and medical and veterinary research facility workers.

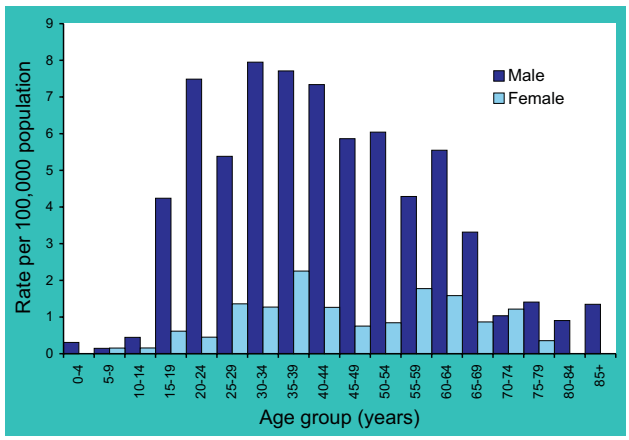
Transmission is usually through airborne dissemination of the organism in dust particles but also via direct contact with contaminated material, ingestion of contaminated placentas or ingestion of milk. Ticks may also be involved in transmission of the organism. Cases have occurred in individuals with no direct contact with contaminated animals and their bodily fluids, but such cases have resided downwind from areas that are contaminated.

In 1999, 518 notifications of Q fever were reported with an annual notification rate of 2.7 per 100,000 population, a slight decrease from 3.0 per 100,000 population reported in 1998. Queensland and New South Wales each accounted for 57 per cent and 32 per cent of all the cases for the year, respectively. The highest notification rates for Statistical Divisions were localised to the South West (155.6 per 100,000 population) and the Central West (130.6 per 100,000 population) of Queensland (Map 11).

The highest age-specific notification rates were in the 35–39 year age groups for males (9.5 per 100,000 population) and in the 40–44 year age groups for women (2.8 per 100,000 population, Figure 42). Males accounted for 79 per cent of all the notifications, and male to female ratio was 3.8:1.

Q fever is still the most important of all zoonotic diseases in terms of reported numbers of cases in Australia. The true prevalence of the disease is likely to be under-estimated. A recent study found that 27 per cent of Australian abattoir staff tested positive for Q fever infection.[65] An effective vaccine is available in Australia for people who are at high-risk.[66]

Figure 42. Notifications of Q fever, Australia, 1999, by age and sex

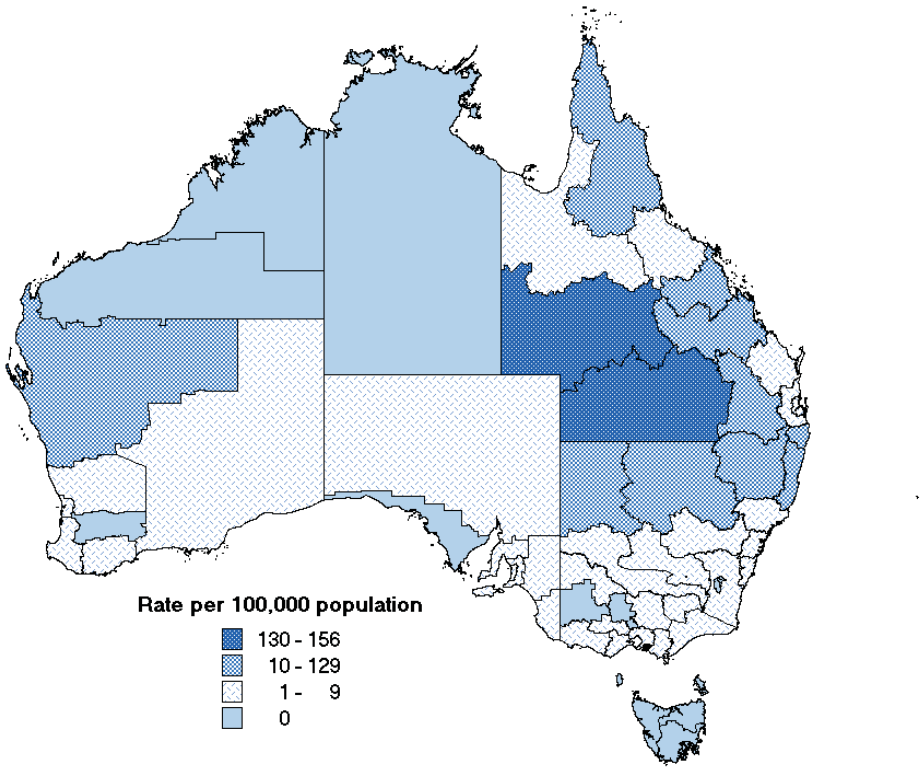


Other bacterial infections

Legionellosis

Legionellosis is an acute bacterial infection with two clinical manifestations: Legionnaire's disease associated with pneumonia and Pontiac fever, which is generally self-limiting. Legionellosis describes a group of diseases caused

Map 11. Q fever notifications by Statistical Division of residence



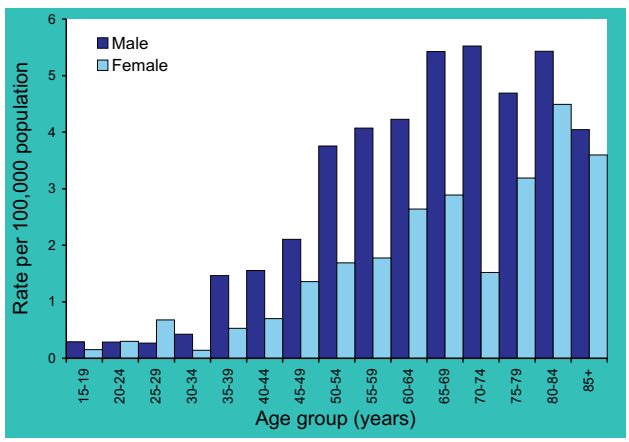
by various species of *Legionella* as well as the pneumonia of classical Legionnaire's disease caused by *Legionella pneumophila*.

L. pneumophila occurs in water sources with a wide range of temperatures, pH and dissolved oxygen contents. Despite chlorination, the bacteria proliferate in cooling towers and water systems depending on favourable temperatures, sediment accumulation, and commensal microflora. Inhalation of aerosols generated by air-conditioning, nebulisers, humidifiers and showerheads is the major mode of transmission. Age, chronic lung disease, immunosuppression and cigarette smoking have been identified as important risk factors for legionellosis.[67] *L. longbeachae* has been recognised for some years as a frequent cause of *Legionella* pneumonia in Australia.[68,69] *L. longbeachae* has been isolated from a large proportion of potting mixtures in Australia, suggesting this route of exposure may be important in the epidemiology of sporadic legionellosis in Australia. [70]

Legionellosis is notifiable in all States and Territories of Australia, and includes notifications of infections caused by all *Legionella* species. There were 249 notifications of legionellosis in 1999 resulting in a notification rate of 1.3 per 100,000 population compared with 1.4/100,000 population in 1998. The rates were highest in South Australia (4.2 per 100,000 population), Western Australia (2.3 per 100,000 population) and the Northern Territory (2.1 per 100,000 population, Table 2). Men accounted for 63 per cent of reported cases giving a male to female ratio of 1.7:1. Cases were recorded in age groups from 15 to 85 with a peak in the 50–54 year age group. Persons aged more than 60 years made up 47 per cent of all cases (Figure 43).

Most cases of legionellosis were sporadic, though Victoria reported 2 small clusters, one associated with a private spa and the other with contaminated cooling towers[35] (Kirk, 2000). Increased reporting of legionellosis in recent years may reflect the easier diagnosis using the urinary antigen test.[71] Data on the isolated species were available for 132 of the cases. Of these 113 (86%) were identified as *L. longbeachae* and 19 (14%) as *L. pneumophila. L. Pneumophila* isolates were only identified in Queensland (14) and South Australia (5). New South Wales only reported *L. Longbeachae*. *Legionella* species information was not available from other jurisdictions.

Figure 43. Legionellosis notification rate, Australia, 1999, by age and sex



Leprosy

Leprosy is a chronic infection of skin and peripheral nerves with the bacteria *Mycobacterium leprae*. Leprosy is a rare disease in Australia, with the majority of cases occurring among migrants to Australia from leprosy-endemic countries.

There were 6 cases of leprosy notified nationally in 1999 compared with only 3 cases in 1998. Three of the 1999 cases occurred in Western Australia with one each in New South Wales, Queensland and Victoria. Of the 6 cases, three were male and three were female. The age range was 15–39 years.

Invasive meningococcal disease

Neisseria meningitidis is the cause of outbreaks of meningitis worldwide accounting for at least 500,000 cases and 50,000 deaths per annum. A pandemic in the sub-Saharan African 'meningitis belt', which began in 1996, has resulted in at least 300,000 cases to date and many thousands of deaths. An on-going epidemic of meningococcal disease in New Zealand since 1990 peaked at 13.3 cases per 100,000 population in 1997 (Martin, 2001, Communicable Disease Control Conference, April 2001, Abstract 2).

In Australia, there were 568 notifications of meningococcal disease nationally in 1999; a rate of 3.0 per 100,000 population compared with 2.4 per 100,000 population in 1998. Of the total, 365 (64%) cases were culture-confirmed. Of these 212 (58%) were serogroup B, 143 (39%) were serogroup C, 5 (1.5%) were serogroup W135 and 5 (1.5%) were serogroup Y. A pattern of seasonal variation in meningococcal infection notifications continued, with the greatest number of cases occurring in late winter or early spring (Figure 44). The distribution of notifications by age shows the highest peak in children aged 0–4 years and an additional peak in the 15–24 year age group. Overall the male to female ratio was 1.3:1 (Figure 45).

The Australian Meningococcal Surveillance Programme report for 1999[72] reported the phenotype and antibiotic susceptibility of *Neisseria meningitidis* from invasive cases of meningococcal disease. Of the 368 isolates, 90 per cent of the isolates were either serogroup B or C. Serogroup B predominated in all States and Territories. Serogroup C isolates increased in Victoria and phenotype C-2a:P1.2 was the most frequently isolated phenotype. This phenotype was isolated infrequently before 1999. Another new Australian serogroup C phenotype C:2aP1.4(7) was isolated in New South Wales and Victoria. About three-quarters of all isolates showed decreased susceptibility to penicillin and three had reduced susceptibility to rifampicin. Case fatality rates were 9.4 per cent of culture-positive cases, with a higher mortality noted among cases with serogroup C disease.

Enhanced surveillance for invasive meningococcal disease commenced in Queensland in 1999.[73] The Queensland model includes probable cases for the first time, defined as a petechial or purpuric rash, isolation of *N. meningitidis* from a throat swab or an epidemiological link to a confirmed case. Enhanced surveillance has demonstrated a need to promote the use of parenteral antibiotics by GPs on suspicion of meningococcal disease and a need to encourage more timely reporting of cases to health authorities.

Figure 44. Notifications of invasive meningococcal disease, Australia, 1991 to 1999, by month of onset

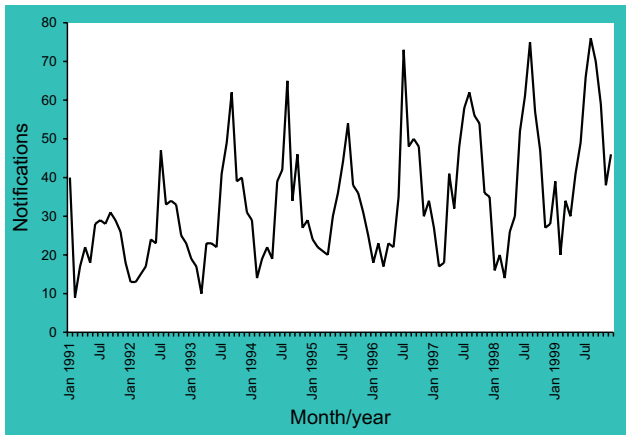
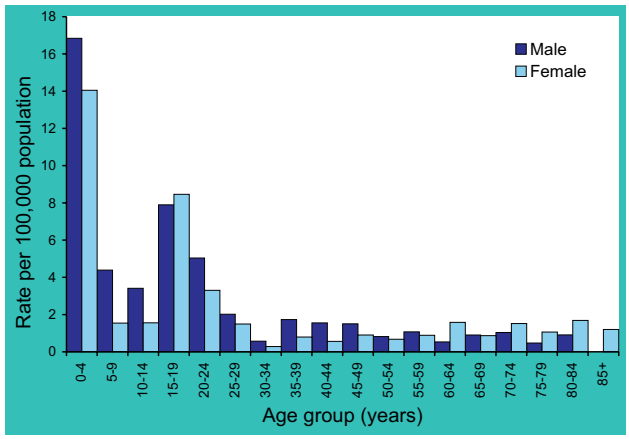


Figure 45. Notification rate for invasive meningococcal disease, Australia, 1999, by age and sex



Victoria reported a marked increase in invasive meningococcal disease in 1999, with a doubling in the notification rate in the 15–19 year age group. There was a large increase in the proportion of cases caused by serogroup C from 13 per cent in 1998 to 31 per cent in 1999.[35] Serogroup B remained the dominant serogroup in children aged 0–4 years in all jurisdictions.

Tuberculosis

There are three national surveillance systems through which tuberculosis (TB) notifications are handled. The NNDSS provides the timeliest information on national TB notifications, but consists mainly of demographic information. The National Mycobacterial Surveillance System (NMSS), a surveillance system dedicated to tuberculosis and atypical mycobacterial infections, produces an annual report on TB notifications[74] with detailed information on risk factors, diagnostic methods, drug therapy and relapse status. 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.[75]

In 1999, 1,153 TB notifications were reported nationally and the reporting rate was 6.1 per 100,000 population. This is consistent with rates since 1994. The highest rate was in the Northern Territory (51.8/100,000); this was inflated by a large number of cases diagnosed in East Timorese refugees in Darwin in September 1999 (see 1999 TB report following). There was little difference in notification rates between males and females with males accounting for just over 50 per cent of notifications. Some increases in jurisdictions such as Victoria were due to cases detected among refugees in Australian 'Safe Havens' program during the Kosovo and East Timor crises. Data from Victoria showed that 98 per cent of TB notifications were in people born outside Australia and that 35 per cent of cases were born in South East Asia. The 1999 TB report indicates that there are very low rates of tuberculosis in the non-indigenous Australian born population and that this rate is continuing to decline.

Other communicable disease surveillance

LabVISE

The Laboratory Virology and Serology (LabVISE) Reporting Scheme is a passive surveillance scheme based on voluntary reports of infectious agents contributed by sentinel virology and serology laboratories around Australia, to the Commonwealth Department of Health and Aged Care. In 1999, reports from the scheme were analysed and published monthly in *Communicable Diseases Intelligence*.

LabVISE provides information on a number of viruses and other infectious agents (bacteria, parasites and fungi), and the demographic characteristics of persons they infect. LabVISE records information on some infectious agents that are not reported by other surveillance schemes. The scheme currently holds over 500,000 records collected since 1982.

In 1999, there were 26,452 reports to LabVISE, contributed by 15 laboratories representing every State and Territory. This was a small increase on the number of reports in 1998 (26,359). Although there were no contributing laboratories contributing directly to LabVISE in either the Northern Territory or the Australian Capital Territory, samples from these jurisdictions were included in the reports from reference laboratories (Table 9). LabVISE reporting is not equally distributed across Australia; indeed the Northern Territory has the highest number of reports per 100,000 population while some southern States are relatively poorly represented in the data set.

The breakdown of reports is shown in Table 9. Of the 26,452 reports received, 19,531 (74%) were of viral infections and 6,921 (26%) were bacterial, spirochaetes, fungal, protozoan or helminthic infections. Among reports of viral infection, ortho/paramyxoviruses (including influenza A and B, para-influenza and RSV viruses) made up 32 per cent of reports, and reports of Herpes viruses (including Herpes, CMV, Varicella-zoster and Epstein-Barr virus) constituted 26 per cent (Figure 46). Among reports of non-viral infections, Chlamydia made up nearly half of all reports (49%).

In 1999/2000, an evaluation highlighted a number of weaknesses of the LabVISE scheme, which prevent the optimal utilisation of the collected data. These were the lack of clear objectives, the inability to collect population-based data and the reduction in the number of participating laboratories.

Advances in technology and improvements to laboratory systems have made the prospect of data acquisition direct from laboratory achievable. The use of such technology would facilitate reporting procedures for laboratories, improve the quality and timeliness of data and enhance the capacity of the scheme to collect additional data. Improved analysis and dissemination of the information generated by LabVISE would further enhance the scheme. The evaluation recommended three options of which the Public Health Laboratory Network (PHLN) endorsed the following: 'that LabVISE be retained and developed as a broad based surveillance scheme with clear objectives and that a feasibility study be performed to assess additional uses of laboratory generated data and the possibility of real time transfer of these data direct to public health units and the Commonwealth Department of Health and Aged Care. Such a feasibility study should also examine safeguards for confidentiality and what additional resources may be required for implementation.' These developments to LabVISE will commence in 2002.

Additional reports related to pathogens under surveillance by LabVISE

The Rotavirus Surveillance Programme 1999-2000[76]

Rotavirus surveillance began in July 1999 with the formation of the National Rotavirus Reference Centre, a collaborative laboratory-based initiative. Between June 1999 and May 2000, 1,126 rotavirus specimens from children hospitalised with acute diarrhoea were typed. The common serotypes G1-G4 were represented with serotype G1 being the most common isolate from the whole country. The program reported the first isolates of serotype G9, not previously found in Australia and accounting for 10 per cent of typable strains. The emergence of this new serotype has implications for the rotavirus vaccination strategy, which targets serotypes G1-G4.

Norwalk-like virus outbreaks in 1999[77]

Three outbreaks of gastroenteritis in nursing homes in Brisbane in 1999 were demonstrated to be associated with the presence of Norwalk-like virus (NLV). These findings have implications for infection control procedures, particularly in institutional settings. This, and other reports based on PCR diagnosis, of NLV incidents in Australia and overseas, demonstrate that NLV represents a significant but previously unrecognised cause of gastroenteritis.

Figure 46. LabVISE reports, 1999 (total)

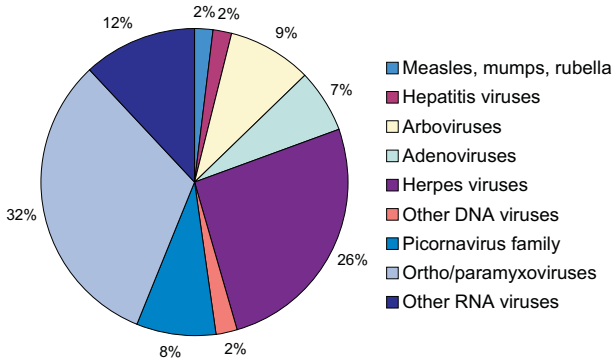


Table 9. Infectious agents reported to LabVISE, 1999

Organism Type	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
Measles virus	0	4	2	3	9	1	117	36	172
Mumps virus	0	0	0	0	2	0	6	50	58
Rubella	1	7	0	100	9	2	11	15	145
Hepatitis A virus	0	9	30	101	43	2	10	180	375
Hepatitis D virus	0	0	0	3	4	0	0	1	8
Hepatitis E virus	0	0	0	1	0	0	0	0	1
Ross River virus	0	42	65	875	28	3	44	366	1,423
Barmah Forest virus	1	8	9	123	0	0	4	35	180
Dengue virus	1	1	13	3	1	1	0	68	88
MVE virus	0	0	0	0	0	0	0	2	2
JE virus	0	0	0	0	0	0	0	1	1
Kunjin virus	0	0	1	0	0	0	0	4	5
Flaviviruses (unspecified)	0	0	3	22	0	0	2	0	27
Adenoviruses	10	213	7	45	217	6	328	479	1,305
Herpes viruses	15	425	52	1,671	1,006	17	902	997	5,085
Other DNA viruses	3	3	1	59	26	14	201	167	474
Picornavirus family	17	590	36	25	47	2	168	745	1,630
Ortho/paramyxoviruses	108	1,570	24	596	481	38	1,494	1,921	6,232
Other RNA viruses	56	895	6	4	204	32	503	620	2,320
Chlamydia trachomatis	61	373	205	1,226	326	17	101	981	3,290
Chlamydia pneumoniae	0	0	0	0	0	0	0	2	2
Chlamydia psittaci	0	0	0	0	0	0	68	10	78
Chlamydia spp	0	8	0	12	0	0	1	0	21
Mycoplasma spp	0	94	6	364	82	3	486	95	1,130
Coxiella burnetti	6	18	1	144	2	0	27	23	221
Rickettsia spp	0	0	0	0	0	1	3	14	18
Streptococcus group A	0	15	69	280	1	0	3	0	368
Brucella species	0	2	0	7	0	0	2	0	11
Bordetella pertussis	1	30	1	443	1	2	329	38	845
Legionella pneumophila	0	6	0	0	3	0	2	6	17
Legionella longbeachae	0	1	0	0	12	0	0	38	51
Yersinia entercolitica	1	8	0	1	0	0	0	0	10
Fungi	0	9	0	0	0	0	0	0	9
Leptospira spp	0	3	0	40	0	0	1	12	56
Treponema pallidium	1	49	431	280	0	0	1	12	774
Protozoa	1	3	0	2	1	1	2	6	16
Echinococcus granulosus	0	0	0	0	0	0	0	4	4
Total	283	4,386	962	6,430	2,505	142	4,816	6,929	26,452

Enterovirus 71 outbreak in Western Australia

A report on an outbreak of hand, foot and mouth disease caused by enterovirus 71 in Western Australia in 1999 associated with severe neurological disease, was recently published.[78] Fourteen children with enterovirus 71 were identified, of whom four developed long-term neurological sequelae. Several large epidemics of enterovirus 71 infection in young children have occurred in South East Asia, including a large outbreak of 129,106 cases of hand, foot and mouth disease in Taiwan in 1998.[79]

Australian Sentinel Practice Research Network

The Research and Health Promotion Unit of the Royal Australian College of General Practitioners operates the Australian Sentinel Practice Research Network (ASPREN). ASPREN is a national network of general practitioners that report on a number of conditions each week. The aim of ASPREN is to provide an indicator of the burden of disease in the primary care setting and to detect trends in consultation rates.

There were approximately 120 general practitioners participating in the scheme from all States and Territories in

1999. Approximately 75 per cent of these were located in metropolitan areas and the remainder were in rural areas. Between 7,000 and 8,000 consultations were recorded each week.

In 1999, 7 conditions related to communicable diseases and environmental health were reported. These were influenza, rubella, measles, chickenpox, and gastroenteritis. Case definitions for these conditions were published in *Commun Dis Intell* 1999;24:7-8. In total there were 323,417 consultations in the sentinel practices reported to ASPREN of which 5,938 were of communicable diseases. The majority of communicable diseases reported were gastroenteritis (3,227 presentations, 47% of the total) and influenza (2,106 presentations, 31%, Figure 47). The weekly reporting of gastroenteritis and influenza as a rate per 1,000 consultations is shown in Figures 48 and 49 respectively. While presentations with symptoms of gastroenteritis were highest in the warmer months (weeks 40 to 52), influenza-like illnesses peaked in the winter months (week 34).

National Influenza Surveillance

This summary is based on the 'Annual report of the National Influenza Surveillance Scheme 1999'.[41]

Influenza surveillance is based on 3 systems: laboratory diagnosis, including virus isolation and serology by laboratories participating in LabVISE; consultation rates for clinically diagnosed influenza illness by sentinel general practitioners; and the absenteeism data of workers from a national employer.

A total of 3,247 reports were received by LabVISE, with 2,681 for influenza A and 386 for influenza B. The ratio of influenza A to influenza B was 7.4:1. Total influenza reports showed a baseline until May, a small peak in June and a second higher and broader peak from late June to early September. The greatest number of reports were recorded in the 15–44 year age group and the male to female ratio approached 1:1. The expected predominance of influenza reports amongst the elderly was not seen in the collected surveillance data. The ASPREN and New South Wales sentinel general practitioner schemes showed a peak of GP attendances for influenza-like illnesses from mid-May to September 1999. Comparison of ASPREN and LabVISE data showed a similar pattern, with the trends in ASPREN data followed about 2 weeks later by similar patterns in LabVISE data. Absenteeism surveillance showed the highest levels in August and September for absences of more than 3 days.

Independent influenza surveillance programs showed an earlier peak on the east coast of Australia than in the west, with an overall ratio of influenza A to B of 5:1. Most isolates were A Sydney 5/97 H3N2-like viruses. The WHO Collaborating Centre for Reference and Research on Influenza performed analysis on 813 isolates in 1999. This represented 25 per cent of the total influenza reports received through LabVISE. Of these, 683 were influenza A and 130 influenza B. The majority of the influenza A strains were H3N2 subtype, closely related to the A/Sydney/5/97 vaccine strain. Approximately 20 per cent reacted more strongly with a recent isolate A/Moscow/10/99. However, there was no evidence of substantial antigenic drift among the influenza A (H3N2) isolates. The three H1N1 isolates found showed significant antigenic changes from the vaccine A/Beijing/262/95 and were closely related to a new variant A/New Caledonia/20/99. Influenza B isolates remained closely related to the vaccine reference strain B/Beijing/184/93. The pattern of influenza in Australia was similar to that seen in most parts of the world in 1999. The level of influenza was lower than many regions in which more severe outbreaks occurred, such as New Caledonia and New Zealand.

Figure 47. ASPREN communicable disease surveillance presentations to GPs, 1999

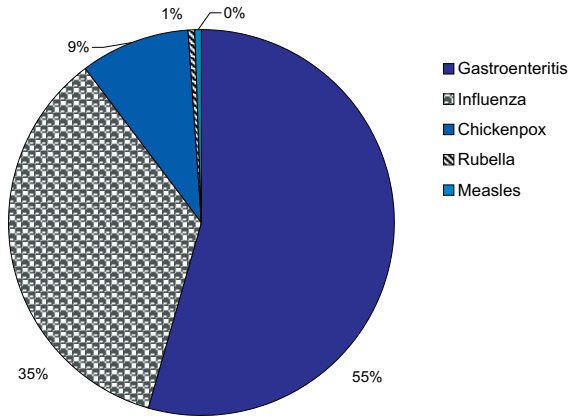


Figure 48. ASPREN consultations for gastroenteritis, 1999

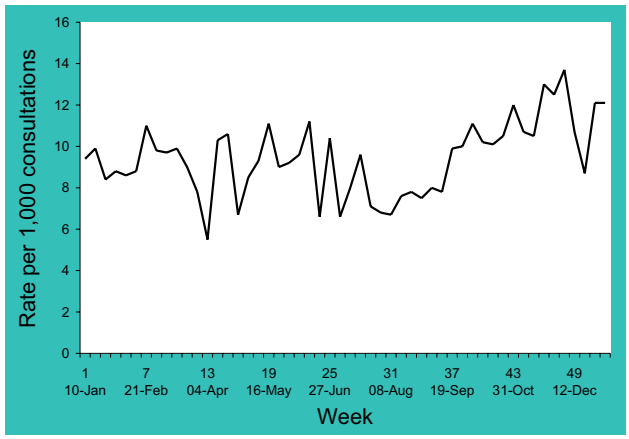
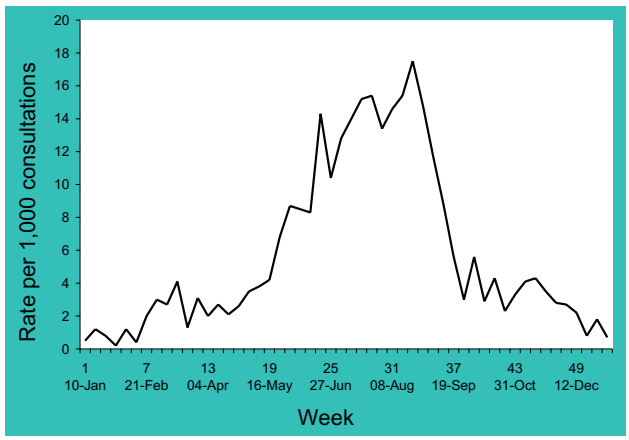


Figure 49. ASPREN presentations of influenza-like illness, 1999



Antibiotic resistance in Australia

In 1999, the major event in this field was the publication of the report of the Joint Expert Technical Advisory Committee on Antibiotic Resistance.[80] This committee was appointed in April 1998 to examine the issue of the use of antibiotics in food-producing animals and the implications for antibiotic resistant bacteria in humans. The committee was charged with developing evidence-based recommendations for the appropriate future management of antibiotic use in food-producing animals.

The following are key extracts from the JETACAR report.

Scientific background

JETACAR reviewed internationally available information on the nature of antibiotics, and the molecular basis of bacterial resistance. The bacteria known to be involved in the transfer from food-producing animals, and those recognised as the cause of medical conditions of most concern in relation to treatment failure due to antibiotic resistance, were also identified. The report identified priority medical problems potentially arising from, or exacerbated by, the use of antibiotics in livestock production. The benefits of antibiotic use in animals were also reviewed and alternatives canvassed. Focusing on Australian information, the committee reviewed current regulatory controls and use patterns of antibiotics in humans and animals and antibiotic resistance patterns in humans. Few data on antibiotic resistance were available for animal isolates in Australia. There were many gaps in the data available and in the current scientific knowledge of the mechanisms involved.

Assessment of evidence

JETACAR attempted to provide an evidenced-based hazard characterisation for antibiotic use in food-producing animals, a framework for the future development of risk assessment methodology for individual drugs, and the basis for the development of an integrated antibiotic-resistance management strategy.

Overall conclusion

JETACAR considered all aspects of the occurrence of antibiotic resistance and its importance in human and veterinary medicine. The committee agreed there was evidence for the emergence of resistant bacteria in humans and animals following antibiotic use, the spread of resistant animal bacteria to humans, the transfer of antibiotic resistance genes from animal bacteria to human pathogens, and resistant strains of animal bacteria causing human disease.

Resistance management program and recommendations

Based on the scientific findings outlined above, and the 4 factors that influence emergence and spread of antibiotic-resistant bacteria (antibiotic load, antibiotic regimen, bacterial load and prevalence of resistant bacteria), JETACAR developed an antibiotic resistance management program that focuses simultaneously on human and animal use of antibiotics in Australia. The proposed program is a co-ordinated multidisciplinary approach with 5 key elements, as follows: regulatory controls; monitoring and surveillance; infection prevention strategies and hygienic measures; education; and further research. The basics of this 'five point plan' are equally applicable to human and veterinary medicine, as well as other areas of antibiotic use. All 5 elements of the program must be implemented together if there is to be any chance of reversing the trend towards increasing antibiotic resistance. In addition, further recommendations are included on communication of the issues surrounding antibiotic resistance management to stakeholders and the general public. The overall coordination of the strategy is covered in recommendations 20 and 21. Finally a recommendation was made that a working group convened by the DHAC develop a fully coordinated resistance management plan for human antibiotics. The plan so developed should be incorporated into the recommended functions of the Working Party on Antibiotics or its successor.

CJD in Australia 1999

This summary is based on report from The Australian National CJD Registry, The University of Melbourne – update to January 2000.

The Australian National Creutzfeldt-Jakob Disease Registry was established in 1993 in response to 4 CJD deaths attributed to cadaveric-derived human pituitary hormone treatment for infertility or short stature. The work of the Registry was expanded to include monitoring both health-care acquired CJD and transmissible spongiform encephalopathies (TSE), both sporadic and familial, in Australia.

Australia is free of animal forms of prion disease, such as bovine spongiform encephalopathy (BSE) and scrapie. At the end of 1999 there were 482 cases on the Registry. These were 208 definite cases, 144 probable cases and 114 incomplete cases (cases positive in an immunoassay but not finally classified). While there has been a doubling of the average incidence to one case per million (1988–1999) compared with 1970–1987, this reflects better case ascertainment due to improved recognition, confirmation and reporting. The composition of cases on the Registry is 91.9 per cent sporadic, 5.7 per cent familial and 2.4 per cent iatrogenic.

Appendices

Appendix 1a. Case definitions and ICD-10 code for notifiable diseases reported to NNDSS in 1999, gastrointestinal diseases

Disease	Case definition (NHMRC 1994)	ICD-10 code(s)
Botulism	A clinically compatible illness (diplopia, blurred vision, muscle weakness, paralysis or bulbar palsy) with a history of exposure to a probable food source in the absence of a contaminated wound AND one of the following: isolation of *Clostridium botulinum* from faeces or other clinical specimens OR detection of *C. botulinum* toxin in serum, faeces or probable food source OR epidemiological linkage to other cases of confirmed foodborne botulism	AO5.1
Campylobacteriosis	Isolation of *Campylobacter* species from a clinical specimen	AO4.5
Haemolytic uraemic syndrome (HUS)*	Acute microangiopathic anaemia on peripheral blood smear AND acute renal impairment AND/OR thrombocytopaenia	D59.3
Hepatitis A	Anti-HAV IgM positive in the absence of recent vaccination OR demonstration of a clinical case of hepatitis (jaundice and/or elevated aminotransferase levels) without a non-infectious cause AND epidemiologically linked to a serologically confirmed case	B15
Hepatitis E*	A person who demonstrates anti-HEV IgM in sera collected less than 4 weeks after onset of acute hepatitis OR IgG seroconversion in paired sera OR HEV identified by nucleic acid test OR HEV identified by EM on stool OR a hepatitis-like illness in the absence of other causes of hepatitis and detection of antibodies to HEV	B17.2
Listeriosis	Isolation of *Listeria monocytogenes* from a site which is normally sterile, including foetal gastrointestinal contents	A32
Salmonellosis	Isolation of *Salmonella* species (excluding *S. typhi*) from any clinical specimen	AO2
Shigellosis	Isolation of *Shigella* species from any clinical specimen	AO3
SLTEC, VTEC*	A person with bloody diarrhoea or HUS from whom, in a clinical specimen: Shiga-toxin producing *E. coli* (SLTEC) are isolated OR isolation of Shiga-toxin from an *E. coli* isolate OR identification of the gene associated with the production of Shiga-toxin in *E. coli*	A4.1, A4.4
Typhoid	Isolation of *Salmonella typhi* or *S. parathphi* serotype A, B, or C from any clinical specimen	AO1.0
Yersiniosis	Isolation of *Yersinia enterocolitica* or *Y. pseudotuberculosis* from blood or faeces OR detection of circulating antigen by ELISA or agglutination test OR positive *Yersinia* serology in the presence of clinical compatible illness	AO4.6

All definitions from Surveillance Case Definitions, National Health and Medical Research Council, March 1994, except those marked * which are draft summary definitions from the Communicable Diseases Network Australia (January 2001). Some Australian States and Territories have their own case definitions for some diseases, which may vary from those shown here.

Appendix 1b. Case definitions and ICD-10 code for notifiable diseases reported to NNDSS in 1999, bloodborne diseases

Disease	Case definition (NHMRC 1994)	ICD-10 code(s)
Hepatitis B (incident)	Demonstration of documented seroconversion to HBV	B16
Hepatitis B (unspecified)	HBsAg positive AND *either*: anti-HBcIgM positive OR demonstration of a clinical illness consistent with acute viral hepatitis (jaundice, elevated aminotransferases)	B18.0, B18.1
Hepatitis C (incident)	Demonstration of documented seroconversion to hepatitis C	B17.1
Hepatitis C (unspecified)	Demonstration of anti-hepatitis C positive or hepatitis C PCR positive AND a clinical illness consistent with acute viral hepatitis AND is not an acute case of hepatitis A, B, or D.	B18.2
Hepatitis D*	Positive for anti-HDV or HDV Ag or seroconversion or rise in IgG in serum or liver AND HBSAG OR anti-HBc negative	B17.0, B16.1, B18.0
Hepatitis (NEC)	Any other viral hepatitis not classified here	B17.8

All definitions from Surveillance Case Definitions, National Health and Medical Research Council, March 1994, except those marked * which are draft summary definitions from the Communicable Diseases Network Australia (January 2001). Some Australian States and Territories have their own case definitions for some diseases, which may vary from those shown here.

Appendix 1c. Case definitions and ICD-10 code for notifiable diseases reported to NNDSS in 1999, quarantinable diseases

Disease	Case definition (NHMRC 1994)	ICD-10 code(s)
Cholera	An illness characterised by diarrhoea and/or vomiting AND isolation of toxigenic *Vibrio cholerae* serogroup O1 or O139 from a clinical sample	AO0
Plague	A four-fold or greater change in serum antibody titre for *Yersinia pestis* OR isolation of *Yersinia pestis* from a clinical specimen	A20
Rabies	Clinically compatible neurological illness AND either detection of rabies viral antigens in tissue OR isolation of rabies virus from saliva, skin snips, CSF or neural tissue	A82
Viral haemorrhagic fever	Sudden or insidious onset of fever, nausea, vomiting, diarrhoea, multifocal haemorrhages and shock. An appropriate travel history to an endemic country is supportive of diagnosis AND one of the following: demonstration of specific IgM antibody by ELISA, IFA or Western blot OR isolation of the virus in cell culture OR demonstration of viral antigen in a tissue specimen to Ebola virus, Lassa fever virus, Marburg virus or Crimean Congo virus.	A96, A98, A99
Yellow fever	A clinically compatible illness AND demonstration of yellow fever virus, antigen or genome in any clinical specimen OR a four-fold or greater change in serum antibody titre to yellow fever virus, OR a single elevated yellow fever specific IgM antibody titre, where cross-reaction with other flaviviruses has been ruled out and the patient has not received yellow fever vaccine during the previous 2 months	A95

Appendix 1d. Case definitions and ICD-10 code for notifiable diseases reported to NNDSS in 1999, sexually transmissible infections

Disease	Case definition (NHMRC 1994)	ICD-10 code(s)
Chancroid	Isolation of *Haemophilus ducreyi* from a clinical specimen OR a clinically compatible illness characterised by painful genital ulceration and inflammatory inguinal adenopathy, where syphilis, granuloma inguinale and herpes simplex have been excluded OR a clinically compatible illness in a patient who is epidemiologically linked to a laboratory confirmed case	A57
Chlamydial infection	Isolation of *Chlamydia trachomatis* from a clinical (genital) specimen OR demonstration of *Chlamydia trachomatis* in a clinical (genital) specimen by antigen detection methods	A56
Donovanosis	Demonstration of intracytoplasmic Donovan bodies on Wright or Giemsa stained smears or biopsies of clinical specimens OR a clinically compatible illness characterised by usually painless, beefy red, granulomatous or ulcerative lesions with rolled edges and a tendency to form scar tissue, where syphilis has been excluded	A58
Gonococcal infection	Isolation of *Neisseria gonorrhoeae* from a clinical specimen	A54
Lymphogranuloma venereum	Isolation of *Chlamydia trachomatis* serotype L1, L2 or L3 from a clinical specimen OR demonstration (by immunofluorescence) of inclusion bodies in leucocytes aspirated from an inguinal lymph node (bubo) OR a positive serological test for lymphogranuloma venereum strain of *Chlamydia trachomatis* in the presence of a clinically compatible illness (one or more tender, fluctuant inguinal lymph nodes or characteristic proctogenital lesions)	A55
Syphilis	A compatible clinical illness or past history AND demonstration of *Treponema pallidum* by darkfield, fluorescent antibody or equivalent microscopic methods OR reactive treponemal tests (eg: FTA-ABS, TPHA)	A50, A51, A52

Appendix 1e. Case definitions and ICD-10 code for notifiable diseases reported to NNDSS in 1999, vectorborne

Disease	Case definition (NHMRC 1994)	ICD-10 code(s)
Arbovirus infection (NEC)	Demonstration of a four-fold or greater change in serum antibody titres between acute and convalescent-phase serum specimens obtained at least 2 weeks apart and preferably conducted in parallel at the same laboratory OR demonstration of specific IgM antibodies in CSF or acute phase serum OR isolation of virus from blood, CSF or tissue specimens	A92, A93, A94
Barmah Forest virus infection	Demonstration of above criteria for Barmah Forest virus	A92.8
Ross River virus infection	Demonstration of criteria for Arbovirus infection for Ross River virus	B33.1
Dengue	Demonstration of above criteria for dengue virus (all types)	A90
Malaria	Demonstration of malaria parasites (*Plasmodium* species) in a blood film	B50, B51, B52, B53

Appendix 1f. Case definitions and ICD-10 code for notifiable diseases reported to NNDSS in 1999, vaccine preventable diseases

Disease	Case definition (NHMRC 1994)	ICD-10 code(s)
Diphtheria	Isolation of toxigenic *Corynebacterium diphtheriae* AND pharyngitis and/or laryngitis (with or without a membrane OR toxic (cardiac or neurological) symptoms	A36
Haemophilus influenzae type B	An invasive clinically compatible illness (meningitis, epiglottitis, cellulitis, septic arthritis, osteomyelitis, pneumonia, pericarditis or septicaemia) AND either the isolation of *Haemophilus influenzae* type b (Hib) from blood OR detection of Hib antigen (in a clinical case) OR detection of Gram-negative bacteria where the organism fails to grow in a clinical case	A41.3, GO0.0, JO5.1
Measles	An illness characterised by all the following features: a generalised maculopapular rash lasting three or more days AND a fever (at least 38°C if measured) AND cough or coryza or conjunctivitis or Koplik spots OR Demonstration of measles specific IgM antibody OR A four-fold or greater change in measles antibody titre between acute and convalescent-phase sera obtained at least 2 weeks apart, with tests preferably conducted in parallel at the same laboratory OR Isolation of the measles virus from a clinical specimen OR A clinically compatible case epidemiologically related to another case	BO5
Mumps	Isolation of mumps virus from a clinical specimen OR significant rise in mumps antibody level by any standard serological assay, except following immunisation OR a clinically compatible illness (unilateral or bilateral swelling of the parotid or other salivary glands lasting 2 days or more without other apparent cause)	B26
Pertussis	Isolation of *Bordetella pertussis* from a clinical specimen OR elevated *Bordetella pertussis*-specific IgA in serum or *B. pertussis* antigen in a nasopharyngeal specimen using immunofluorescence with a history of clinically compatible illness	A37
Poliomyelitis	Acute onset of a flaccid paralysis of one or more limbs with decreased or absent tendon reflexes in the affected limbs without other apparent cause, without sensory or cognitive loss	A80
Rubella	A generalised maculopapular rash and fever AND one or more of: arthralgia/arthritis OR lymphadenopathy OR conjunctivitis AND an epidemiological link to a confirmed case OR demonstration of rubella-specific IgM antibody, except following immunisation OR a four-fold or greater change in rubella antibody titre between acute and convalescent-phase sera obtained at least 2 weeks apart	BO6
Tetanus	A clinically compatible illness without other apparent cause, with or without a history of injury and with or without laboratory evidence of the organism or its toxin	A33

Appendix 1g. Case definitions and ICD-10 code for notifiable diseases reported to NNDSS in 1999, zoonoses

Disease	Case definition (NHMRC 1994)	ICD-10 code(s)
Brucellosis	Isolation of *Brucella* species from a clinical specimen OR a four-fold or greater change in *Brucella* agglutination titres or complement-fixation titres between acute and convalescent-phase serum samples at least 2 weeks apart with the tests preferably conducted in parallel at the same laboratory	A23
Hydatid infection	Positive serological test for infection with *Echinococcus granulosus* in a patient with clinical, radiological or sonographic evidence of hydatid disease OR identification of *Echinococcus granulosus* in cyst fluid or sputum OR immunoelectrophoresis demonstrating arc 5 or three or more arcs	A28
Leptospirosis	Isolation of *Leptospira* species from clinical specimens OR a four-fold or greater change in *Leptospira* agglutination titres or complement-fixation titres between acute and convalescent-phase serum samples at least 2 weeks apart with the tests preferably conducted in parallel at the same laboratory OR demonstration of leptospiral antigen in a clinical specimen OR a single raised *Leptospira* agglutination titre with a clinically compatible illness	A27
Ornithosis (Psittacosis)*	A clinically compatible illness (fever, headache, myalgia, dry cough, pneumonia) AND a four-fold or greater rise in serum antibody titres to *Chlamydia psittaci* between acute and convalescent phase sera OR detection of *C. psittaci* by nucleic acid test OR a single high titre of IgG to *C. psittaci* after the onset of a clinically compatible illness and where other diseases are excluded	A70
Q fever	A four-fold or greater change in serum (CF) antibody titre to phase II antigen of *Coxiella Burnetti* OR a four-fold or greater change in ELISA antibody titre to phase I or II antigens of *C. Burnetti* OR an IgM fluorescent antibody titre of at least 1:160 during convalescent phase of the illness (ie: 10 days or more after onset)	A78

All definitions from Surveillance Case Definitions, National Health and Medical Research Council, March 1994, except those marked * which are draft summary definitions from the Communicable Diseases Network Australia (January 2001). Some Australian States and Territories have their own case definitions for some diseases, which may vary from those shown here.

Appendix 1h. Case definitions and ICD-10 code for notifiable diseases reported to NNDSS in 1999, other bacterial infections

Disease	Case definition (NHMRC 1994)	ICD-10 code(s)
Legionellosis	A clinically compatible illness (fever, cough or pneumonia) AND at least one of the following: isolation of *Legionella* species from lung tissues, respiratory secretions, pleural fluid, blood or other tissues OR demonstration of *Legionella* species antigens in lung tissue, respiratory secretions or pleural fluid OR a four-fold or greater rise in (IFA) titre against *Legionella* species to at least 128, between acute and convalescent phase sera OR a stable high *Legionella* titre (at least 512) in convalescent phase serum	A48.1
Leprosy	Enlarged dermal nerves with associated sensory loss OR demonstration of acid-fast bacilli (in a skin smear or biopsy specimen) OR a histological picture compatible with leprosy in a biopsy specimen	A30
Meningococcal infection	Isolation of *Neisseria meningitidis* from a normally sterile site OR detection of meningococcal antigen in joints, blood or CSF OR detection of Gram-negative intracellular diplococci in blood or CSF	A39
Tuberculosis	Isolation of *Mycobacterium tuberculosis, Mycobacterium bovis,* or *Mycobacterium africanum* from a clinical specimen OR demonstration of acid-fast bacilli in a clinical specimen or in a histopathological lesion, when culture is not available, in a person with signs or symptoms compatible with tuberculosis OR evidence of resolution of disease where treatment with two or more anti-tuberculosis medications have been prescribed and follow-up has been instigated	A15, A16, A17, A18, A19

Appendix 2. Years from which diseases became notifiable in different jurisdictions in Australia*

Disease	ACT	NSW	NT	Qld	SA	Tas	Vic	WA
Bloodborne								
Hepatitis B (incident)	1996	1993	1993	1991	1993	1993	1993	1996
Hepatitis B (unspecified)	1991	1991	NN	1991	1991	1991	1991	1991
Hepatitis C (incident)	1995	1993	1995	NN	1993	1995	1997	1996
Hepatitis C (unspecified)	1991	1991	1991	1991	1994	1991	1991	1993
Hepatitis D	1999	1999	1999	1999	1999	1999	1999	NN
Hepatitis (NEC)	1991	1991	1991	1991	1991	1991	1991	NN
Gastrointestinal diseases								
Botulism	1992	1998	1998	1998	1993	1992	1992	NN
Campylobacteriosis	1991	NN	1991	1991	1991	1991	1991	1991
Haemolytic uraemic syndrome	1999	1999	1999	1999	1999	1999	1999	1999
Hepatitis A	1991	1991	1991	1991	1991	1991	1991	1991
Hepatitis E	1999	1999	1999	1999	1999	1999	1999	NN
Listeriosis	1991	1991	1993	1991	1993	1991	1991	1991
Salmonellosis (NEC)	1991	1991	1991	1991	1991	1991	1991	1991
Shigellosis	1991	NN	1991	1991	1991	1991	1991	1991
SLTEC, VTEC	1999	1999	1999	NN	1999	1999	1999	NN
Typhoid [1]	1991	1991	1991	1991	1991	1991	1991	1991
Yersiniosis (NEC)	1993	NN	1991	1991	1991	1991	1991	1991

Appendix 2. (continued) Years from which diseases became notifiable in different jurisdictions in Australia*

Disease	ACT	NSW	NT	Qld	SA	Tas	Vic	WA
Quarantinable								
Cholera	1991	1991	1991	1991	1991	1991	1991	1991
Plague	1991	1991	1991	1991	1991	1991	1991	1991
Rabies	1993	1997	1991	1991	1991	1991	1991	1991
Viral haemorrhagic fever	1993	1991	1991	1991	1991	1991	1991	1991
Yellow fever	1991	1991	1991	1991	1991	1991	1991	1991
Sexually transmissible								
Chancroid	1991	1994	1991	1991	1997	1993	1991	1991
Chlamydial	1993	1991	1991	1991	1993	1991	1991	1994
Donovanosis	1991	1999	1991	1991	NN	1993	1991	1991
Gonococcal infection[2]	1991	1993	1991	1991	1991	1991	1991	1991
Lymphogranuloma venereum	1991	1997	1991	1991	1997	1992	1991	NN
Syphilis	1991	1991	1991	1991	1991	1991	1991	1991
Vaccine preventable								
Diphtheria	1991	1991	1991	1991	1991	1991	1991	1991
Haemophilus influenzae type b	1993	1991	1991	1991	1993	1993	1993	1994
Measles	1991	1991	1991	1991	1991	1991	1991	1991
Mumps	1992	1992	1995	1997	1994	1995	1992	1994
Pertussis	1991	1991	1991	1991	1991	1991	1991	1991
Poliomyelitis	1991	1991	1991	1991	1991	1991	1991	1991
Rubella	1991	1991	1993	1991	1993	1995	1992	1994
Tetanus	1991	1991	1991	1994	1991	1991	1991	1991
Vectorborne								
Arbovirus infection (NEC)[3]	1997	1997	1997	1997	1997	1997	1997	1991
Barmah Forest virus infection	1995	1995	1997	1995	1995	1995	1995	1996
Dengue	1993	1991	1991	1991	1991	1991	1991	1991
Malaria	1991	1991	1991	1991	1991	1991	1991	1991
Ross River virus infection	1993	1993	1991	1991	1993	1993	1991	1991
Zoonoses								
Brucellosis	1991	1991	1991	1991	1991	1991	1991	1991
Hydatid Infection	1991	NN	1991	1991	1991	1991	1991	1991
Leptospirosis	1991	1991	1991	1991	1991	1991	1991	1991
Ornithosis	1991	NN	1991	NN	1991	1991	1991	1991
Q fever	1991	1991	1991	1991	1991	1991	1991	1991
Other bacterial infections								
Legionellosis	1991	1991	1991	1991	1991	1991	1991	1991
Leprosy	1991	1991	1991	1991	1991	1991	1991	1991
Meningococcal infection	1991	1991	1991	1991	1991	1991	1991	1991
Tuberculosis	1991	1991	1991	1991	1991	1991	1991	1991

* Data from NNDSS annual reports from 1991. First full year of reporting to Commonwealth is shown. Some diseases may have been notifiable to State or Territory health departments before the dates shown here.

NN Not notifiable in 1999

1. Includes paratyphoid in New South Wales, Queensland and Victoria.
2. Includes neonatal ophthalmia in the Northern Territory, Queensland, South Australia and Victoria.
3. Before 1997, includes RR, dengue and BF.

Appendix 3. Completeness of data received in NNDSS from States and Territories in 1999

Field	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
No. missing age	0	21	41	3	1	0	172	18	256
% complete for age	100	99.9	98.9	100	100	100	99.2	99.8	99.7
No. missing sex	2	334	21	8	0	0	414	1	780
% complete for sex	99.8	98.6	99.4	100	100	100	98	100	99.1

Appendix 4. Population totals for States and Territories, 1999*

State	Population
ACT	313,346
NSW	6,411,680
NT	192,882
Qld	3,512,356
SA	1,493,074
Tas	470,261
Vic	4,712,173
WA	1,861,016
Australia	18,966,788

* Based on Australian Bureau of Statistics mid-year population estimates

References

1. Department of Health and Aged Care. Let's work together to beat measles. Canberra: Commonwealth Department of Health and Aged Care, 2000.
2. Bennett C, Mein J, Beers M, Chant K, Vemulpad S. Preparing for refugee crisis in Australia: Kosovar health surveillance. *Commun Dis Intell* 1999;23:305.
3. Evans C, Noonan S, Krause V. East Timorese evacuees in Darwin 1999. *NT Disease Control Bulletin* 2000;7:5-11.
4. Bennett C, Mein J, Harvey B, Vemulpad S, Chant K, Dalton C. Operation Safe Haven: an evaluation of health surveillance and monitoring in an acute setting. *Commun Dis Intell* 2000;24: 21-26.
5. McAlister T, George N, Faoagali J, Bell J. Isolation of b-lactamase positive vancomycin resistant *Enterococcus faecalis*: first case in Australia. *Commun Dis Intell* 1999;23:237-239.
6. Lowe D, Cotton R. Hepatitis C: a review of Australia's response. Canberra: Department of Health and Aged Care, 1999.
7. Crofts N, Thompson S, Kaldor J. Epidemiology of the hepatitis C virus. Canberra: Communicable Diseases Network Australia New Zealand, *Commun Dis Intell* 1999; Technical report series no. 3.
8. Sanders L. Creutzfeldt-Jakob disease surveillance — Australia at the crossroads? *Commun Dis Intell* 2000;24:265-266.
9. Centers for Disease Control and Prevention. Outbreak of Hendra-like virus — Malaysia and Singapore, 1998-1999. *MMWR* 1999;48: 265-269.
10. Mackenzie JS, Chua KB, Daniels PW, et al. Emerging viral diseases of South east Asia and the Western Pacific. *Emerging Infectious Diseases* 2001;7 (Suppl 3):497-504.
11. Black PF, Cronin JP, Morrissy CJ, Westbury HA. Serological examination for evidence of infection with Hendra and Nipah viruses in Queensland piggeries. *Aust Vet J* 2001;79:424-426.
12. Centers for Disease Control and Prevention. Outbreak of West Nile-like viral encephalitis — New York, 1999. *MMWR* 1999; 48:845-849.
13. Petersen LR, Roehrig JT. West Nile Virus: a re-emerging global pathogen. *Emerging Infectious Diseases* 2001;7:611-614.
14. Scherret JH, Poidinger M, Mackenzie JS, et al. The relationship between West Nile and Kunjin viruses. *Emerging Infectious Diseases* 2001;7:697-705.
15. National Health and Medical Research Council. Surveillance case definitions. Canberra: National Health and Medical Research Council, 1994.
16. Ponnuthurai A, Hall R, Australia CDN-R. Annual report of the National Notifiable Diseases Surveillance System, 1991. *Commun Dis Intell* 1992;16:334-346.
17. Hall R, Australia CDN-R. Annual report of the National Notifiable Diseases Surveillance System, 1992. *Commun Dis Intell* 1993;17:502-511.
18. Longbottom H, Evans D, Myint H, Hargreaves J. Annual report of the National Notifiable Diseases Surveillance System, 1993. *Commun Dis Intell* 1994;18:518-548.
19. Hargreaves J, Longbottom H, Myint H. Annual report of the National Notifiable Diseases Surveillance System, 1994. *Commun Dis Intell* 1995;19:542-574.
20. Herceg A, Oliver G, Myint H. Annual report of the National Notifiable Diseases Surveillance System. *Commun Dis Intell* 1996;20:440-464.
21. Curran M, Harvey B, Crerar S et al. Annual report of the National Notifiable Diseases Surveillance System, 1996. *Commun Dis Intell* 1997;21:281-307.
22. O'Brien E, D'Souza R, Gilroy N, Burgess M, Lister S, McIntyre P et al. Australia's notifiable diseases status, 1997. *Commun Dis Intell* 1999;23:1-27.
23. Thomson J, Lin M, Halliday L, Preston G, McIntyre P, Gidding H, et al. Australia's notifiable diseases status, 1998. Annual report of the National Notifiable Diseases Surveillance System. *Commun Dis Intell* 1999;23:277-305.
24. McIntyre P, Amin J, Gidding H. Vaccine preventable diseases and vaccination coverage in Australia, 1993-1998. *Commun Dis Intell* 2000;Suppl:1-83.
25. Lauer GM, Walker BD. Hepatitis C infection. *New Engl J Med* 2001;345:41-52.
26. Dimitrakakis M, Waters MJ, Wootton AL, Gust ID. Epidemiology of hepatitis D virus (delta) infection in Melbourne over a 15-year period. *Med J Aust* 1986;145:128-130.
27. Delpech V, Thackway S, Young L, et al. Hepatitis A in south-eastern Sydney 1997-1999: continuing concerns for gay men and an outbreak among illicit drug users. *Commun Dis Intell* 2000;24:203-206.
28. Gilroy N, Tribe N, Passaris I. Hepatitis A in injecting drug users: a national problem. *Med J Aust* 2000;172:142-143.
29. Chin J. Control of Communicable Diseases Manual. (7th edition ed.) Washington: American Public Health Association, 2000.
30. Anon. Salmonellosis outbreak, South Australia. *Commun Dis Intell* 1999;23:73.
31. Taylor R, Sloan D, Cooper T, Morton B, Hunter I. A waterborne outbreak of *Salmonella* Saintpaul. *Commun Dis Intell* 2000;24: 336-340.
32. McCall B, Stafford R, Cherian S, et al. An outbreak of multi-resistant *Shigella sonnei* in a long-stay geriatric nursing centre. *Commun Dis Intell* 2000;24:272-275.
33. Cameron S, Walker C, Beers M, Rose N, Anear E. Entero-haemorrhagic *Escherichia coli* outbreak in South Australia associated with consumption of mettwurst. *Comm Dis Intell* 1995;19:70-71.
34. Bartlett M, McAnulty J, Rutherford A, et al. Haemolytic uraemic syndrome: a cluster of cases in early 1999. *NSW Public Health Bulletin* 1999;10:109-112.
35. Kirk M, Andrews R, Carnie J, Tallis G, editors. Surveillance of notifiable infectious diseases in Victoria 1999. Department of Human Services, Victoria, 2000.
36. Donovan B, Bodsworth NJ, Rohrsheim R, McNulty A, Tapsall JW. Increasing gonorrhoea — not only in London. *Lancet* 2000; 355:1908.
37. Donovan B. What is the gonococcus telling us? *Commun Dis Intell* 1998;22:216-217.
38. Tapsall J. Annual Report of the Australian Gonococcal Surveillance Programme, 1999. *Commun Dis Intell* 2000;24: 113-124.
39. Kennett M, Stambos V, Turnbull A, Ibrahim A, Kelly H. Report of the Australian National Polio Reference Laboratory, 1 January to 30 June 1999. *Commun Dis Intell* 1999;23:324-327.
40. Kennett V, Stambos V, Turnbull A, Ibrahim A, Kelly H. Report of the National Polio Reference Laboratory, 1 July to 31 December 1999. *Commun Dis Intell* 2000;24:118-121.
41. Thomson J, Lin M, Hampson A. Annual report of the National Influenza Surveillance Scheme, 1999. *Commun Dis Intell* 2000;24:145-152.
42. The Australian Paediatric Surveillance Unit. The seventh annual report of the Australian Paediatric Surveillance Unit, 1999. Sydney: 2000.

43. O'Brien ED, Sam GA, Mead C. Methodology for measuring Australia's childhood immunisation coverage. *Commun Dis Intell* 1998;22:36-37.
44. Lambert S, Lynch P, Morgan M, et al. Measles outbreak — young adults at high risk. *Victorian Infectious Diseases Bulletin* 1999;2:21-22.
45. Department of Health and Aged Care. National documentation for certification of poliomyelitis eradication in Australia. Canberra: Commonwealth of Australia, 2000.
46. National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases. Australian measles control campaign 1998. Evaluation report. Sydney: University of Sydney, Royal Alexandra Hospital for Children, 1999.
47. Gilbert GL, Escott RG, Gidding HF. Impact of the Australian Measles Control Campaign on immunity to measles and rubella. *Epidemiol Infect* 2001;(In press).
48. McIntyre P, Menzies R, Krause V, et al. Surveillance of pneumococcal disease in Australian States and Territories. *Commun Dis Intell* 2000;24:93-95.
49. Heath T, Burgess M, McIntyre P, Catton M. The National Measles Surveillance Strategy. *Commun Dis Intell* 1999;23: 41-50.
50. Gidding HF, Gilbert GL. Measles immunity in young Australian adults. *Commun Dis Intell* 2001;25:133-136.
51. Campbell M. Young adult measles vaccination (editorial). *Commun Dis Intell* 2000;24:241-242.
52. Conaty SJ, McAnulty JM. The Australian Childhood Immunisation Register: validation of the immunisation status of children who are very overdue. *Aust N Z J Public Health* 2001; 25:138-140.
53. Mackenzie JS, Broom AK, Hall RA, et al. Arboviruses in the Australian region, 1990 to 1998. *Commun Dis Intell* 1998; 22:93-100.
54. Flexman JP, Smith DW, Fraser JRE. A comparison of the diseases caused by Ross River virus and Barmah Forest virus. *Med J Aust* 1998;169:159-163.
55. Bi P, Tong S, Donald K, Parton K, Hobbs J. Southern Oscillation Index and transmission of the Barmah Forest virus infection in Queensland, Australia. *J Epidemiol Community Health* 2000; 54:69-70.
56. McBride WJ, Bielefeldt-Ohmann H. Dengue viral infections; pathogenesis and epidemiology. *Microbes Infect* 2000;2: 1041-1050.
57. Mackenzie JS, Smith DW. Mosquito-borne viruses and epidemic polyarthritis. *Med J Aust* 1996;164:90-93.
58. Whelan P, Hayes G, Carter J, Wilson A, Haigh B. Detection of the exotic mosquito *Culex gelidus* in the Northern Territory. *Commun Dis Intell* 2000;24:74-75.
59. Walker J. Malaria in a changing world: an Australian perspective. *International Journal for Parasitology* 1998;28:947-953.
60. Robson JM, Harrison MW, Wood RN, Tilse MH, McKay AB, Brodribb TR. Brucellosis: re-emergence and changing epidemiology in Queensland. *Med J Aust* 1993;159:153-158.
61. McCullagh PJ. Hydatid disease: medical problems, veterinary solutions, political obstacles. *Med J Aust* 1996;164:7-8.
62. Jenkins DJ, Power K. Human hydatidosis in New South Wales and the Australian Capital Territory, 1987-1992. *Med J Aust* 1996;164:18-21.
63. Smythe L, Dohnt M, Symonds M, et al. Review of leptospirosis notifications in Queensland and Australia: January 1998 to June 1999. *Commun Dis Intell* 2000;24:153-157.
64. Williams J, Tallis G, Dalton C, et al. Community outbreak of psittacosis in a rural Australian town. *Lancet* 1998;351: 1697-1699.
65. Hutson B, Deaker RA, Newland J. Vaccination of cattle workers at risk of Q fever on the north coast of New South Wales. *Aust Fam Physician* 2000;29:708-709.
66. Marmion BP, Ormsbee RA, Kyrkou M, et al. Vaccine prophylaxis of abattoir-associated Q fever. *Lancet* 1984;22:1411-1414.
67. Yu VL. *Legionella pneumophila* (Legionnaire's disease). In: Mandell GL, Bennett JE, Dolin R, eds. Principles and practice of infectious diseases. Fourth edition ed. New York: Churchill Livingstone, 1995;2:2087-2097.
68. Cameron S, Roder D, Walker C, Feldheim J. Epidemiological characteristics of *Legionella* infection in South Australia: implications for disease control. *Aust N Z J Med* 1991;21:65-70.
69. Ruehlmann SA, Crawford GR. Panic in the potting shed. The association between *Legionella longbeachae* serogroup 1 and potting soils in Australia. *Med J Aust* 1996;164:36-38.
70. Steele TW, Moore CV, Sangster N. Distribution of *Legionella longbeachae* serogroup 1 and other Legionellae in potting soils in Australia. *Appl Environ Microbiol* 1990;56:2984-2988.
71. Breiman RF, Butler JC. Legionnaire's disease: clinical, epidemiological and public health perspectives. *Semin Respir Infections* 1998;13:84-89.
72. Tapsall J. Annual report of the Australian Meningococcal Surveillance Programme, 1999. *Commun Dis Intell* 2000;24: 181-189.
73. Ward J, Hanna JN, Bates JR, Selvey LA. Enhanced surveillance for meningococcal disease in Queensland in 1999. *Commun Dis Intell* 2000;24:332-335.
74. National Tuberculosis Advisory Committee. Tuberculosis notifications in Australia, 1998. *Commun Dis Intell* 2001;25:1-8.
75. Dawson D. Tuberculosis in Australia: bacteriologically confirmed cases and drug resistance. *Comm Dis Intell* 1999;23: 349-353.
76. Masendycz P, Bogdanovic-Sakran N, Palombo E, Bishop R, Barnes G. Annual report of the Rotavirus Surveillance Programme. *Commun Dis Intell* 2000;24:195-198.
77. Ward J, Neill A, McCall B, Stafford R, Smith G, Davison R. Three nursing home outbreaks of Norwalk-like virus in Brisbane in 1999. *Commun Dis Intell* 2000;24:229-236.
78. McMinn P, Stratov I, Nagarajan L, Davis S. Neurological manifestations of enterovirus 71 infection in children during an outbreak of hand, foot and mouth disease in Western Australia. *Commun Infect Dis* 2001;32:236-242.
79. Ho M, Chen E-R, Hsu K-H, et al. An epidemic of enterovirus 71 infection in Taiwan. *N Engl J Med* 1999;341:929-935.
80. JETACAR. The use of antibiotics in food-producing animals: antibiotic-resistant bacteria in animals and humans. Canberra: Commonwealth Department of Health and Aged Care, Commonwealth Department of Agriculture, Fisheries and Forestry — Australia, 1999.